International Conference
on
Recent Advances in Textile and Electrochemical Sciences

March 21-23, 2013

Book of Abstracts

Editors
P. MANISANKAR
G.GOPU
S.VISWANATHAN

Organized by
Department of Industrial Chemistry
(DST FIST, DST PURSE and UGC SAP sponsored Department)
SCHOOL OF CHEMICAL SCIENCES
ALAGAPPA UNIVERSITY
(A State University Re-accredited with 'A' Grade by NAAC)
Karaikudi - 630 003

Sponsored by
Alagappa University & DST -PURSE

UNIVERSAL PUBLISHERS
26/2, Narden Street,
Mandaveli, Chennai – 600 028
Tamilnadu, India.
mail: publiheruniversal@gmail.com

First Impression:2013

RECENT ADVANCES IN TEXTILE AND ELECTROCHEMICAL SCIENCES

ISBN: 978-82-920867-5-0

DISCLAIMER

The authors are solely responsible for the contents of the papers compiled in this volume. The publishers or editors do not take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the editors or publishers to avoid discrepancies in future.

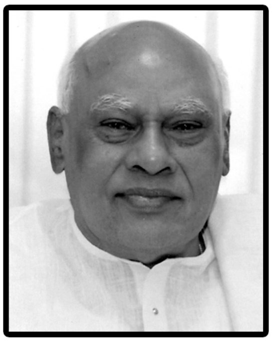
Published by
UNIVERSAL PUBLISHERS
26/2, Narden Street,
Mandaveli, Chennai – 600 028
Tamilnadu, India.
Mobile: 8825554095
mail: publisheruniversal@gmail.com

Typeset by:
Department of Industrial Chemistry
Alagappa University
Karaikudi – 630 003.

Printed by:
POOCHARAM PRINTERS
8A, College Road,
Subramaniapuram 7th Street North,
Karaikudi – 2

RAMESH CHAND MEENA, IAS.,
Secretary to Governor

GOVERNOR'S SECRETARIAT
RAJ BHAVAN
CHENNAI- 600 022
Phone: (044) 22351700
Fax: (044) 22350570
Email : govsec@tn.nic.in



14th March 2013

MESSAGE

His Excellency Dr. K. Rosaiah, Governor of Tamil Nadu is pleased to learn that the School of Chemical Sciences, Department of Industrial Chemistry, Alagappa University is organizing an International Conference on Recent Advances in Textile and Electrochemical Science-2013 - "RATES - 2013" from 21st to 23rd March 2013.

His Excellency the Governor conveys his warm felicitations to the Vice-Chancellor, Alagappa University, Head of the Department, Faculty, Staff & Students of the School of Chemical Sciences, Department of Industrial Chemistry, Alagappa University.

His Excellency wishes the International Conference "RATES - 2013" all success.

15/3/13
Secretary to Governor

To

Dr. P. Manisankar
Profess & Head
School of Chemical Sciences
Department of Industrial Chemistry
Alagappa University
Karaikudi - 630 003

ALAGAPPA UNIVERSITY
(Reaccredited with 'A' Grade by NAAC)
KARAIKUDI - 630 003, TAMIL NADU, INDIA

Prof. S. Sudalaimuthu
Vice-Chancellor

Ph : (O) 04565-225200 (R) 225201
Fax : 04565-225202 (M) 9442601377
vc_alagappa@rediffmail.com

MESSAGE

I am very happy to note that the Department of Industrial Chemistry, School of Chemical Sciences is organizing an International Conference on Recent Advances in Textile and Electrochemical Sciences – 2013 (RATES – 2013) during March 21-23, 2013.

The theme of the conference is to provide a platform for the young researchers to expound and bring forth the latest advances in Textile and Electrochemical Sciences. Textile industrial units in the country perform well and their exports are remarkable. Electrochemistry is a challenging as well as fascinating branch of Chemistry, which finds applications in almost all areas of Science and Technology. In this regard, it is appropriate that the Department of Industrial Chemistry, School of Chemical Sciences has taken efforts to arrange this International Conference with invited lectures from eminent personalities from abroad and India and paper presentation by academicians, scientists, scholars and industrialists.

I am sure that all the delegates would be greatly benefited by the deliberations and this conference will undoubtedly emerge with many innovative ideas for the young researchers in the frontier areas.

I wish the conference a grand success.

6/3/13.

Date : 06.03.2013

(S. Sudalaimuthu)

सीएसआईआर – केंद्रीय विद्युतरसायन अनुसंधान संस्थान
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद)
कारैकुडी–630 006, तमिलनाडु, भारत

CSIR - CENTRAL ELECTROCHEMICAL RESEARCH INSTITUTE
(Council of Scientific & Industrial Research)
KARAIKUDI-630 006, Tamil Nadu, India
Tel : 04565 - 227777, 227778 (Off), 226662 (Res), Fax : 04565 - 227779
E-mail : director@cecri.res.in, director.cecri@gmail.com

डॉ. विजयमोहनन के. पिल्लै
निदेशक
Dr. Vijayamohanan K. Pillai
Director

Felicitation Message

It gives me immense pleasure in wishing all the participants and speakers of the International conference on 'Recent Advances in Textile and Electrochemical Sciences' as this is an important theme essential for the current needs and societal growth.

Moving electrons from a conducting surface to precisely defined reaction centers in molecules anchored to that surface has several challenges and electrochemists can help to design electronic fabrics which will change many properties by modulating electron field.

Electrochemists are capable of creating extended structures in which atoms and molecules are deliberately organized in space so that they can cooperatively carry out a complex task which can bring about effective changes in colour, strength and shape of textiles with embedded energy conversion and storage device.

I am sure that, this International Conference will add great value to all the delegates and young researchers and I wish complete success in all conference related endeavours.

14 MAR 2013

(Vijaymohanan K Pillai)

(चेन्नै, मंडपम तथा तूतीकोरिन में विस्तार केंद्र हैं / Extension Centers at Chennai, Mandapam and Tuticorin)
Visit us at <www.cecri.res.in>

ORGANIZING COMMITTEE

Patron
Prof. S. SUDALAIMUTHU
Vice-Chancellor
Alagappa University

Co-Patron
Dr. V. MANICKAVASAGAM
Registrar
Alagappa University

Conveners
Dr. P. MANISANKAR
Professor & Head of Industrial Chemistry
Alagappa University

Dr. G.GOPU
Assistant Professor of Industrial Chemistry
Alagappa University

Organising Secretary
Dr. S.VISWANATHAN
Assistant Professor of Industrial Chemistry
Alagappa University

Members
Dr. G. PARUTHIMAL KALAIGNAN
Professor of Industrial Chemistry
Alagappa University

Dr. H. GURUMALLESH PRABU
Professor of Industrial Chemistry
Alagappa University

Dr. S. THAMBIDURAI
Assistant Professor of Industrial Chemistry
Alagappa University

Dr. M. SUNDRARAJAN
Assistant Professor of Industrial Chemistry
Alagappa University

Dr. T. STALIN
Assistant Professor of Industrial Chemistry
Alagappa University

Preface

Textile Chemistry and Electrochemistry are two challenging as well as fascinating branches of Chemistry and they find applications in almost all areas of Science and Technology. Textile Chemistry is a highly specialized field that applies the principles of the basic fields of chemistry to the understanding of textile materials and to their functional and aesthetic modification into useful and desirable items. Specializing in the field of textile chemistry can provide opportunities for dynamic and creative applications of chemistry. Electrochemistry, an interdisciplinary science, plays a vital role in a vast number of research and applied areas. The footprints of Electrochemistry spread over in a variety of fields in science and technology. Advancements in research activities on Textile and Electrochemical sciences attain greater momentum and reached hallmark in the era of scientific developments. The present conference on **RECENT ADVANCES IN TEXTILE AND ELECTROCHEMICAL SCIENCES (RATES-2013)** is the First International Conference organized by the Department of Industrial Chemistry to focus on the update of various advancements in Textile, Electrochemical and allied chemical science and technologies. The aim of this international conference is to provide a forum to all the chemists in particular textile chemists and electrochemists, technologists and researchers to discuss their recent findings and information and to promote cooperation both nationally and internationally. It is proposed to have invited talks and paper presentations during the conference on various advanced aspects in Electrochemistry, Textile Chemistry, Materials Chemistry, Nano Chemistry, Supramolecular Chemistry, Green Chemistry, Solar Cell Applications, Polymer Chemistry, Computational Chemistry and allied areas.

It is indeed a matter of great pleasure and satisfaction to the editors to present this volume containing abstracts of the Invited Talks and Research Scholar's presentations to be discussed during the conference to be held in Alagappa University, Karaikudi during 21-23 March 2013. In the present conference, there are about 16 Invited Talks, 50 Oral Presentations and 172 Poster Presentations. In addition, the programme would include open forum discussions. About 200 delegates from various Research Institutes, Universities, Colleges and Industries in India including four Invited Speakers from overseas would participate in the conference.

The editors are thankful to **Prof. S. Sudalaimuthu**, Vice-Chancellor, Alagappa University, Karaikudi for supporting all the activities of this International Conference and advising in promoting the growth of the Department of Industrial Chemistry. Our sincere thanks are to all the Syndicate Members, **Prof. V. Manickavasagam**, Registrar and Authorities of Alagappa University, Karaikudi for their constant support and encouragement. The editors are pleased to acknowledge all the sponsors. Sincere thanks are due to the Organizing Committee Members of the conference, Faculty Members, Research Scholars and Students of the Department of industrial chemistry. We also thank all the authors for submitting their abstracts.

We take this opportunity to wish all the delegates a pleasant stay in Karaikudi and stimulating discussions during the International Conference on RATES 2013.

Editors

CONTENTS

Invited Talks (IT)

Oral Presentations (OP)

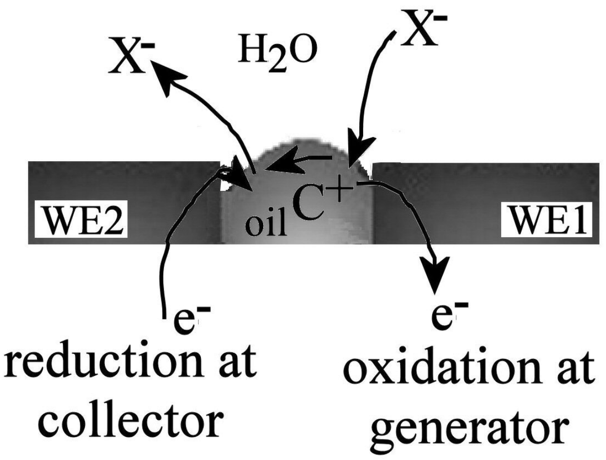
Poster Presentations (PP)

IT 1

Photoelectrochemistry at Liquid | Liquid | Electrode Triple Phase Boundary Interfaces

Frank Marken
University of Bath, Department of Chemistry
Claverton Down, Bath, BA2 7AY, UK
F.Marken@bath.ac.uk

Ion transfer at liquid | liquid junctions can be investigated at the line junction (or triple phase boundary) formed in contact to an electrode surface [1]. Ion transfer voltammetry measurements at this type of electrode are enhanced for (i) electrodes with extended triple phase boundaries, (ii) porous membrane, (iii) with hydrodynamic effects, and (iv) generator – collector triple phase boundary systems [2] (see Figure).



Novel facilitated ion transfer processes and photo-electrochemical processes [3,4] at triple phase boundary electrodes are discussed.

References:

[1] F. Marken, J.D. Watkins, A.M. Collins, *Phys. Chem. Chem. Phys.* 13 (2011) 10036.

[2] A. Vuorema, H. Meadows, N. Bin Ibrahim, J. Del Campo, M. Cortina-Puig, M.Y. Vagin, A.A. Karyakin, M. Sillanpää, F. Marken, Electroanalysis 22 (2010) 2889.

[3] A.M. Collins, G.J. Blanchard, J. Hawkett, D. Collison, F. Marken, Langmuir 27 (2011) 6471.

[4] A.M. Collins, X.H. Zhang, J.J. Scragg, G.J. Blanchard, F. Marken, ChemPhysChem 11 (2010) 2862.

IT 2

Batteries and Fuel Cells for Defense Application

G. A. Pathanjali,

High Energy Batteries (India) Ltd., Mathur 622 515

Abstract: The power source for powering various sub systems in space and missile applications require high energy, high power, highly reliable and the battery meeting the electrical, climatic and dynamic requirements. High Energy Batteries such as AgO-Zn, Ni-Cd, AgCl-Mg, CuCl-Mg are very useful in Fighter Aircrafts, Torpedoes, Submarine for Defence application. Silver Zinc system has the highest gravimetric and volumetric energy density of all the batteries which is in use today in many of the Defence applications, Fuel cell systems are one of the promising non conventional energy source especially for remote area and unattended applications. Among the various candidates systems such as Phosphoric acid fuel cell, Polymer Electrolyte membrane fuel cells, Solid oxide fuel cell and so on. In these paper different types of batteries and fuel cells, their specifications and end use for Defence applications will be presented.

An Investigation on the Corrosion Inhibition Characteristics of Some Heterocyclic Compounds on Aluminum and Mild Steel in Acidic Medium

J. Ishwara Bhat and Vijaya D. Alva
Department of Chemistry, Mangalore University, Mangalagangothri-574199.
Email: bhatij@yahoo.com

Abstract: Most of the drugs are heterocyclic compounds containing N or S or O atoms and they proved to be a good corrosion inhibitor. Use of pharmaceutical compounds as corrosion inhibitors is of particular interest because of their safe usage, high solubility in water and high molecular size. Also, drugs do not contain heavy metals or other toxic species. Hence, they are environmentally safe, friendly and have great potential to be used as corrosion inhibitors

Inhibition effect of some pharmaceutical compounds namely miconazole nitrate (MN), meclizine hydrochloride (MH), nevirapine (NE) and drug intermediates like 2-mercapto 5-methoxybenzimidazole (MMB) and ufiprazole(MDPMB) on the corrosion of aluminium and mild steel in hydrochloric acid medium has been investigated by weight loss, potentiodynamic and impedance study at laboratory temperature. Inhibition efficiency of the studied inhibitor in case of Al was found to be in the order MMB<MDPMB<NE<MH<MN and in the case of mild steel the order is NE<MMB<MDPMB<MH<MN. This observed trend may be explained on the basis of the structure of the inhibitor compound. Obtained values of activation parameters for the corrosion process indicated that the adsorption of these studied inhibitors occurred predominantly through physisorption. All the inhibitors studied obeyed Langmuir's adsorption isotherm

Dissolution of aluminium or mild steel in hydrochloric acid medium was found to decrease, whereas inhibition efficiency was found to increase with the increase in the concentration of the inhibitor. Rate of corrosion of aluminium in hydrochloric acid medium was studied by weight loss method at four different temperatures in order to evaluate activation and thermodynamic parameters of adsorption. Surface morphology and possible reaction scheme has also been proposed.

Key words: corrosion inhibition, aluminium, mild steel, pharmaceutical compounds, activation parameters, adsorption.

IT 4

Nanostructured Materials and Biomolecules Modified Electrodes For Applications of Electroanalysis and Energy Storage Devices

Shen-Ming Chen
Department of Chemical Engineering and Biotechnology, National Taipei University of Technology,
No. 1, section 3, Chung-Hsiao East Road, Taipei, Taiwan 106
smchen78@ms15.hinet.net

Abstract: We have investigated the various bioactive enzymes like glucose oxidase (GOx) and cholesterol oxidase (ChOx), at nano structured modified electrodes for the potential applications in the biosensor. Furthermore, we have used the GOx immobilized bioanode electrode for the electrooxidation of glucose in the glucose/O_2 biofuel cell. GOx was covalently immobilized onto MWCNT modified GCE by well known glutaraldehyde (GAD) chemistry and (ChOx) was immobilized at MWCNT modified electrode for the cholesterol sensor. We also have developed various modified electrodes by composites of graphene with metal oxides, metal nanoparticles, polymers, carbon nanotube and metal hexacyanoferrates by simple strategies. The fabricated electrodes were characterized by Atomic Force Microscopy, Scanning Electron Microscopy, FT-IR, UV-Vis and Raman spectroscopy and analytes electrocatalytic activity were analysed by CV and amperometric techniques. All these proposed electrodes are electrochemically active, stable and employed for the sensing of glucose, dopamine, ascorbic acid, uric acid, H_2O_2, Carbamazepine, nitrite etc. We constructed glucose/O_2 biofuel cells by assembling graphene based bioanode and cathode, where glucose is the fuel generate electricity through oxidation of glucose on the anode and reduction of oxygen on the cathode. We achieved enhanced photo current using graphene-TiO2 composite based working electrode and further research is underway for the fabrication of graphene based counter electrode.

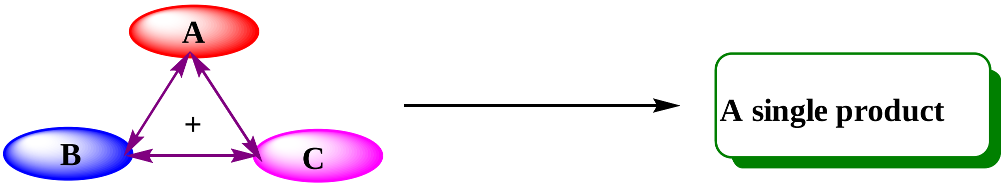
IT 5

Multicomponent Reactions as a Greenchemical Protocol in Organic Synthesis

S. Muthusubramanian

Department of Organic Chemistry
School of Chemistry
Madurai Kamaraj University
Madurai 625 021
Email:muthumanian2001@yahoo.com

Abstract: Multicomponents reactions (MCRs) are those reactions in which three or more reactants come together in a single reaction vessel to form a new product which contains portions of all the components and all the stating materials should be different. In recent years multicomponent reactions have been extensively utilized to produce libraries of heterocyclic molecules with biological activity against a variety of targets. The majority of these compounds were tested for their anticancer, antioxidant and antimicrobial properties and numerous promising compounds were identified and were further evaluated. With the continuous development of new multicomponent reactions and combinations of MCRs with subsequent transformations, this area of research holds great promise for the discovery of novel therapeutic agents.



A, **B**, **C** etc are reactants

Popular multicomponent reactions and their utility in drug synthesis will be discussed in this lecture. Selected multicomponent reactions studied in our laboratory will be deliberated highlighting their mechanisms.

IT 6

Hydrogen – An Ideal Energy Vector

K. S. Dhathathreyan

Centre for Fuel Cell Technology,
International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI),
(An autonomous R&D Centre under Department of Science & Technology (DST), Govt. of India)
2nd Floor , IIT-M Research Park, 6, Kanagam Road, Taramani, Chennai – 600113
(ksdhatha@arci.res.in;ksdhatha@gmail.com)

Abstract: Globally, there is a continuous increase in demand for every form of energy . Depletion of fossil fuel reserves has been a serious concern and the gap between supply and demand continues to increase. Every government is looking at different forms of renewable energy technologies to reduce the gap between supply and demand, reduce dependence on fossil fuel, decrease the greenhouse gas emission in power generation and transport , improve air quality , improve the health of villagers by providing alternative/ improved methods for cooking , provide electricity to villages in remote areas and for sustainable overall development. In addition, the need for transportation fuel is also on the increase especially in the developing countries. No single technology can address all the issues and every country needs a basket of energy technologies which leverage their natural resources.

Hydrogen has been gaining importance as one of the cleanest and most efficient energy vector owing to its number of advantageous characteristics .Hydrogen energy is relevant in all sectors, be it domestic use or industry use or transportation. Electrochemical science is linked with several aspects of hydrogen energy such as its production byelectrolysis, its conversion to electricity in fuel cells , its detection and use in batteries either as gas or metal hydride.

The talk would provide an insight based on experiences and results from intensive R&D and demonstration programmes carried out at ARCI in the area of hydrogen production, fuel cell and storage for the last one decade. The talk would also give an overview of national and international efforts on different aspects of hydrogen energy technologies .

IT 7

MODULATION OF DEVICE EFFICIENCIES USING SUPRAMOLECULAR INTERACTION

K. Krishnamoorthy

Polymers and Advanced Materials Laboratory
CSIR-National Chemical Laboratory-Pune, India

Abstract: The talk will be of two parts. First, I will discuss reversible disassembly and assembly of micelles using thin polymer films. Supramolecular complexes involving nanoscopic amphiphilic assemblies (AAs) and polyelectrolytes have been used to prepare a variety of materials, wherein the dynamic AAs retain the structural features, but the polyelectrolytes undergo conformational changes. Here, we show that a charge bearing rigid conjugated polymer can alter the structural features and disassemble AAs. We also demonstrate reversible assembly and disassembly of AAs by controlling the number of charges on the rigid polymer.

In the second part of my talk, I will discuss about the Field Effect Transistors that are fabricated using thin films of small molecules. Binding of metals with charge transport ligands lead to the formation of ordered structures. These materials showed high charge carrier mobility under atmospheric conditions. The device also works at a very low operating voltage.

IT 8

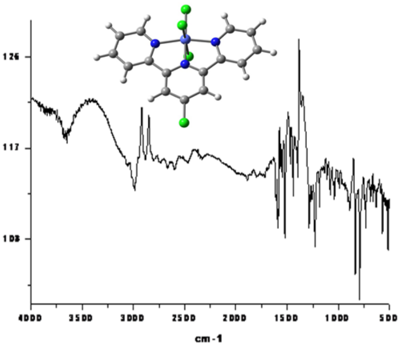
Designing and Understanding of the Nanoscopic Material Modifications to Enhance Electrochemical Applications

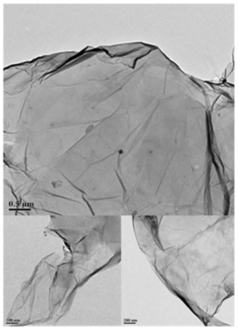
Kaliaperumal Selvaraj

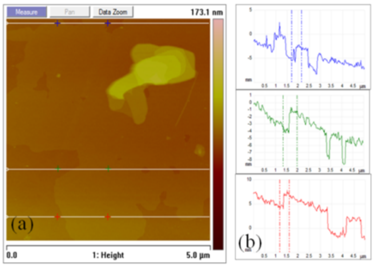
Nano and Computational Materials Lab, Catalysis Division,
CSIR - National Chemical Laboratory, Pune, 411 008, INDIA.
Email: ***k.selvaraj@ncl.res.in****;* ***kselva@gmail.com***

Although modification of materials has been ever progressing since the mankind originally started to exploit them, its transformation has been colossal since 21st century. This is mainly attributed to the expansion of nanoscience and technology. The obvious consequence of a strong stimulus to modify materials for enhanced electrochemical application is the recent upsurge of research in this area. Nanoscopic designing of materials and understanding their changing properties is a fast advancing research now.

The presentation would exhibit few example cases of modifications and their understanding through several physico- and electro-chemical characterization techniques along with the feedback for further synergistic modification. This also includes computational studies that have huge potential in designing such modifications.







Carbon nanomaterials functionalized for enhanced electrochemical responses.

Metal nano clusters for the use as electrocatalytic materials in applications such as fuel cells is an example case here. This covers search for the modification possibilities with respect to chemical homogeneity and reactivity in bimetallic nano- and subnano-clusters. Carbon materials in different nanoscopic forms such as CNTs, Fullerenes, Graphenes are a classic group of materials undergoing extraordinary exploitations in electrochemical systems. The talk would present few example cases what we have tried in our group to design materials for potential application in electrocatalysis and electrochemical sensing etc.,

Keywords: Nanomaterials, Metal Subnano-Clusters, Carbon Materials, Fuel Cell, Electrochemical Sensing, DFT Based Computational Study.

IT 9

Investigation on certain phosphate cathodes for lithium intercalation behaviour

N. Kalaiselvi

CSIR-Central Electrochemical Research Institute,
Karaikudi – 630 006, India

Abstract: $LiM_xP_yO_z$ cathodes are upcoming category lithium intercalating electrode materials, which are bestowed with unique advantages such as inherent safety and compatibility with other components of rechargeable lithium-ion cell assembly. $LiFePO_4$, the well known and so-called futuristic lithium battery cathode with steady-state capacity behaviour still requires research attention in terms of identification of simple synthesis protocols. As a result, other pyro ($LiMP_2O_7$) and poly phosphates [$Li_xM_y(PO_4)_Z$] gain R&D interest, wherein demonstration of appreciable electrochemical properties along with an acceptable conductivity and economically viable synthesis approaches pose challenges. $LiMPO_4$ [M = Fe, Mn, Co, Ni] cathodes along with few poly phosphates have been investigated for their facile lithium intercalation behaviour and the interesting results on the synthesis and characterisation of the same will be discussed

IT 10

Current Status and Future Outlook Pertaining to Encapsulation of Organic Pigments: Review

O. A. Hakeim
National Research Centre, Tahrir st., Dokki, Cairo, Egypt

Abstract: Organic pigments have a wide range of commercial applications in coatings, printing and paint industries. Encapsulating pigments with various polymers is a promising approach for improving the quality of the pigment dispersion. This article gives a summary of the most commonly and new processes and techniques for encapsulation of organic pigments. It must be noted that a successful encapsulation technique should not impair the original color appearance of pigments but enhance their dispersion. The review describes a wide variety of polymeric materials or functional nanomaterials can be used for encapsulation to create nanoscale organic pigments with completely new properties. Many techniques have been reviewed for encapsulating organic pigments such as emulsion or miniemulsion polymerization, phase separation, layer-by-layer assembly, sol-gel and free radical precipitation polymerization. Additionally, some living materials such as macro-RAFT copolymer and polymerizable dispersant were also reported for pigment encapsulation. The effect of polymer encapsulation on electrophoretic property of organic pigments has been also reviewed.

IT 11

Recent Developments in Textile Dyeing Technologies

B. Muralidharan

BITS Pilani, Dubai Campus, International Academic City, Dubai-UAE
E.mail: muralidharan@dubai.bits-pilani.ac.in bmdharan@gmail.com

Abstract: According to a report by Global industry analysts (GIA), the textile dyes market is expected to reach USD 5.9 billion by the year 2017 which is influenced by changing perceptions, technological innovations, consumer spending and population growth. Textile processing industry consumes large amount of water and electricity for various processes like dyeing, printing and finishing operations. Mounting pressure on environmental pollution control regulations necessitates development of newer eco friendly technologies and machineries which will minimize water consumption and pollution load. The major energy consumption in textile processing industry involves drying of processed textile material and treatment of unspent dye liquor. Some of the revolutionary technological developments in the dyeing processes include use of ultrasonic waves, microwave dyeing, Plasma technology, supercritical carbon dioxide, and electrochemical dyeing of textiles. Replacement of dye liquor with air as a method of transporting piece goods in jet-dyeing machines is a big step toward reducing water and chemicals consumption. Introduction of Dry Dye fabrics which use an exclusive waterless dyeing process will save millions of litres of fresh water annually.

IT 12

Medical textiles

S. Thiruppathi

Senior Scientific Officer, CoE-Meditech, South India Textile Research Association (SITRA),
Coimbatore -641014
Email: thiru_1371@yahoo.com

Abstract: ***Medical textiles is a textiles which are used in healthcare,hygiene and other medical applications,used in hospitals***

Combination of textile technology and medical sciences has resulted in new field that has come to be known as “Medical textiles”.

Medical textile contributes 6% to 10% of total textile product turnover. Medical textile has emerged as one of the fastest growing segments in the global textiles market and has found novel applications in many medical and surgical procedures.From Rs.1514 crore in 2007-2008, the domestic consumption meditech is expected to make a 50% increase to around Rs.2263 crores by the year 2012-2013. This increase in demand for meditech products corresponds with the growth of the health and hygiene sector.The 9% to 10% growth per year is expected to be compounded in the coming year. It is important programme for the fledging medical textile in India.We are hopeful that an event this nature would be very useful for the promotion of the medical textile industry in India, which is already growing at very decent rate.India has all the capabilities to design, develop and manufacture from the low end/high volume hygiene products to the high end/niche medical devices. However lack of coherent and comprehensive approach to develop this industry, until a few years ago.

The Government of India, especially the Ministry of Textiles, with excellent support from the office of the textile commissioner, has taken up the responsibility of the promotion of the technical textile sector. Several policy level measures have been initiated to address the concerns and issues that have been impeding the growth of technical textiles in India. To assist them in this process, the Ministry of textiles has also launched 8 centre of excellence to promote the various segments of this sector like agrotech, geotech, protech, meditechetc. with a capital outlay of Rs.200 crores. Additionally countrywide awareness programmes, assistance in entrepreneurship, innovative schemes like contract research etc. have been initiated by the ministry.

As you all well aware of SITRA is a centre of Excellence for Medial textiles, awarded and recognized by ministry of textiles, Govt. of India.

Our aim to make, Moreentrepreneurs in the field of medical textiles for that we are responsible to help industrialist/enterprenursfor giving the following facilities

(1) Training
(2) Testing facilities
(3) Development of new products
(5) Prototype models
(6) Manufacturing pilot scale facilities
(7) Resource centre
(8) Detailed project report etc.

The medical textile training programme, attempts to highlight products with high potential for growth in India and abroad, project demands for some of these medical textile products and also provide sample profiles for diversification possibilities of these products.

The training programme will focus on product like face mask, compression stockinet, hernia mesh, bed sheet covered with antimicrobial finish, surgical gown ,surgicaldressing, compression flat bandages, vascular craft, heart patches and wound dressing etc.

India imports 60-70% of medical textile products from USA, Germany and European countries, we don't have unit that is sophisticated enough to manufacture medical textile products in high volume.We have to built infrastructure to produce large scale. Right now the demanad met by imports.

We are organising guided tours for the delegates, to visit the existing facilities of SITRA in medical textiles

(1) Face mask production process
(2) Non-woven production process
(3) Coating and lamination process
(4) Warp knitting manufacturing process
(5) Compression stocking
(6) Electro spinning
(7) Medical textile testing

Among all the technical textiles, Medical textile has very important because it touches every body's life. Each individual need medical textiles products directly and indirectly through hospitals.Each patient wants to cure quickly and go home from hospital, for that innovation and development in medical textile products required.

SITRA is developed 8 new products and two instruments for testing medical textile products.

Our only motto would be to make this meditech very strong, vibrant and successful sector.

Innovation is the way of life ....

IT 13

Technical Textiles: Electrochemistry and Electrochemical Applications

M. Anbu Kulandainathan
Electro Organics, CSIR-CECRI, Karaikudi-630 006.

Abstract: Technical textiles are defined as textiles that can sense and react to environmental conditions or stimuli from mechanical, thermal, chemical, electrical or magnetic sources. These novel functions or properties are obtained by utilizing special textiles or electronic devices integrated into the textile structures. The demand for electrically conductive fibres and textiles has increased in recent years because of applications as antistatic materials, sensors, materials for electromagnetic shielding, UV-blocking property, biomedical use, heating fabrics and intelligent textiles. In this presentation, we are focusing the polymer-nanomaterials coated textiles for various applications such as conductive textiles, antimicrobial finishes, superhydrophobic textiles and UV protective textiles.

Achieving good electrical contact between the electrode surface and a fabric is a relatively difficult task. However, if it is achieved the electrochemical formation of conducting polypyrrole film formed on cotton fabrics can be carefully controlled Conducting polymer coated textile was prepared using chemical and electrochemical method on cotton substrate. In-situ electrochemical polymerisation as well as vapour phase polymerisation methods was adopted for polymerisation of pyrrole on the various textile substrate such as cotton, linen, polyester and viscose rayon.

Improvement of existing properties and the creation of new material properties are the most important requirement for the functionalization of textiles. Multifunctional fabrics were prepared by coating polypyrrole-silver composites on cotton fabrics. Polymer – silver composites were deposited on the cotton fabrics through a facile redox reaction between pyrrole monomer and silver nitrate. These composites coating on textile showed good electrical conductivity with antimicrobial property against E.coli and S.aureus micro organisms.

A surface with water contact angle higher than 150^0 is considered to be superhydrophobic surface, which is one of the most desirable properties for textiles to impart self cleaning and antimicrobial property. In this work, it is modified cotton fabrics by hydrophobization using hydrolysed alkoxysilane. Environment friendly hydrophobic molecules like tetraethoxysilane, phenyl triethoxysilane and methyl triethoxysilane were used to modify the textile surface and compared the results.

Metal oxides like ZnO as a UV –blocker are more stable when compared to organic UV blocking agents. ZnO nanoparticles were prepared by chemical precipitation method and dispersed in PMMA dispersed toluene. This solution was coated on textile substrate by dip coat method. The presence of PMMA was confirmed by FT-IR and incorporation ZnO nanoparticles in composites were analysed by XRD and SEM. The UV-Blocking behavior of coated textile was studied and PMMA-ZnO nanocomposite coated textile performed good protection against UV radiation (above 85%). The presentation will clearly bring out the present scenario of the smart textiles and electroactive polymers.

IT 14

Size and Shape-selective formation of Catalytically active Cobalt oxide Nanomaterials by Microwave heating

M. Jayachandran* and Subrata Kundu

Electrochemical Materials Science (ECMS) Division,
CSIR-Central Electrochemical Research Institute,
Karaikudi-630006, Tamilnadu, INDIA
E-mail: mjayam54@gmail.com; mjayam54@cecri.res.in

Metal oxide nanoparticles (NPs) are attracting a great deal of in-depth research due to their wide applications in optics, electronics, catalysis, and in medical sciences. The development of new techniques and routes for the synthesis of materials with controlled shapes and different dimensions is critical for developing efficient catalysts and novel nanodevices. Among the many oxides, Cobalt oxide (CoO) has become technologically important due to its interesting fundamental material properties and the variable physico-chemical properties with nanocrystalline form. Other than in catalysis, CoO nanomaterials are usefuls in making pigments, lithium-ion batteries, solid state sensors, magnetic recording media and computer hard disks.

Synthesis of CoO with cubic structure is very difficult and tedious using the conventional chemical routes owing to the harsh chemical reactions and the longer time involved to complete the synthesis process. Further, the end products contain many phases like CoO, Co_3O_4, Co metal and no controle over size and shape. In this regard, we have selected the microwave (MW) heating technique to achieve faster reaction, in which different size/shape-selective chemical media are used. The salient features of MW heating are: generates high temperature, heats uniformly in a short time, produces nanomaterials with uniform size and shape, gives monophase and high purity materials. In this presentation, the features of MW heating, the process of synthesising size/shape-selective CoO nanomaterials and their catalytic activity in removing organic dyes from polluted water are given in detail.

Size-controlled and shape-selective synthesis of CoO nanomaterials under MW heaeting has been achieved using micellar and polymer media respectively. Size-controlled CoO nanowires were synthesized in CTAB micellar media within 6 min of MW heating. It exclusively generated CoO nanowires of different dimensions, lengths of about 50-160 nm and diameters of about 5-15 nm by varying the CTAB concentration. Shape-selective CoO nanoparticles were synthesized using poly (vinyl) alcohol (PVA) solution within 2 minutes of MW heating. It produced CoO nanoparticles with different shapes like nano spheres, nano sheets, and nano dendrites mainly by varying the ratio of Co(II) and PVA precursors. Initially, the CoO nanowires were tested for their ability and efficiency as catalyst for the removal of many organic dye molecules using $NaBH_4$ as the reducing agent. Interestingly, the catalysis rate is found varying with the length of the CoO nanowires. These results show that technologically important CoO nanomaterials with different shapes can be synthesised through MW heating technique, which are efficient catalysts for the cleaning of dye contaminated water effluent from dye industry.

IT 15

Carbon Composites for Electrochemical Bio-Sensing Applications

J. Mathiyarasu

Electrodics and Electrocatalysis Division,
CSIR-Central Electrochemical Research Institute,
Karaikudi – 630006, Tamilnadu, India.
Tel: +91-04565-241340, Fax: +91-04565-227779,
Email: jmathiyarasu@gmail.com

Abstract: The application of electrochemical methodologies to sense biologically important species provides significant advantages. Specifically, the advantages of bioelectronic approaches include the speed, sensitivity, and low cost/mass/power requirements of electrochemical detection; the relatively high stability and environmental insensitivity of electro active labels; and the availability of electro active labels with non-overlapping redox potentials for multi-labeling and the simultaneous detection of multiple analyte molecules. The binding of a protein to the small molecule recognition element alters the dynamics of the scaffold, increasing or decreasing the efficiency with which the redox tag collides with the electrode and thus altering the observed *faradaic* current. Sensors for targets are sensitive (detection limits in the low nanomolar range), rapid (minutes), reusable, and selective enough to function directly in complex matrices including blood serum, soil, and foodstuffs. Since a single material cannot cater to all the needs of a sensor performance, a combination of materials is used to modify the electrode surface. Approaches like (electro-) polymerization, covalent and non-covalent linkages and surface precipitation are employed to immobilize specific modifiers onto the desired electrode surface. In this talk, electrochemical sensing of some important bio molecules such as glycated haemoglobin, dopamine and uric acid are discussed in detail using simple carbon matrix as a sensing platform.

Key words: Electrochemical sensors, biosensors, sensitivity, selectivity, carbon

IT 16

Electrochemical Processes for Clean Environment - Special Emphasize On CSIR-CECRI Technologies

S. Vasudevan

CSIR - Central Electrochemical Research Institute, Karaikudi – 630 006, India.
Email: svasudevan65@gmail.com

Abstract: The continuous increase in word population as well as phenomenal growth of industries will make enormous demands on global resources and consequently affect the biosphere – the air and water. The global awareness to the growing energy demand, depletion of fossil fuel and alarming rate of environmental pollution had drawn the attention of researchers all over the word the explosive alternate energy system. In this context, it is hopefully expected that the hydrogen energy system, where hydrogen is produced by electrolysis of water, can form the good link between the new energy source and solving environmental pollution. Further the role of electrochemistry on environmental pollution abatement will be broadly discussed. Thus for the removal of pollutants there are few very powerful tools based on electrochemical principal which are:

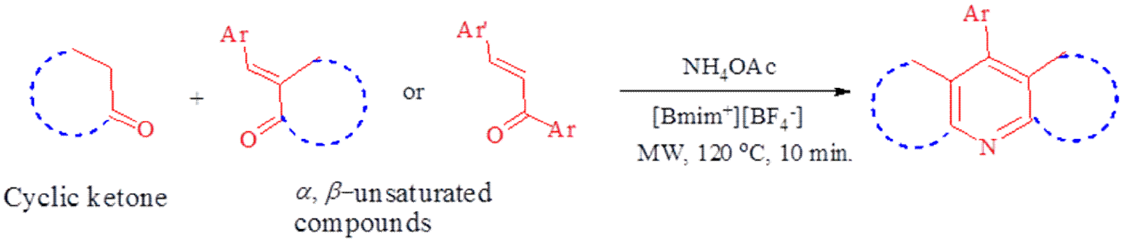
- Electrodialysis eg. Desalination of brackish water and waste recovery
- Electrocoagulation, electroflotation and electro flocculation eg. removal of fluoride, arsenic, dye from water etc.,
- Anodic process (indirect and direct oxidation)
- Electrochemical Advanced Oxidation Processes (EAOP)

OP 1

A Green Approach for Efficient Synthesis ofFused-Pyridine Heterocycles in Ionic Liquid under Microwave Irradiation

S. Chitra[a], N. Paul[b],S. Muthusubramanian[c,*],P. Manisankar[d,*]
[a]Department of Chemistry, Seethalakshmi Achi College for Women, Pallathur-630 107
[b]Department of Chemistry, Kerala Government Polytechnic College, Kozhikode-673 604
[c]Department of Organic Chemistry, Madurai Kamaraj University, Madurai-625 021
[d]Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003
E-mail:pms11@rediffmail.com

Abstract:A rapid, efficient and eco-friendly method for the synthesis of pyridine, thienopyridines and pyrroloquinolines from the reaction of cyclic ketones and cyclic/acyclic α, β-unsaturated compounds and ammonium acetate using ionic liquid as reaction medium is described. Operational simplicity, high yields and reusability of ionic liquid are the notable features of the present protocol. When 6,7-dihydro-1*H*-indol-4(5*H*)-one is used as the cyclic ketone, an unusual product is formed by a second Michael addition-elimination pathway.



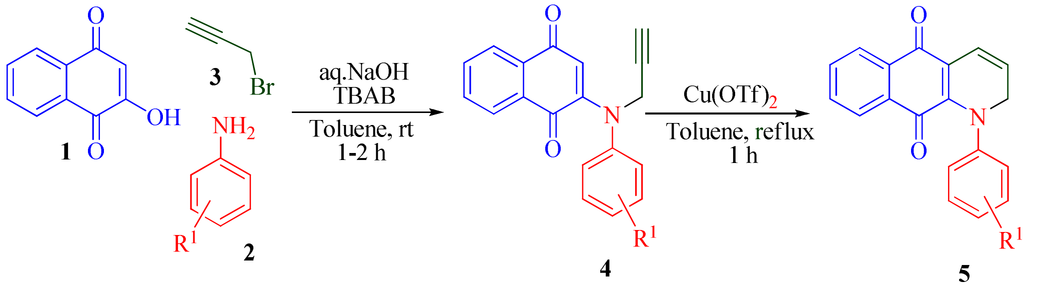
OP 2

An Expedient Synthesis of 1,2-Dihydrobenzo[G]Quinoline-5,10-Diones via Copper(II) Triflate-Catalyzed Intramolecular Cyclization of *N*-Propargylaminonaphthoquinones

B. Devi Bala, Subbu Perumal*
Department of Organic Chemistry, Madurai Kamaraj University,Madurai 625021
E-mail: subbu.perum@gmail.com

Abstract: Development of new efficient synthetic methodologies for functionalized heterocyclic building blocks remains a great challenge in modern organic synthesis.[1] 1,2-Dihydro-benzo[*g*]quinoline-5,10-dione framework is such an important structural motif prevalent in natural products with interesting biological properties.[2] Alkynes serve as important synthons, besides being the subunits of myriad organic compounds. In continuation of our interest in the assembly of functionalized novel heterocycles by tandem, multi-component and green transformations,[3] herein we describe an expedient synthesis of a series of 1,2-dihydrobenzo[*g*]quinoline-5,10-diones in good yields has been accomplished via three-component one pot sequential reactions of 2-hydroxynaphthalene-1,4-dione, substituted anilines and propargyl bromide furnishing

N-propargylaminonaphthoquinones and their concomitant copper(II) triflate-catalyzed intramolecular 6-*endo-dig* cyclization.



References:

1 (a) Nefzi, A.; Ostresh, J. M.; Houghten, R. A. Chem. Rev. 1997, 97, 449;(b) Teagues, S. J.; Davis, A. M.; Leeson, P.D.; Opera, T. Angew. Chem. Int. Ed. Engl. 1999, 38, 3743.

2 (a) Brisach-Wittmeyer, A.; Sido, A. S. S.; Guilini, P.; Désaubry, L. Bioorg.Med. Chem. Lett. 2005, 15, 3609; (b) Soonthornchareonnon, N.; Suwanborirux, K.; Bavovada, R.; Patarapanich, C.; Cassady, J. M. J. Nat. Prod.1999, 62, 1390.

3 (a) Devi Bala B.; Michael Rajesh, S.; Perumal, S.; Menéndez, J. C. Green Chem. 2012, 14, 1484 ;(b) Indumathi, S.; Perumal S.; Menéndez, J. C. J. Org. Chem. 2010, 75, 472; (c) Muthusaravanan, S.; Perumal, S.; Almansour, A. I. Tetrahedorn Lett. 2012, 53, 1144.

OP 3

Electrochemical Synthesis and Characterization of Selenium Doped Copper Thin Film for Solar Cell Application

A.Ashok kumar, J. Peter , C.Vedhi*
Department of Chemistry, V.O Chidambaram College, Tuticorin –628008, Tamilnadu, India
E-mail: cvedhi@rediffmail.com,chinavedhi@yahoo.co.in

Abstract: Selenium incorporated copper thin films are synthesized by electrodeposition technique. The cyclic voltammogram of 0.1 M of $CuSO_4$ and 0.05 M selenium dioxide at potential range from -0.8 to 0.8 V vs. Ag/AgCl in pH 1.0. Formed thin film was characterized through electrochemical behaviour, UV-VIS, X-ray diffraction, SEM and electrochromic studies. The stability of the doped thin film was studied using electrochemical behaviour. The transmittance and absorption of thin films was analyzed through UV-Vis spectra. An energy gap of 1.78 eV is obtained for nano selenium doped thin films by extrapolating the linear portion of the curves $h\upsilon$ versus $(\alpha h\upsilon)^2$. The diffraction peaks of spherical selenium doped copper thin films are observed at 2⍰ values. Surface morphology of thin film shows uniform granular mixed texture like structure. The sizes of the grains are found to be in the range between 53.33nm and 93.33nm. The film composition was investigated using an EDX micro analytic unit attached with scanning electron microscope. The insitu spectroelectrochemical behaviour of selenide copper thin film at various applied potentials in 0.1 M H_2SO_4. Doped copper thin film exhibits dual colour chromic behaviour from contrast red colour to contrast yellows colour. The electrochromic device shows good optical contrast, coloration efficiency, response time and stability.

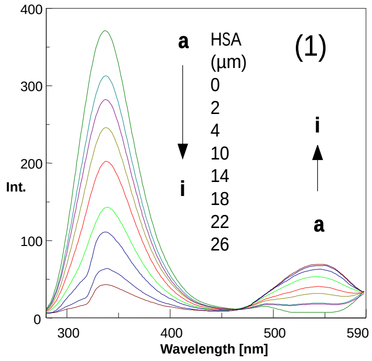
Key words: Thin film, Electrodeposition, XRD, SEM, Electrochromic

OP 4

Interaction of Rhenium(I) Tridentate Surfactant Complexes with Human Serum Albumin: A Spectroscopic Approach

<u>GBalakrishnan</u>[a], K. Senthil Murugan[a], S. Malayappa Samy[b], M. Ganesan[a], V. Kamaraj Sivasubramanian[a], A. Ilangovan[b], S. Rajagopal[c], T. Rajendran[a, d*]
[a]Department of Chemistry, Vivekananda College,Thiruvedagam West, Madurai 625 214, India
[b]School of Chemistry, Bharathidasan University, Thiruchirappalli-620 023, India
[c]School of Chemistry, Madurai Kamaraj University, Madurai-625 021, India
[d]Department of Chemistry, PSNA College of Engineering & Technology,Dindigul-624 622, India.
E-mail <u>trajan542004@yahoo.co.in</u>

Abstract: The interaction of four rhenium tridentate surfactant complexes, [Re(CO)$_3$(α-diimine) {4-C$_{11}$py}]CF$_3$SO$_3$**1-5** (α-diimine = 2,2'-bipyridine (L$_1$), 4,4'-dinonyl-2,2'-bipyridine (L$_2$), 4,4'-di-tert-butyl-2,2'-bipyridine (L$_3$) 2,2'-biquinonline (L$_4$) and 4-C$_{11}$py = (py-4-(CH$_2$)$_{10}$CH$_3$) or 4-undecylpyridine long chain surfactant, with Humane serum albumin (HSA) in pH 7.4 buffer by optical spectroscopic techniques. The quenching constant (k_q), binding constant (K) and number of binding sites (I) were determined by fluorescence quenching method. Protein intrinsic fluorescence quenching by Re **1-4** occurs through ground-state static quenching of about ($k_q \approx 10^{13}$ M^{-1} S^{-1}), as well as binding strongly to HSA with binding constant of about ≈ 10^5 to 10^6 M^{-1} at 298K. Given fluorescence lifetime (TCSPC) spectra indicate that the formation of the protein-quencher complex in the ground state. Moreover, synchronous fluorescence spectral studied revealed some changes in the local polarity around the tryptophan residues.



Reference:
1. Lo, K. K-W.; Louie, M-W.; Zhang, Y. K. Coord. Chem. Rev. 2010, 254, 2603-2622.
2. Bhuvaneswari, J.; Fathima, K. A.; Rajagopal, S. Inorg. Chim. Acta. 2012, 227, 38-44.
3. Lo, K.K.-W.; Sze, K.-S.; Tsang, K.H.-K.; Zhu, N. Organometallics. 2007, 26, 3440-3447.
4. Thorp-Greenwood, F.L.; Coogan, M. P.; Mishra, L. Kumari, N.; Rai, G.; Saripella. S. New J. Chem., 2012, 36, 64-72.
5. Bhuvaneswari, J.; Muthu Mareeswaran, P.; Shanmugasundaram, S.; Rajagopal, S. J. Photochem. Photobiol. A: Chem. 2011, 375, 205-212.

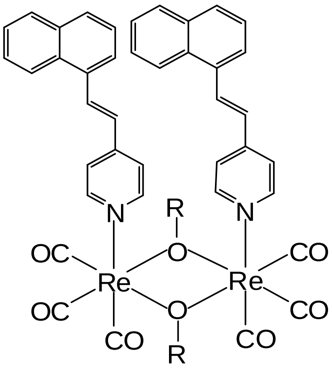
OP 5

Nanoaggregates of Alkoxy Bridged Binuclear Rhenium(I) Complexes as Sensors for Explosives

<u>V. Sathish</u>, A. Ramdass, P. Thanasekaran[a], S. Rajagopal[b]
[a]School of Chemistry, Madurai Kamaraj University, Madurai - 625 021, India.
[b]Institute of Chemistry, Academia Sinica, Taipei 115, Taiwan.
Email: <u>vsathish1985@gmail.com</u>

Abstract: There has been upsurge interest in thwarting terrorism is due to explosives are used to deleterious effect to the world and the detection of explosives is paramount

importance of countries defence as well as environmental safety.The sensing and removal of trace level explosives is a challenging area, but the stupendous efforts made by the researchers in the field of chemical sensors.In the present work, the strong emission of nanoaggregates of complex **1** is used to explore their potential applications in the selective detection of nitro aromatic explosive picric acid (PA). The formation of nanoscopic aggregates of **1** was confirmed by TEM image with the average size of the nanoparticles is 100-150 nm. When different [PA] is added to the nanoaggregates of complex **1,** the absorbance is increasedand red shifted to the tune of 40nm from 326 nm to 366 nm, whereas in the emission spectra the fluorescence intensity is rapidly quenched at 420 nm without any considerable shift and further interesting results will be presented in the symposium.



R = $C_{10}H_{21}$

Fig. 1 Structure of Complex **1**

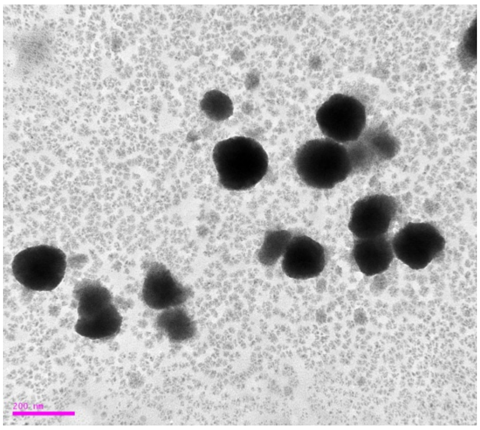


Fig. 2 TEM image of nanoaggregates of complex **1** in CH_2Cl_2-CH_3CN mixture (10:90 v/v).

OP 6

Non Platinum Metal Catalyst for Oxygen Reduction Reaction in Fuel Cells

Anjaiah Sheelam, M.P.Karthikayini, R. Kothandaraman
Department of Chemistry, IIT Madras, India.
E-mail: anjansheelam@gmail.com

Abstract: Fuel Cells generate electricity oxidizing continuously fed fuel at anode and reducing continuously fed oxidant at cathode without emitting any noxious products. Cost of platinum based catalyst used for oxygen reduction reaction at cathode is what limiting successful commercialization of polymer electrolyte membrane fuel cell (PEMFC). The catalyst that we have developed uses iron, nitrogen and carbon, which are widely abundant and costless in comparison to platinum. This catalyst made by pyrolyzing simple sources of metal, nitrogen and high surface area carbon in inert atmosphere. Fig. 1 depicts the type of active sites hypothesized by the researchers; however previous attempts in literature failed to enhance iron content beyond 1wt. % leaving catalyst nitrogen rich. Due to poor metal distribution, oxygen reduction activity does not scale up with iron content, even though the catalyst surface is nitrogen rich. We have attempted to disperse metal down to cluster level using a freeze drying method, and turned the excess nitrogen content in carbon support into active sites for oxygen reduction. Fig. 2 shows the oxygen reduction activity at 0.7V vs. RHE scaling

with increase in iron content upto 4 wt.%. This catalyst reduces oxygen completely to water by a four electron pathway as observed from RRDE measurements. Moreover, in the literature there is a controversy on iron being part of oxygen reducing active site, we have proven iron's role being part of active site via an experiment which shows increase in oxygen reduction overvoltage while blocking iron sites with suitable ligand in acidic medium.

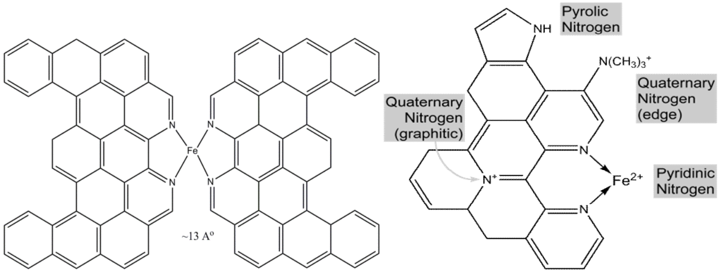


Fig. 1 *MN_4 and MN_2 type of active sites believed to be responsible for ORR*

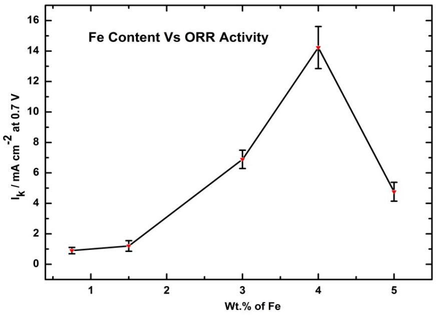


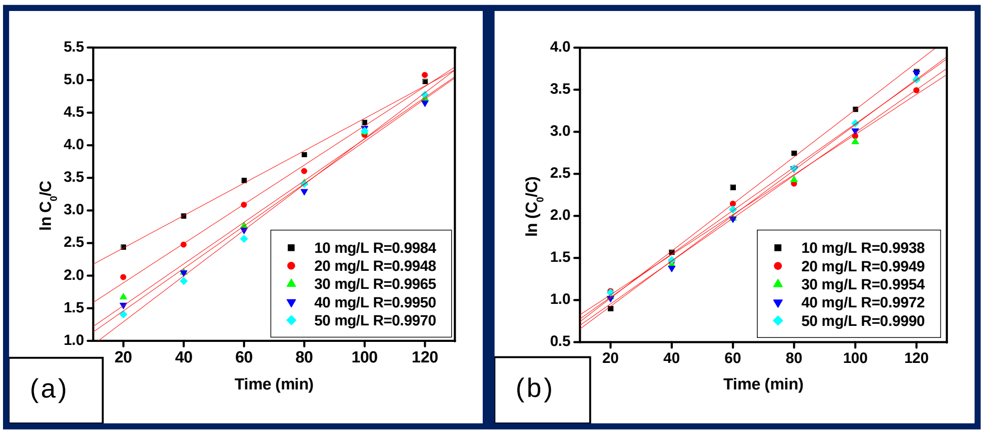
Fig. 2 *Influence of iron content on kinetic current density observed at 0.7 V vs. RHE.*

OP 7

Photocatalytic Degradation of Reactive Red 141 and Reactive Yellow 105 Dyes using UV/Tio$_2$ Nanoparticles

A. Amalraj, M. Singaram, Anitha Pius*
Department of Chemistry, Gandhigram Rural Institute -Deemed University,Gandhigram – 624302
E-mail: dranithapius@gmail.com, augustin14amal@gmail.com

Abstract: Pigments and dyes are widely used in textiles, leather dyeing, paper, printing, pharmaceutical, and cosmetic industries. Many of these have been identified as toxic or even carcinogenic. The release of these coloured wastewaters in the ecosystem causes aesthetic pollution, eutrophication and perturbations in aquatic life. We have investigated the photocatalytic degradation of two reactive dyes, Reactive Red 141 (RR-141) and Reactive Yellow (RY-105) in the aqueous suspensions of TiO_2 nanoparticles under UV light irradiation. The effects of initial dye concentration and pH on the photocatalytic activity were studied and the results obtained were fitted with Langmuir–Hinshelwood model to study the degradation kinetics and the reaction follows pseudo-first order which is discussed in detail.



Langmuir-Hinshelwood relationship between lnC_0/C and time at different initial concentrations of (a) RR-141 and (b) RY-105.

OP 8

Polyisothianaphthene/Graphene Nanocomposite for Highly Efficient Pt-Free Dye Sensitized Solar Cells

Alagar Ramar[a], A. T. Ezhil Vilian[b], Shen-Ming Chen[b], Ramiah Saraswathi[a]*
[a] *Department of Materials Science, School of Chemistry, Madurai Kamaraj University, Madurai-625 021, Tamil Nadu, India.*
[b] *Electroanalysis and Bioelectrochemistry Laboratory, Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, No.1, Section 3, Chung-Hsiao East Road, Taipei 106, Taiwan (ROC).*
E-mail: chemramar@gmail.com, saraswathir@yahoo.com

Abstract: Dye sensitized solar cells (DSSC) are considered as a potential alternative to silicon solar cells due to their ease of fabrication, low cost and high power conversion efficiency (PCE). A typical DSSC comprises a mesoporous titanium dioxide film, a dye sensitizer, an electrolyte containing I_3^-/I^-redox couple and a counter electrode, CE (usually Pt). Some conducting polymers exhibit high electrical conductivity akin to metals and can be used as electrodes in energy conversion and storage devices. Polyisothianapthene (PITN) a low band gap conjugated polymer. Graphene, the most promising nanocarbon is extensively used in electronic devices owing to its high electron mobility, electrical, optical, thermal, mechanical properties and high surface area.

In this paper, for first time the application of a novel nanocomposite *viz.* PITN/Graphene as a counter electrode, replacing Pt in a DSSC is demonstrated. The composite was prepared by sonicating an aqueous mixture of PITN and graphene in the presence of poly(sodium-4-styrenesulfonate) for about 3 h until a fine dispersion was obtained. The nanocomposite was prepared by varying the PITN - Graphene ratio as 1:1, 1:2, 1:4, 2:1 and 4:1. The SEM, FT-IR and XRD characterization helped to confirm the formation of the PITN/Graphene nanocomposite. Cyclic voltammetry, electrochemical impedance spectroscopy and Tafel polarization were also performed to obtain information on the electrocatalytic efficiency towards the I_3^-/I^- redox reaction.The DSSC was assembled with the configuration ITO/TiO_2/N719/electrolyte (I_3^-/I^-)/PITN-Graphene/ITO. Parallel experiments have been carried out using Pt, PITN and graphene as CE, to directly ascertain the performance of the DSSCs. Among the five

PITN/Graphene nanocomposites investigated, the one prepared with the 1:4 ratio resulted in the best performance as CE with a PCE of 5.2% which is found to be higher than that of the DSSCs made with PITN (3.5%), graphene (2.5%), Pt (4.5%) as CEs.

OP 9

Preparation of Graphene-Polyacrylonitrile Composite and its use as Precursor of Cathode Material for High Rate Rechargeable Lithium-Sulfur Batteries

Meeta Trivedi[a], **RajniMathur**[b]
[a]*Indian Institute of Technology (IIT) Roorkee (India)*
[b]*P.G.Department of Chemistry,Govt P.G.College,Dausa (Raj)*
E.mail: rajni 1965@yahoo.co.in

Abstract: Sulfur is a promising cathode material with almost the highest theoretical specific capacity (1672 mAh/g) , the advantage of natural abundance, low cost, and environmental friendliness. However, low electrical conductivity of sulfur, dissolution of poly sulfides in electrolyte and volume expansion of sulfur during cycle limit the development of rechargeable Li-S batteries.Pyrolyzed polyacrylonitrile-sulfur (pPAN-S) composite has been demonstrated effective to overcome the problem above mentioned.Graphene is a useful additive for electrochemical energy storage applications.GNS-PAN composites have been synthesized by a simple in situ polymerization method in the first time and the composite was used as precursor to prepare sulfur cathode material for high rate rechargeable Li-S batteries.The superior performance of GNS-pPAN-S is clearly established by comparison of the results with those from bhare pPAN-S.GO was synthesized from natural graphite by a modified Hummers method. Acrylonitrile was added into the suspension of GO.After stirring 1 hr , the polymerization process was carried out by slow addition of potassium persulfate initiator and the mixture was allowed to stir for 3 hours at 70 degree centrigrate.The process was terminated by the addition of 0.1 M solution of ammonium ferrous sulfate.The N2H4.H20 was added into the solution.After stirring for 3h at 100 degree centrigrate , the gray product,designated GNS-PAN. Was filtered and washed with double distilled water and dried in an oven at 50 degree centrigrate for 24h. Then GNS-PAN was mixed with Sulfur and the mixture was held at 300 degree centrigrate for certain time to prepare GNS-pPANS composite.GNS-pPANS composites were synthesized with different contents of GNS(1,3, and 5% of the composites weight).Results show that the GNS-pPANS composite with a graphene content of 3.0% wt% exihibited a stable capacity of about 600 mAh/g with no noticeable fading in the range of 0.1 to 2.0 C.And even up to 10C, relatively competitive capacity around 300mAh/g was obtained.The graphene nanosheets in the composite materials could act not only as electronically conductive matrix but also as an frame work to improve the electrochemical performance of pPAN-S.

OP 10

Recognition Of 5-Fluorouracil by Multiwalled CarbonNanotubes

Jeena Abraham, Beena Mathew
School of Chemical Sciences, Mahatma Gandhi University, Kottayam-656560
E-mail: Jeenaabraham23@gmail.com

Abstract: Molecularly imprinted polymers (MIPs) are special polymers that are attained by the polymerization of a monomer with a crosslinker in the presence of a template molecule. Molecular recognition sites are formed after the extraction of the template molecule from the polymerized material. The formed cavities are complementary to the template in size and shape for the subsequent rebinding process. Through the formation of the MIP on the surface of MWCNTs, the accessibility of the analyte to binding sites can be improved, and the binding time can be reduced.A novel MWCNT supported with homogeneous 5-Fluoro uracil imprinted outer layer for its selective recognition was synthesized. For fabricating MIPs on MWCNT, the vinyl group was first introduced on the surface of MWCNT, which directed the selective polymerization of functional monomers and crosslinkers in the presence of 5-FU on the MWCNT surface. Various analytical techniques confirmed the homogeneous formation of MWCNT MIP binding sites; 5-FU imprinted carbon nanotube showed its specific rebinding. In the kinetic study, it was found that the rate of adsorption 5- FU increased rapidly in the initial stage and then reduced after it reached equilibrium. Compared a to pseudo first order model, a second order kinetic equation gave a better fit for the adsorption kinetic data. The adsorption increased with increasing 5-FU concentration. The results showed that the adsorption process obeys a Langmuir adsorption isotherm. The fabricated system showed remarkable selectivity towards 5-FU from other structurally related compounds such as thymine and uracil. The fabricated polymer also conduct in chromatographic separation.

References:

1. Rezaei, B.; Mallakpour, S.; Rahmanian.; J Iran Chem Soc, 7,(2010), 1004.
2. Li Xu.; Zhi-feng Xu.; J Polym Res,19, (2012), 9942.

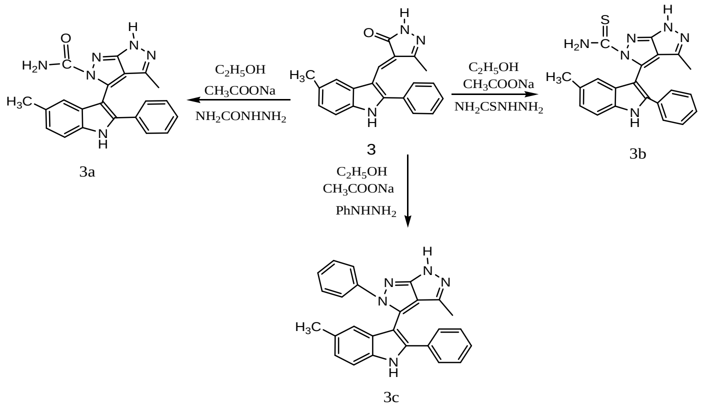
OP 11

Synthesis ofsome New Pyrazolo-Pyrazole Derivatives Containing Indoles with Antimicrobial Activity

P. Ashokgajapathiraju, R. Mallikarjuna Rao, K.Venugopal J. Sreeramulu*
Department of Chemistry, Sri Krishnadevaraya University, Anantapur-515003
E-mail: ashok.organic@gmail.com

Abstract: A series of new pyrazolo[3,4-c] pyrazole derivatives bearing indole moiety (3a-c and 5a-c) have been prepared by making by use of 3-methyl-4-((5-methyl-2-phenyl-3H-indol-3-yl)methylene)-1H-pyrazol-5(4H)-one and 3-methyl-4-((4,7-dichloro-2-phenyl-3H-indol-3-yl)methylene)-1H-pyrazol-5(4H)-one as a key intermediates obtained by the reaction of Substituted 2-phenyl indoles-3-carboxaldehydes and 3-methyl-1H-pyrazol-5(4H)-one. The structure of the newly synthesized compounds have been confirmed on the basis of their I.R, H^1NMR and elemental analysis data and the newly synthesized compounds have been screened for their antibacterialactivities.

Key words: pyrazole, indole, pyrazolone, anti-microbial activity.



OP 12

Disposable Electrochemical Sensor for the Determination of Antioxidant Capacity

M. Muthulakshmi[a], C. Delerue-Matos[b], P. Manisankar[a], S. Viswanathan[a,b]*
[a]*Department of Industrial Chemistry, Alagappa University, Karaikudi 630 003, Tamilnadu, India*
[b]*REQUIMTE, Instituto Superior de Engenharia do Instituto Politécnico do Porto*
Rua Dr António Bernardino de Almeida, 431, 4200-072 Porto Portugal
Email: rsviswa@gmail.com

Abstract: The evaluation of antioxidant capacity using an electrochemical biosensor was investigated. The biosensor consist of purine base (guanine) adsorbed on a graphene modified screen printed electrode. Purine base damage was induced by the hydroxyl radical generated by Fenton-type reaction. The antioxidant applied to counteract the deleterious effects of the hydroxyl radical. Antioxidants have ability to scavenge the hydroxyl radicals & protect the guanine adsorbed on the graphene modified screen printed electrode surface. The interaction carried out between the purine-base immobilized and free radical in the absence & presence of antioxidant was evaluated by means of change in the guanine anodic peak obtained by square wave voltammetry. The result shows that the purine-biosensor is suitable for electrochemical antioxidant determination.

Keywords: Antioxidant biosensor, Screen printed electrode, Purine base, Graphene modification, square wave voltammetry.

OP 13

Bio Plastic Production by Marine Microbes

A. Arun[a], S. Karuppuchamy[a], M. Jothi basu[b]
[a]*Department of Energy Science , Alagappa University, Karaikudi, Tamilnadu, India*
[b]*Alagappa University, Karaikudi, Tamilnadu, India*
E-mail: arunalacha@gmail.com

Abstract: The industrially important of Poly-β-hydroxybutyrate (PHB) producing capability of the bacteria isolated from the various marine fields were compared with

Wausteria eutropha (MTCC-1285). Among the forty two isolates, four strains displayed the accumulation of PHB. They were identified to be two *Vibrio* spp., (MK3 and MK4), *Bacillus cereus* (MC1) and *Bacillus mycoides* (MR7) based on the microbiological characterization and 16S rRNA sequence homology. The maximum PHB producer *Vibrio* sp., (MK4) was further studied in detail. In view of the problem associated with high production cost, in the present study, steps were taken to appraise the effect of carbon sources, nitrogen sources, pH and sodium chloride concentration on PHB productivity by MK4. This would not only diminish the production cost of PHB but also help to enhance productivity. The various conditions optimized for the intracellular accumulation of PHB by strain MK4 were carbon source – glucose, nitrogen source – ammonium sulphate, pH – 7 and sodium chloride concentration – 30 %. These optimized conditions were further used for the batch fermentation over a period of 72 hrs. Significantly higher maximum biomass of 9.1 g/L with the PHB content of 4.223 g/L was obtained in a lab scale bioreactor at 64 hrs, thus giving a productivity of 0.065 g/L/h. The polymer extracted was compared with the authentic PHB and was confirmed to be Poly-β-hydroxybutyrate using FTIR analysis and ^{1}H NMR analysis. Thus the study highlights the potential of the use of *Vibrio* sp (MK4) in the commercial production of PHB.

OP 14

A New Approach for Biofuel Production from Microalgae

<u>N.P.Krishnan</u>[a],M.Ilayaraja[b], R.Sayeekannan[b]*
[a]*Department of Chemistry, K.L.N. College of Engineering, Pottapalayam*
[b]*Department of Chemistry, Thiagarajar College, Madurai-9*
E-mail: krishyas@gmail.com, rsamkannan@yahoo.co.in

Abstract: Many people from individuals to research firms are searching for an alternative fuel source. Biodiesel has received much attention in recent years. The motivation for renewable fuel is not just energy independence but also mitigation of global climate disruption, which has been called "the deficiency challenge of our era" Energy, is essential and vital for development, and the global economy literally runs on energy. Biofuel production from renewable sources is widely considered to be one of the most sustainable alternatives to petroleum sourced fuels and a viable means for environmental and economic sustainability. Microalgae are currently being promoted as an ideal third generation biofuel feedstock with much higher yields than second generation crops. This study examined different strains, harvesting, and extraction methods of algae for production of algae biodiesel with a goal of determining the potential impact, algae biodiesel can make on the economy, the environment and reducing emissions.

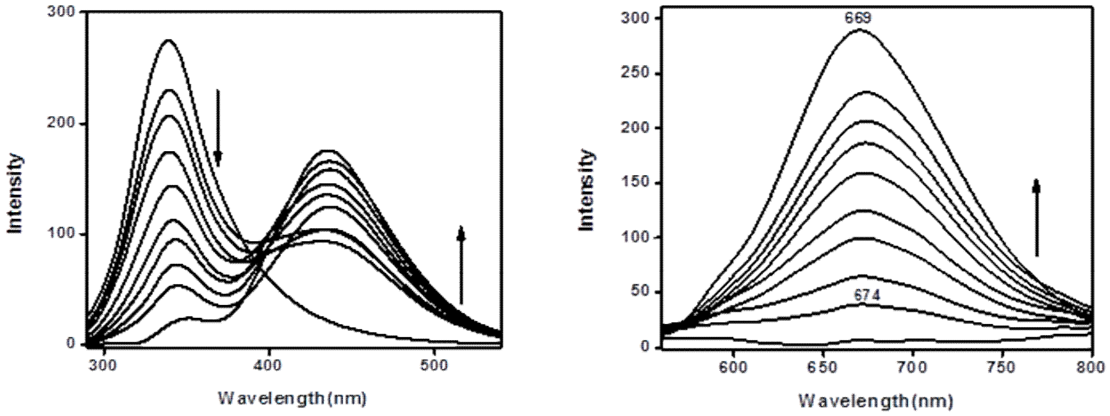
Keywords: Biofuels; Biodiesel; Microalgae;

OP 15

Interaction of [Bis(Bipyridine)(Salphen)Ruthenium(II)] Complex with BSA – Absorption and Emission Spectral Study

V. Gomathi Sankareswari[a], **R. Ramaraj**[b], **S. Rajagopal**[b]
[a]*Department of Chemistry, G.V.N College, Kovilpatti-6285021*
[b]*School of Chemistry, Madurai Kamaraj University, Madurai-625021*
E-mail: gomathigvn@gmail.com

Abstract:The study of photochemistry of ruthenium(II)-bipyridine complexes has received the maximum attention in the past four decades because of their diverse applications as probes, drugs and in the construction of solar cells. The most attractive feature of these metal complexes is the tenability of their ground and excited state properties by changing the nature of the ligand and the medium. Ruthenium-based drugs appear to be good alternatives to platinum drugs as they generally exhibit lower toxicity than their platinum counterparts. In the present study, several [bis(2,2'-bipyridine)(salicylidenephenylenediamine)ruthenium(II)], $[Ru^{II}(bpy)_2$ (salphen)] complexes have been synthesized and characterized by spectral techniques. The interaction of $[Ru^{II}(bpy)_2$(salphen] complexes with bovine serum albumin (BSA) has been studied by using absorption and emission spectral techniques. Upon the addition of BSA, a marked increase in the emission intensity of Ru(II) complex is observed when the metal complex is excited at its absorption maximum (~545 nm) in the phosphate buffer (PBS, pH = 7.4) solution. On the other hand, the intrinsic emission intensity of BSA is quenched in the presence of Ru(II) complex when BSA is excited at 280 nm. These spectral changes show that the Ru(II) complexes bind strongly with BSA and the binding constants measured from the absorption and emission spectral changes are in the range of 10^4 M^{-1}. The luminescent enhancement of Ru(II) complex in the presence of BSA and the fluorescence quenching of BSA accompanied by an increase in the luminescence intensity at 450 nm (luminescence of the salphen ligand) shows efficient fluorescent resonance energy transfer (FRET) from the protein to the probe (Figure 1).



Changes in the luminescence intensity of (a) BSA at different concentration of Ru(II) complex and (b) of ruthenium(II) complex at different [BSA]

References:

P. Muthu Mareeswaran, D. Maheshwaran, E. Babu, S. Rajagopal, J. Fluoresc. 2012, 22, 1345–1356.

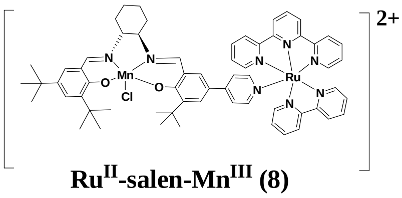
K.K.-W. Lo, A.W.-T.Choi and W.H.-T. Law, Dalton Trans., 2012, 41, 6021–6047.

OP 16

Light Induced Oxidation of Organic Sulfides by Ru^{ii}-Salen-Mn^{iii}Photosensitizer-Catalyst Module: Photogeneration of the High-Valent Salen-Mn^{iv} and Sulfur Radical Cation

<u>K. Senthil Murugan</u>[a], G. Balakrishnan[a], M. Ganesan[a], V. K. Sivasubramanian[a], A. Ilangovan[b], J. Sankar[c], P. Ramamoorthy[d], S. Rajagopal[e], T. Rajendran[a,f,]*
[a]*PGand Research Department of Chemistry, Vivekananda College, Madurai 625 234.*
[b]*School of Chemistry, Bharathidasan University, Tiruchirappalli 620 024.*
[c]*Department of Chemistry, Indian Institute of Science Education and Research, Bhopal-462 023*
[d]*National Centre for Ultrafast Processes, University of Madras, Chennai 600 113.*
[e]*School of Chemistry, Madurai Kamaraj University, Madurai 625 021.*
[f]*Department of Chemistry, PSNA College of Engineering & Technology,Dindugul 624 622.*

Abstract: We have designed and synthesized a new redox-active module (**1**) to hold both a photoactive unit, $[Ru^{II}(terpy)(bpy)]^{2+}$ and a putativecatalytic center, salen-Mn^{III}through a pyridine-based electron-relay moiety. We generated high-valent Mn^{IV} state by the light-driven intramolecular Electron Transfer (ET) from Mn^{III} to Ru^{III} chromophore. We have investigated the mechanistic pathway for the light-driven oxidation of organic sulfides by the photogenerated salen-Mn^{IV} unit. The detection of the formation of a sulfur radical cation and Mn^{III}-phenoxyl radical using time-resolved transient absorption spectroscopy confirms the ET nature of the reaction. This is the first report for the generation and detection of sulfur radical cations from the photochemically generated salen-Mn^{IV} catalytic center.



Ru^{II}-salen-Mn^{III} (8)

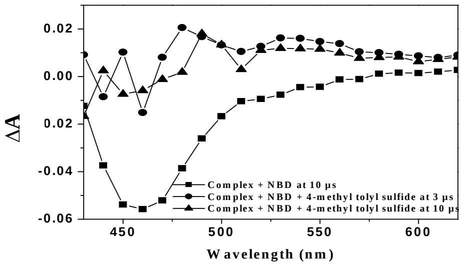


Fig.1. Transient absorption spectra of Ru^{II}-salen-Mn^{III} (0.32mM) with 0.5M 4-methyl tolyl sulfide in aqueous acetonitrile (7:3 v/v ACN+H_2O) in the presence of an irreversible electron acceptor (≈45mM NBD) following a 7ns, 30mJ flash at 532nm.

OP 17

Metal Free Nitrogen Containing Carbon Nanotubes for Oxygen Reduction Reaction

<u>S.Lalitha</u>, B.Viswanathan
National center for catalysis research,IIT Madras,Chennai – 600036

Abstract: Catalysts for oxygen reduction reactions are at the main key of renewable energy technologies including fuel cells, corrosion, and water splitting. Despite various efforts, developing oxygen reduction catalysts with high activity at low costs remains a great challenge.The synthesis of well aligned nitrogen containing carbon nanotubes by pyrolysis of polyvinylpyrrolidone as a metal free catalyst for oxygen reduction reaction

is reported. The nanotubes were characterized by Scanning electron microscopy, X-ray photoelectron spectroscopy, IR spectroscopy. Electrochemical characterization studies were carried out for oxygen reduction reaction by cyclic voltammetry, Rotating disk electrode voltammetry.

OP 18

NR/PEO Block Copolymers for Complexation of Potassium and Sodium Ions

M. S. Mrudula*,M. R. Gopinathan Nair
School of Chemical Sciences, Mahatma Gandhi University,Kottayam, Kerala -686560, India.

Abstract: Metal ions are essential species for numerous areas of industrial applications and in environmental and biological systems. A wide range of physical and chemical processes are available for uptake of metal ions from aqueous medium. But most of them are sludge producing or not cost effective. This has led to the use of better materials which are low cost and value added products from easily available materials (1). In recent years, insoluble polymeric sorbents having different functional groups that can be complexed with metal ions have become well – known for the removal of metal cations from aqueous solutions (2). The polymeric hydrogels incorporated with different chelating groups are promising materials in the field of hydrometallurgical applications, water purification, agriculture, bioengineering, food industry and other fields (3). Hydrogels are polymeric materials containing a large number of hydrophilic groups capable of absorbing and retaining water in their three dimensional networks. They swell by absorbing water and shrink on drying (4). In recent years, the synthesis of hydrogels with chelating groups has received considerable attention for rapid and inexpensive metal ion separation and concentration. It was found that crosslinked polymeric materials having functional groups such as carboxylic acid, amine, hydroxyl, amidoxime, and sulphonic acid groups could be used as complexing agents for metal ions in aqueous solutions (5).

In the present work polyethylene oxide (PEO) which is immobilized with crosslinked short chains of natural rubber (NR) has been used for complexation with alkali metal ions. For this purpose polyethylene oxide and short chains of natural rubber are block copolymerized. Since natural rubber is hydrophobic and polyethylene oxide is hydrophilic they form excellent hydrogels which can swell in aqueous medium and shrink on drying.. Swelling characteristics may be varied by varying the PEO molecular weight. One such product formed from PEO of 6000 molecular weight is used in this study.

The prepared copolymeric hydrogel can act as chelating exchangers due to the presence of electron donor oxygen atoms of PEO. So they can form metal complexes and can remove metals from aqueous medium. The effect of initial metal ion concentration on the metal ion adsorption capacity was investigated for KCl and NaCl aqueous solutions of four different concentrations. The adsorption capacity increases from 93.34 mg/g to 355.79 mg/g for potassium ion and for sodium ion it increases from 43.03 mg/g to 157.29 mg/g when initial concentration of each metal ion increases from 5 mg/l to 20 mg/l. The NR/PEO block copolymers showed 94.14% removal efficiency for potassium (20 mg/l) and 90.02% for sodium (20 mg/l). The distribution coefficient for potassium ion is 4.07 and that of sodium ion is 1.30 at the initial concentration 20 mg/l. The

experimental data showed that the adsorption capacity, removal efficiency and distribution coefficient are high for potassium ions compared to that of sodium ions. The adsorption isotherm models were applied on experimental data and it is found that the Langmuir isotherm model was the best for potassium ions while the Freundlich isotherm model was the best one for sodium ion. From the Freundlich isotherm, the slope value, $n<1$, indicates that the sorption of ions onto the polymer is a concentration – dependent process. This may be attributed to the fact that with progressive surface coverage of the adsorbent, the attractive forces between the metal ion species such as van der Waals forces, increase more rapidly than the repulsive forces and consequently, the metal ions manifest a stronger tendency to bind to the polymer surface.

References:

1. Ekebafe, L. O; Ogbeifun, D. E; Okieimen, F. E. African Journal of Environmental Science and Technology, 6(7) (2012) 275
2. Kasgoz, H; Kasgoz, A; Sahin, U;Temelli,T. Y; Bayat, C. Polymer-Plastics Technology and Engineering, 45 (2006) 117
3. Ei-Hag Ali, A; Shawky, H. A; Abd El Rehim, H.A; Hegazy, E.A. European Polymer Journal, 39 (2003) 2337
4. Uzum, O. B; Karadag, E. Advances in Polymer Technology, 00 (2011) 1
5. Kradag, E; Saradin, D; Guven, O. Sep. Sci.Technol., 30 (1995) 3747

OP 19

Photoluminescence Emission of Cerium Doped Yttrium Oxide Nanoparticles

M.Senthil kumar[a], **V.Sethuraman**[b] **P.Muthuraja**[b], **P. Manisankar***[b]

[a]Departmentof Chemistry, Alagappa Chettiar College of Engg. & Tech.,Karaikudi-4
[b]Department of Industrial Chemistry, Alagappa University,Karaikudi – 630 003
E-mail: pms11@rediffmail.com, senthilshrivi@gmail.com

Abstract: Rare earth ions possess good luminescence characteristic (high colour purity) due to their inner shell electronic transitions between the $4f^n$ energy levels. Cerium (1%) doped crystalline yttrium oxide powders were prepared by hydrolysis assisted co-precipitation method. Yttrium nitrate hexahydrate ($Y(NO_3)_3.6H_2O$) and cerium nitrate hexahydrate ($Ce(NO_3)_3.6H_2O$) were used as precursor materials for this method. The crystal structure of the cerium doped yttrium oxide nano particles at the annealed temperature of 500°C was analysed by X-ray powder diffraction (XRD) using Rigaku Ultima III X-ray diffractometer with Cu Kα1 radiation in the range of 20°-80° (2θ) with a scanning step of 0.02°. The XRD pattern indicates the cubic structure with well crystalline nature of $YCeO_3$ nanoparticles. The average grain size was determined as 20 nm from the full-width at half maximum (FWHM). The surface morphology of the nanoparticle was found out from FE SEM image. The PL spectral peaks of the samples at 500°C become very intense, centered at 423.5 nm and 441 nm. The observed PL may be attributed to the 5d → 4f transition of Ce^{3+}. The ground state level of Ce^{3+} has a doublet character due to splitting, ($^2F_{5/2}$, $^2F_{7/2}$), leading to two possible transitions at 423.5 nm and 441 nm for each phase cerium doped yttrium oxide nanoparticles. The emission spectrum shows a series of emission peaks at 486.5 and 530.5 nm. The emission spectrum shows a green emission with less intensity at 530.5 nm. The green emission line corresponds to the magnetic dipole transition of $^3D_{3/2} \rightarrow {}^3F_{3/2}$ states and $^3D_{3/2} \rightarrow {}^3F_{5/2}$.

Keywords : $YCeO_3$ Nanoparticles, Co-precipitation method , XRD , PL Spectra

OP 20

Quantitative Analysis of Molecular Interactions in Cyclophanes

S. Meenakshisundaram[a], **G. Gopu**[b*]
[a]*Research and Development Centre, Orchid Chemicals and Pharmaceuticals Ltd., Sozhanganallur, Chennai – 600 119, India*
[b]*Department of Industrial Chemistry Alagappa University, Karaikudi-630 003, India.*
E-mail: gopug@alagappauniversity.ac.in

Abstract: Supramolecular chemistry examines the weaker, reversible and non-covalent interactions like hydrogen bonding, metal coordination, hydrophobic forces, van der Waals forces, π-π interactions, dipole-dipole, ion-dipole interactions and electrostatic effects between molecules. The concepts of supramolecular chemistry include molecular self-assembly folding, molecular recognition, host-guest chemistry, mechanically-interlocked molecular architectures and dynamic covalent chemistry.[1] Supramolecular architecture containing bridged aromatic compounds known as cyclophanes[2] are one of the important central classes of synthetic receptors in molecular recognition. Nowadays, the term "cyclophane" has been widened to include macrocyclic compounds incorporating aromatic ring systems and saturated or unsaturated bridges as alternating components of the ring structure.[3] The unique physical and chemical properties of cyclophanes vary considerably on the basis of the size and constitution. All the types of guests such as organic and inorganic cations, anions and neutral molecules have been complexed by cyclophanes. In this association process, all known modes of intermolecular binding interactions have been employed. In this study we estabilished the intermolecular interactions of some cyclophanes with the help of Hirshfeld Surface analysis.

Keywords:Cyclophanes, Hirshfeld Surface, Inter-Intra molecular interactions.

References

1. Oshovsky, G. V.; Reinhoudt, D. N.; Verboom, I. W. Angew. Chem. Int. Edn. 2007, 46, 2366.
2. Diederich, F. Cyclophane In Monographs in Supramolecular Chemistry; Stoddart, J. F.; Ed.; The Royal Society of Chemistry: Cambridge, 1994.
3. McNaught, A.D.; Wilkinson, A.; IUPAC Compendium of chemical terminology, 2nd Ed.; Blackwell, Oxford, 1997.
4. a) M.A.Spackman, P.G.Byrom, Chem.Phys.Lett., 1997, 267, 215; b) J.J.Mckinnon, A.S. Mitchell, M.A.Spackman, Chem.Eur.J. 1998, 4, 2136.

OP 21

Spectral and Electrochemical Studies on Host-Guest Inclusion Complex between 2, 4-Dinitrobenzoic Acid and β-Cyclodextrin

K. Srinivasan, T. Stalin*
Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi, 630 003 Tamilnadu, India
E-mail: tstalinphd@rediffmail.com

Abstract: The host-guest inclusion complex formation between 2, 4-dinitrobenzoic acid (2,4-DNB) and β-cyclodextrin (β-CD) in solution phase were studied by UV-visible spectroscopy and electrochemical (cyclic voltammetry, CV) methods. The prototropic behaviors of 2,4-DNB with and without β-CD was employed and their ground state acidity constant (pKa) were calculated by spectrophotometry method. The binding constant of inclusion complex at 303 K was calculated using Benesi–Hildebrand plot and thermodynamic parameter (ΔG) were also calculated. The solid inclusion complex formation between β-CD and 2,4-DNB was confirmed by ^{1}H NMR, 2D ROESY NMR, FT-IR, XRD and SEM analysis. A schematic representation of this inclusion process is proposed by molecular docking studies using patch dock server.

Key words:β-Cyclodextrin, 2,4-dinitrobenzoic acid , Inclusion complex, Patch dock server, 2D ROESY NMR

OP 22

Spectroscopic, NLO and Photophysical Properties of Triazine Derivatives

M. Shyamala Devi, P. Tharmaraj
Department of Chemistry, Thiagarajar College, Madurai-625 009
E-mail: shyami712@yahoo.co.in, ptharma@rediffmail.com

Abstract: Triazine based donor-π-acceptor (D-π-A) ligand 6-phenyl-2,4-((4-amino-1, 5-dimethyl-2-phenyl pyrazol-3-ylidene)(4-nitro benzylidene))-diamino-1, 3, 5-triazine (NDP) and its Cu(II), Co(II), Ni(II) and Zn(II) complexes have been synthesized from 2,4-diamino-6-phenyl-1,3,5-triazine. The structural features have been investigated from their elemental analysis, magnetic susceptibility, molar conductance, IR, UV-Vis, ^{1}H NMR, mass and ESR spectral studies.Spectroscopic and other analytical data of the complexes suggest octahedral complexes around central metal ion.Their fluorescence and absorbance properties have been investigated by Luminescence spectroscopy and UV-Vis spectroscopy. The ligand exhibited positive solvatochromic behavior in polar solvents indicating a greater stabilization of the excited state as compared to the ground state by a polar solvent. Emission spectra of copper(II), cobalt(II) and nickel(II)complexes exhibited more intense fluorescence in all media indicating their high photo active nature. Powder second harmonic generation efficiency for the ligand is about 11.5 times as that of potassium dihydrogen phosphate and 1.3 times as that of urea.

OP 23

Tailor-Made $Li_2Ni_{0.9}Co_{0.2}Mn_{2.9}O_8$ Spinel Cathode for Rechargeable Lithium Battery Applications

P. Remith, **Bongu Chandrasekhar, N. Kalaiselvi**
Central Electrochemical Research Institute, Karaikudi – 630 006, India
E-mail: kalaiselvicecri@gmail.com

Abstract: With the increasing demand to search for high voltage and/or high capacity cathode materials for use in rechargeable lithium batteries, tailor-made spinel and layered oxides is gaining importance. In this regard, a newer $Li_2Ni_{0.9}Co_{0.2}Mn_{2.9}O_8$, analogous to $Li_2CoMn_3O_8$ spinel has been identified to exhibit acceptable lithium intercalation/ de-intercalation behaviour. Without requiring any special atmosphere or synthesis protocols, the title compound has been prepared at 850 °C using citric acid assisted sol-gel method. The cubic spinel compound obtained with desired phase purity has been investigated for its local cationic arrangement using FTIR and FT-Raman analyses. Upon cycling, the $Li_2Ni_{0.9}Co_{0.2}Mn_{2.9}O_8$ cathode exhibits characteristic CV peaks at the respective voltages, thus demonstrating the possible intercalation and de-intercalation of lithium reversibly in the cell assembly. $Li_2Ni_{0.9}Co_{0.2}Mn_{2.9}O_8$ cathode exhibits a high initial capacity of >160 mAh/g and a steady state capacity as good as >100mAh/g upon extended cycling, despite the inherent high voltage characteristics of the compound. A working voltage of > 4.2V has been observed for the currently synthesized $Li_2Ni_{0.9}Co_{0.2}Mn_{2.9}O_8$ cathode leading to a possible high energy density value and thus finding its suitability for application in lithium batteries.

OP 24

The Photodynamic Activity of Ag @ Tio_2 Core – Shell Nanoparticles in Human Erythrocytes

K. I. Dhanalekshmi, **I.Ramesh, K.S.Meena**
Department of Chemistry, Queen Mary's College, Chennai, India.
Email: dhanamveni88@gmail.com

Abstract: Core-shell type Ag @TiO_2 nanoparticles were prepared by one pot simultaneous reduction of $AgNO_3$ and hydrolysis of Ti(IV) isopropoxide. They were characterized by absorption spectroscopy, XRD and HR-TEM techniques. XRD patterns show the presence of anatase form of TiO_2 and the noble metal (Ag). High resolution transmission electron microscopic measurements revealed that their size is below 50 nm. Ag@TiO_2-NPs are showing photodynamic activity in human erythrocytes. The photohemolysis induced by Ag@TiO_2 core-shell type nanoparticles reveal that the percent hemolysis increased with the increase in concentration and light dose. The study of effect of scavengers, GSH and NaN_3 showed the formation of considerable amount of superoxide anion and singlet oxygen that caused cell death. The mechanism has been discussed. Ag@TiO_2 nano-photosensitizer being non-toxic, serves as proper substitute for the classical photosensitizers (organic dyes).

OP 25

Electrochemical Preparation of Molecularly Imprinted Polypyrrole-Modified Pencil Graphite Electrode for Determination of Picric Acid

P. Karthika, I. Muthukumari, P. Manisankar and S. Viswanathan*
Department of Industrial Chemistry, Alagappa University, Karaikudi 630 003, Tamilnadu, INDIA
Email: rsviswa@gmail.com

Abstract: A molecularly imprinted polymer polypyrrole based film was fabricated for the determination of picric acid. The film was prepared by incorporation of template molecule (picric acid) during the electro polymerization of pyrrole onto a pencil graphite electrode in aqueous solution using cyclic voltammetry method. The performance of the imprinted and non-imprinted films was evaluated by differential pulse voltammetry. The effect of pH, monomer and template concentration, electropolymerization cycle's interference on the performance of the molecularly imprinted polymer electrode was investigated and optimized. The molecularly imprinted film exhibited a high selectivity and sensitivity toward piciric acid. The differential pulse voltammetric peak current shows a linear dependence on the picric acid concentration at pH 2. That pH is considered as optimized, in which highest peak current is obtained. The molecularly imprinted polypyrrole modified pencil graphite electrode showed a stable and reproducible response, without any influence of interference commonly existing in samples. The proposed method is simple and quick. The polypyrrole electrodes have a low response time, good mechanical stability and are disposable, simple to construct.

Keywords: Molecularly imprinted polymer, graphite electrode, Polypyrrole, Voltammetry.

OP 26

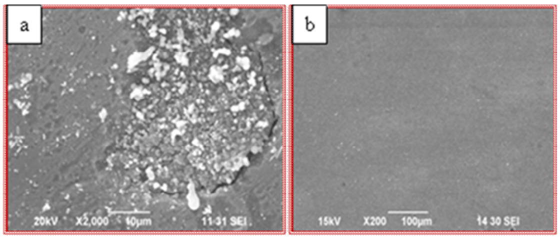
An Investigation on the Synergistic Effect of SPA –Zn^{2+}on the Corrosion of the Carbon Steel in Aqueous Medium

M. Prabakaran, S. Ramesh*, V. Periasamy
Department of Chemistry, Gandhigram Rural Institute, Gandhigram-624302, Dindigul.
E-mail: drsramesh_56@yahoo.com

Abstract: The use of inhibitors is one of the most economical and practical methods of protecting materials against deterioration from corrosion. The iron/electrolyte interphase has been studied in the presence of 3-(trihydroxysilyl) propylmethylphosphonate (SPA) inhibitor with the bivalent cation like Zn^{2+}. A protective film has been developed on the surface of carbon steel in low chloride aqueous environment using a synergistic mixture of an inhibitor, SPA and Zn^{2+}. The synergistic effect of SPA in controlling corrosion of carbon steel has been investigated by gravimetric studies in the absence and presence of Zn^{2+} and showed excellent inhibition efficiency. The mixed mode of inhibition studied by electrochemical polarization and the results of electrochemical impedance spectroscopy have shown the changes in the impedance parameters like charge transfer resistance (R_{ct}) and constant phase element (CPE) to confirm the strong adsorption on the carbon steel. Surface

characterization techniques (FT-IR, SEM and EDX) are used to ascertain the nature of the protective film. The mechanistic aspects of corrosion inhibition are proposed.

Keywords: Carbon steel, SPA, Zn^{2+}, Gravimetric, Electrochemical, SEM/EDX



SEM images of carbon steel immersed in (a) absence of inhibitor (b) presence of inhibitor.

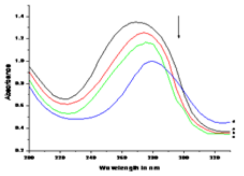
OP 27

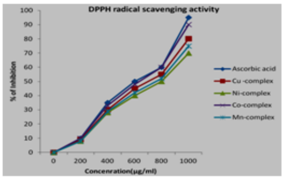
Biocompatible Bivalent Metal Complexes as Anti- Bacterial and Anti-Oxidant Agents: Synthesis, Spectral Characterization and Electrochemical Study

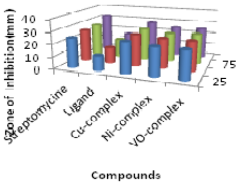
E. Akila, M. Usharani, R. Rajavel*
Department of Chemistry, Periyar University, Salem-11, Tamil Nadu, India
Email: akilachemphd@gmail.com

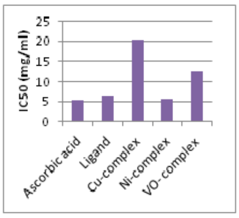
Abstract:A series of Cu(II), Ni(II) and VO(II) complexes of the type M_2L have been synthesized with Schiff base derived from 3, 3′-dihydroxybenzidine, Benzil and 2-aminophenol. The complexes were insoluble in common organic solvents but soluble in DMF and DMSO. The measured molar conductance values in DMF indicate that the complexes are non-electrolytic in nature. All the metal complexes have been fully characterized with the help of elemental analyses, molecular weights, molar conductance values, magnetic moments and Spectral studies. The analytical data helped to elucidate the structure of the metal complexes. The Schiff bases are found to act as a tetradentate ligand using N_2O_2 donor set of atoms leading to a square-planar geometry for the Cu(II), Ni(II) and square pyramidal for VO(II) complexes. The binding properties of metal complexes with DNA were investigated by electronic spectra, cyclic voltammetry and viscosity measurements. Detailed analysis reveals that the metal complexes intercalate into the DNA base stack as intercalators. All the metal complexes cleave pUC18 DNA in presence of H_2O_2. The Schiff bases and their complexes have been screened for their antibacterial activity against four bacterial strains (*Staphylococcus aureus, Escherichia coli, Bacillus subtilis* and *Klebsilla pneumonia*) by disc diffusion method. It is also found that all the metal complexes have potent biocidal activity than the free ligand. The antioxidant activity of the Schiff base complexes were determined by DPPHmethod *in vitro*.

Keywords: Binuclear, Staphylococcus aureus, Spectroscopic, DNA-binding.









References
1. Farukh Arjmand, Fatima Sayeed, Mohd. Muddassir, Journal of Photochemistry and Photobiology B: Biology, 2011, 103, 166.
2. Nahid Shahabadi, Soheila Kashanian, Farivash Darabi, European Journal of Medicinal Chemistry, 2010, 45, 4239.
3. P.Jayaseelan, S. Prasad, S.Vedanayaki and R. Rajavel, Arabian Journal of Chemistry, doi;10.1016/j.arabjc.2011.07.029.

OP 28

Casein Micelle-Metal Nanoparticle-Drug Conjugates for Drug Delivery

S. Sophia[a], A. Aleyamma[a],R. Alagunambi[b],D. Arun[a]
[a]*Department of Nanotechnology, Karunya University, Coimbatore, Tamil Nadu 641114, India*
[b]*PG & Research Department of Chemistry, Government Arts College, Coimbatore*
E-mail: arun@karunya.edu

Abstract: Casein, an amphiphilic milk protein, has proved to be a promising material for drug delivery. The characteristic properties of casein enable it to be used in different formulations. Though there have been many reports on casein, as well as on metal nanoparticles in drug delivery studies, this project is the first of its kind to focus on bioconjugation of casein with metal nanoparticle and drug. The model drug used here is Amoxycillin. Casein-metal nanoparticle-drug conjugates were prepared and characterized using UV-spectrophotometer, photoluminescence spectrophotometer, particle size analyzer and SEM. Analysis revealed significant interaction between casein, metal nanoparticle and drug. Hence, targeted drug delivery and imaging could be achieved through this method.

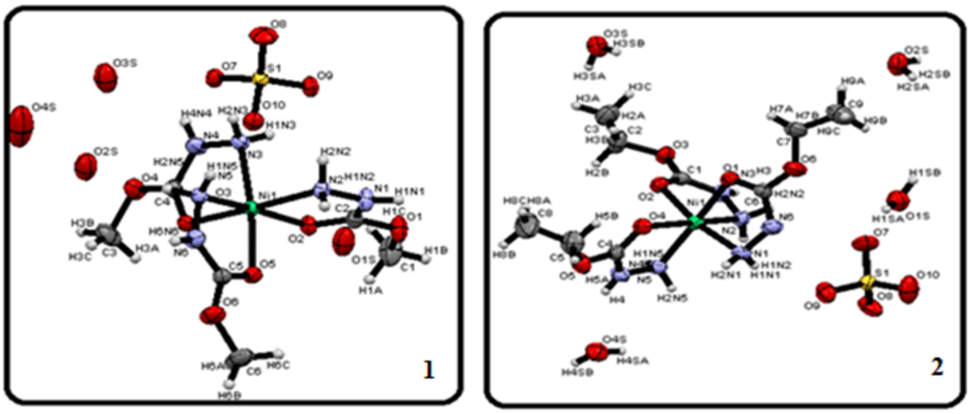
OP 29

Comparative Studies on Nickel(II) Complexes of Alkyl Carbazates with Sulfate as Counter Ion

P. Nithya, M. Lokeswari, S. Govindarajan*
Department of Chemistry, Bharathiar University, Coimbatore - 641 046
E- mail: nithya.msc2007@yahoo.com; drsgovind@yahoo.co.in

Abstract: Alkyl carbazate is an ester of carbazic (hydrazine carboxylic) acid. Among the alkyl carbazates, methyl, ethyl and benzyl carbazates have been exploited as a neutral

bidentate ligand for the synthesis of metal complexes. Also coordination complexes of these neutral carbazate ligands should accommodate anions in order to compensate the charge on metal ion. It is known that among the various factors that affect the thermal properties of metal complexes containing hydrazine and its derivatives, the nature of counter ions present in the complexes is found to play a vital role [1, 2].Herein we report a series of nickel(II) complexes of alkyl carbazates with sulfate anion which have been synthesized and characterized by various physico-chemical techniques. The single crystal X- ray structures of $[Ni(mc)_3]SO_4.4H_2O$ (**1**) , $[Ni(ec)_3]SO_4.4H_2O$ (**2**) and $[Ni(bc)_3]SO_4.2H_2O$ (**3**), where **mc** = methyl carbazate, **ec** = ethyl carbazate and **bc** = benzyl carbazate, have been determined. The structures reveal that in the complex cation, each nickel(II) center is coordinated in a distorted octahedral (NiN_3O_3) fashion consisting of three chelate (N, O) carbazate groups. The sulfate anion and water molecules are present in the lattice and facilitate the three dimensional network through hydrogen bonding. These complexes undergo endothermic dehydration followed by exothermic decomposition to give metal/metal oxide as the end products.



ORTEP diagram of 1 and 2 (with 60% thermal ellipsoid)

References:
1. T.L. Zhang, J.C. Song, J.G. Zhang G.X. Ma , K.B. Yu, Z. Naturforsch. Teil 60B (2005) 505
2. A. M. M. Lanfredi, A. Tiripicchio , M.T. Camellini, Cryst. Struct.Commun. 5 (1976) 827

OP 30

Corrosion Resistance of Ni-W Alloy with the Inclusion of Tin by Electrodeposition Method

K.Arunsunai Kumar, S.Sangeetha, G.Paruthimal Kalaignan* S. Muralidharan
Advanced Nano Composite Coatings Laboratory,Department of Industrial Chemistry, Alagappa University,Karaikudi – 630 003, Tamilnadu, India.
Email: pkalaignan@yahoo.com

Abstract: Electrodeposition of Ni-W-TiN nanocomposite on mild steel substrate from ammonical citrate bath containing dispersed titanium nitride is demonstrated. The structure, surface morphology, composition and corrosion resistance properties of nanocomposites are characterized by using various techniques. X-ray diffraction analysis (XRD) of Ni-W-TiN nanocomposite shows that it is fcc crystal. Scanning electron micrographs (SEM) reveals that smaller grains and uniform distribution of the titanium nitride in the alloy matrix. The microhardness of nanocomposite coatings is higher than that of alloy. The corrosion resistance property of the electrodeposited nanocomposite is evaluated by electrochemical impedance and Tafel polarization studies. Ni-W-TiN nanocomposite is more corrosion resistant than Ni-W alloy. The finer grain and uniform distribution of the titanium nitride in alloy matrix are favoured to the enhanced microhardness and corrosion resistance of the nanocomposite.

Keywords: Electrodeposition, Nanocomposite, Ni-W-TiN, Microhardness and Corrosionresistance.

OP 31

Corrosion Resistance of Super Elastic Nickel – Titanium in Artificial Saliva in the Presence of Digene

A. Krishnaveni[a],S.Rajendran[b,c]
[a] Department of Chemistry , Yadava College , Madurai – 14.
[b] PG and Research Department of Chemistry , GTN Arts College , Dindigul.
[c] Department of Chemistry , RVS School of Engineering and Technology , Dindigul.

Abstract: Dentists recommend the use of orthodontic wires to regulate the arrangement of teeth. After the regulation, people having these orthodontic wires, regulating the arrangement of teeth , have to take orally many tablets. These tablets may corrode the wires in the oral environment, especially saliva. Hence there is a need to investigate the influence of corrosion resistance of orthodontic wires made of metals and alloys. The corrosion resistance of super elastic nickel – titanium in artificial saliva in the presence of a tablet namely Digene has been evaluated by electro chemical study such as polarisation study and AC impedance spectra. Analysis of Polarisation study reveals that the corrosion resistance of super elastic nickel – titanium increases when Digene is added to artificial saliva. This is revealed by the fact that when super elastic nickel – titanium is immersed in artificial saliva LPR value is 4.726187 x 10^6 ohm/cm^2 . When 50ppm of Digene is added the value increases to 9.219169 x 10^6 ohm/cm^2. When 200ppm Digene is added the LPR value further increases to 1.0646957 x 10^7 ohm/cm^2. Correspondingly the corrosion current value decreases. Analysis of AC impedance spectra reveals that the corrosion resistance of super elastic nickel – titanium increases when Digene is added to artificial saliva. This is revealed by the fact that when super elastic nickel – titanium is immersed in artificial saliva charge transfer resistance is 4.2654 x 10^4 ohm cm^2. When 50ppm Digene is added the value increases to 1.51661 x 10^5 ohm cm^2 , when 200ppm Digene is added the charge transfer resistance further increases to 1.60424 x 10^5 ohm cm^2 . Correspondingly the double layer capacitance value decreases.

Keywords: Biomaterials, Corrosion, Artificial Saliva, AC Impedance Spectra.

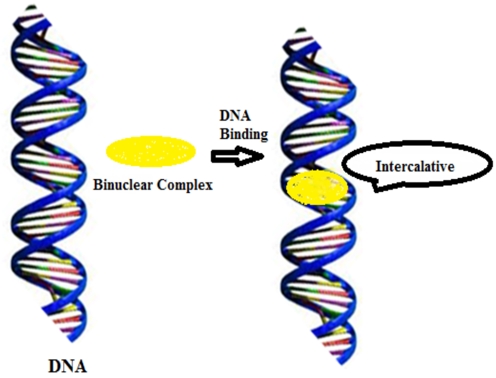
OP 32

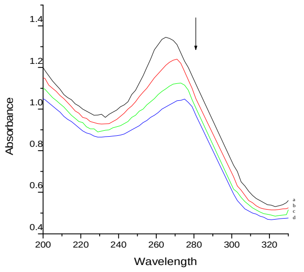
DNA Interactions and Bacterial Inhibition Studies of Binuclear Cu(II) Complexes Derived From Binucleating Schiff Base Ligands

M. Usharani, E. Akila, R. Rajavel*
Department of Chemistry, Periyar University, Periyar Palkalai Nagar, Salem, Tamil Nadu, India
Email:sm.usharani@gmail.com

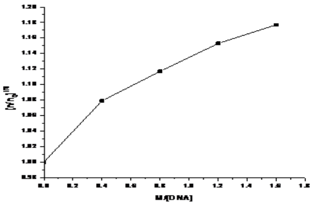
Abstract:A simple method was carried out for synthesizing two new symmetrical and efficient binucleating Schiff base ligands(H_2L) from terephthaldehyde, 2,6

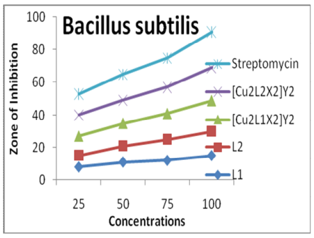
diaminopyridine, Salicylaldehyde / 5-bromosalicylaldehyde with two N_3O potentially active sites.This forms a homo-binuclear complexes with Cu(II) metal ion.The complex formation, stoichiometry and their geometry of the metal complexes were examined by elemental analysis, conductivity measurements, magnetic moments, IR, ^1H-NMR, ESR, electronic spectra and TGA measurements. The conductivity data confirms the electrolytic nature of the complexes.The Metal ion coordinates via pyridyl nitrogen, Phenolic oxygen and the new azomethine (C=N)groups.Octahedral geometry was suggested based on UV–Vis spectra, ESR and magnetic moments.The thermal transformations of Cu(II) complexes based on TG and DTA curves indicates the acetate decomposition and oxidative degradation of Schiff base ligands. DNA binding experiments were investigated using spectroscopic method and viscosity measurements. The observed changes in the physicochemical features of the complexes on binding to DNA suggest that the complexes, bind to DNA with partial intercalation between the base pairs. By gel electrophoresis method it was found that the homo-binuclear Schiff base metal complex cleaves pUC18 DNA in presence of the oxidant H_2O_2. The synthesized Schiff base ligand and binuclear metal complexes were also evaluated for their antibacterial activity and found to be energetic and inhibits the bacterial growth of*Bacillus subtilis, Staphylococcus aureus*, *Klebsilla pneumonia* and*Escherichia coli*.





a-$[Cu_2L_1X_2]Y_2$,b-$[Cu_2L_2X_2]Y_2$,
c- $[Cu_2L_1X_2]Y_2$CT-DNA (40 µM) d-$[Cu_2L_2X_2]Y_2$ CT-DNA (40 µM).





Keywords: Terephthaldehyde, Gel electrophoresis, binuclear, octahedral geometry, Viscosity measurements, binucleating ligand.

References

1. Mohan N. Patel, Mehulsinh R. Chhasatia, Deepen S. Gandhi,Bioorg. Med. Chem, 2009, 17, 5648.
2. Xiaohong Chang, Yu Wang, Yuchun Jiang, Yonglin Guo, Dandan Song, Ximing Song, Francis Verpoort, J. Organomet. Chem, 2012,713, 134.
3. P. Jayaseelan, S. Prasad, S.Vedanayaki and R. Rajavel, European Journal of Chemistry, 2011, 2(4), 480.

OP 33

Electrodeposition of Bi and SnBi Alloys for Microelectronic Packaging

A. R. Rajamani, Murali Rangarajan
Department of Chemical Engineering and Materials Science, Amrita Vishwa Vidyapeetham
Coimbatore 641 112
Email: r_murali@cb.amrita.edu

Abstract: This work concerns electrodeposition of lead-free materials for microelectronic packaging. Given the high component density in microelectronic devices, the components are interconnected by templated electrodeposition of lead-tin solder alloys. However, recovery of lead from e-waste is a huge challenge. To eliminate this issue, bismuth and tin-bismuth alloys are studied as candidate materials, with specific focus on the process of electrodeposition.

Bismuth was electrodeposited from nitrate acid bath, while tin-bismuth alloy was also electrodeposited from an acid bath containing bismuth nitrate, tin chloride, and nitric acid. The deposition was found to be diffusion controlled. Addition of nitric acid facilitated the solubility of bismuth salt, and reduced the difference in deposition potential between bismuth and tin from 450 mV to 260 mV. The effect of additives such as citric acid was also studied. Additives further suppressed bismuth deposition in all cases. The obtained deposits were characterized for morphology using scanning electron microscopy and crystallinity using X-ray diffraction. In the case of bismuth, polycrystalline deposits were obtained with a variety of nanostructured morphologies. The ability of the nitric acid-based baths to deposit nanostructured morphologies with and without additives indicates significant promise for template-assisted electrodeposition similar to those needed in microelectronic packaging.

OP 34

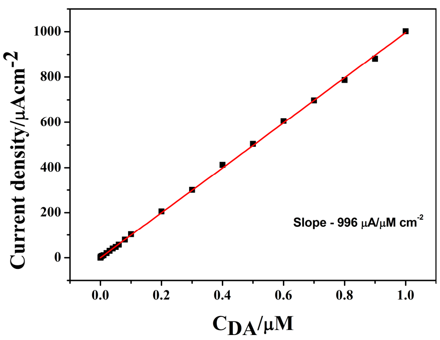
Fabrication of MWCNT/Nf/Au Microarray Electrochemical based Sensor forDopamine Determination

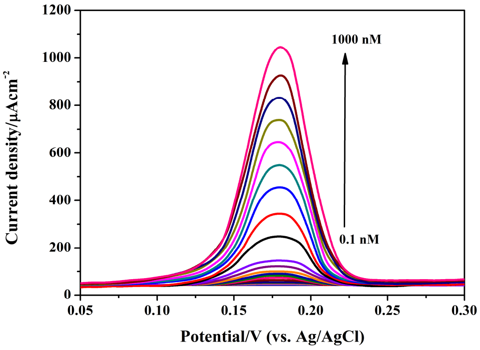
J.Samseya[a], R.Srinivasan[b], V.S.Vasantha[c]
[a] *Department of Industrial Chemistry, Alagappa University , Karaikudi*
[b] *Andavan College of Arts and Science, Trichy*
[c] *School of Chemistry, Madurai Kamaraj University, Madurai*

Abstract: Microelectrode arrays (MEA) can very well be used in electro-analytical applications and biochemical analyses as they are more sensitive than conventional macro electrodes as they provide several advantages in electrochemical analyses like improved signal- to-noise ratio due to increased current density, very low double layer charging current, reduced ohmic drop and high mass transport due to radial diffusion. In this study, gold microelectrode array with electrode of 12μm diameter was fabricated by photolithography technique and subsequently modified with Multi wall carbon nanotube/Nafion (MWCNT/Nf) and used for determination of dopamine. The surface morphologies of unmodified and modified MWCNT/Nf/Au-MEA were tested using SEM technique.

The electro catalytic properties of unmodified and MWCNT/Nf/Au-MEA (gold-micro electrode array) and MWCNT/Nf/Au-ME (gold-macro electrode) towards dopamine were carried out in pH 7.0 by square wave voltammetry. Both bare electrodes exhibited

a single oxidation peak at 240 mV corresponding to dopamine oxidation. In the case of oxidation current, the bare Au-MEA showed high oxidation current (2.5 μA/cm^2) than that of Au-ME (1.2 μA/cm^2) for the same concentration (1 μM). However, after modification with MWCNT/Nf, the peak potential has shifted to 175 mV on both modified electrodes whereas current has been increased enormously on MWCNT/Nf/Au-MEA arrays (1007 μA/cm^2) i.e two fold, than the current obtained on MWCNT/Nf/Au-ME electrode surface (10.5 μA/cm^2). The MWCNT/Nf/Au-MEA sensor exhibits lower detection limit (LOD) of 0.1 nM. It also exhibits enhanced sensitivity (996 μA cm^{-2} μM^{-1}) and a linear range of 0.1 nM to 1000 nM. The MWCNT/Nf/Au-ME exhibits sensitivity of only 10 μA cm^{-2} μM^{-1}, lower detection limit of 10 nM and linear range of 10 nM to 100 μM.Hence, our investigations indicate that the MWCNT/Nf/Au-MEA could serve as highly sensitive sensor for dopamine and can be used for dopamine in a real sample like a serum.





OP 35

Host–Guest Interactions between 3-Hydroxy-2-Naphthoic Acid and Β-Cyclodextrin in Aqueous and Solid Phases Studied By Spectroscopic Methods

R. Kavitha, T. Stalin*

Department of Industrial Chemistry, Alagappa University, Karaikudi- 630 003, Tamilnadu, India.

Abstract: The host-guest inclusion complex between 3-Hydroxy-2-Naphthoic acid (3H2NA) and β-Cyclodextrin (β-CD) was investigated by different spectroscopic techniques. The prototropic behaviors of the 3-Hydroxy-2-Naphthoic acid (3H2NA) in presence and absence of β-Cyclodextrin (β-CD) was employed. The ground state acidity constant (pKa) were calculated by spectrophotometry method including their formation constants and thermodynamic parameter (ΔG) were determined by Benesi–Hildbrand method of inclusion complex. The solid state inclusion complex was characterized by ^{1}H-NMR, FT-IR and XRD analyses. The spectral data clearly indicated that, 3H2NA molecule was encapsulated in β-CD cavity through the host-guest inclusion complex process.

Keywords:*β-Cyclodextrin,* 3-Hydroxy 2-Naphthoic acid,*pH effects,Inclusion complex*

OP 36

Investigation of Host–Guest Inclusion Complexation Between β-Cyclodextrin and Alizarin by Spectroscopic and Electrochemical Methods

S. Mohandoss, T. Stalin*
Department of Industrial Chemistry, Alagappa University,Karaikudi-630 003, Tamilnadu, India.
E-mail: tstalinphd@rediffmail.com

Abstract: The host–guest inclusion complexation between β-cyclodextrin (β-CD) and Alizarin (AZ) were investigated by spectrophotometric (UV–Visible) and electrochemical (CV) methods. The UV–Visible study indicates, the β-CD forms 1:1 inclusion complex with AZ in different ionic solutions pH~4 (neutral form), pH~7 (monoanion form) and pH~12 (dianion form). The electrochemical studies using various buffer medium emphasized the AZ molecule with β-CD. The anodic peak current ($I\text{p}_a$) decreased drastically with increasing β-CD and the anodic peak potential ($E\text{p}_a$) shifted in positive direction. This result indicates for the formation of inclusion complex between β-CD and AZ and their mechanism is proposed to explain the inclusion complex. The solid inclusion complexes were prepared and characterized by Fourier transform- infrared spectroscopy, differential scanning calorimetry, X-ray diffraction pattern. The computational molecular docking studies between β-cyclodextrin and Alizarin were employed using patch dock server.

Keywords:β-cyclodextrin, Alizarin, Inclusion complex, Cyclic voltammetry, Solid complex, Patch dock server

OP 37

Microbial Degradation of Dyes by using Free and Immobilized Cells of "*Lactobacillus sporogenes*"

B. M. Kumar*, Pathuri Uma Anil Kumar, Saladi Sriharish,Unnamatla Vishnu
Department of Biotechnology, Godavari Institute of Engg.& Tech.,Rajahmundry-533296, A.P.
E-mail: bmkumar01@rediffmail.com

Abstract: The rapid development in the industrial sector, especially dye and textile industries leading to the drastic changes in the environmental aspects and is of prime necessity to solve the adverse effects. Microbial degradation (decolorization) of dyes is very effective and eco-friendly technology than that of conventional treatment technologies. Biodegradation techniques have been found more potential to mineralize dye substances to maximum extent and without possibility of secondary pollution. The prime object of this paper is to study the efficiency of the free and immobilized cells of a microorganism, *Lactobacillus sporogenes* for the biodegradation of certain dye compounds (Congo Red and Crystal Violet). The experimental data highlights that the degradation of dye compounds is structural dependant and degradation of dyes is rapid with the immobilized cells of *Lactobacillus sporogenes* when compared to the free cells of the same. The influence of various factors on the dye degradation *viz*., pH and initial concentration of biomass were verified to optimize the process.

Key words: Dyes, Microbial degradation, Lactobacillus sporogenes and influencing factors

OP 38

Solar Thermoelectric Power Generation using Concentrators for Improved Performance

R. Rajapandian,M. Mohamed Hanifa, A.Hariharan, G. Sreedhar
CSIR-Central Electrochemical Research Institute, Karaikudi-630006, Tamilnadu, India
E-mail: raja.pandian6@gmail.com, hanifa.vkp@gmail.com, haran2039@gmail.com

Abstract: Thermoelectricity in general is of strong scientific and technological interest due to its application possibilities ranging from clean energy to photonsensing devices. Recent developments in theoretical studies on the thermoelectric effects, as well as the newly discovered thermoelectric materials provide new opportunities for future applications**.** Thermoelectric modules can be used to convert heat energy to electricity. Using a principle known as "**The Seebeck Effect**" a temperature differential between the two sides of a thermoelectric module, electricity can be generated. BiTe and PbTe materials acts as a p- and n-type of semiconductors in thermoelectric module. Many other type of materials are developed based on operation temperature. However,conversion of sunlight into electricity using thermoelectric modules is now become important in research and development across the globe. Recent work shows that the solar thermoelectric generators achieved a peak efficiency of 4.6% under standard conditions. Our work opens up a promising new approach which has the potential to achieve cost-effective conversion of solar energy into electricity. We focused on the development of solar tracking system with thermoelectric power generators using solar thermal energy concentrators. Our studies shown that using solar thermal energy concentrators, maximum of 140-160°C achieved on hot side of thermoelectric system. Using heat sinks on the cold side of thermoelectric modules, higher temperature gradient can be achieved. This gives more power output as described as the Seebeck Effect. On Comparison with the previous literature, the efficiency is expected higher than the previous published work. Our work opens up a promising new approach which has the potential to achieve cost-effective conversion of solar energy into electricity.

OP 39

Synthesis of MWCNT/SDS/Polypyrrole composite and its application forUric acid determination

A. Daniel Arulraj[a], M. Vijayan[b],V. S. Vasantha[c],*
[a] Alagappa University, Karaikudi, Tamil Nadu, 630 003, India
[b]Central Electrochemical Research Institute, Karaikudi-630 003, India
[c] Madurai Kamaraj University, Madurai- 625 021, India
E-mail: vasantham999@yahoo.co.in

Abstract: This part of work is focused on the synthesis of conducting polymer/MCNTs (Multi wall Carbon Nano Tubes) composites having polypyrrole as matrix. Before the preparation of the polymer/MCNTs composite, the MCNTs were carboxylated through acid treatment in order to disperse MCNTs in aqueous electrolyte. The chemically modified and unmodified MCNTs were characterized by FT-IR spectroscopy. The Polypyrrole (Ppy) and Polypyrrole (Ppy)/MCNTs composites were prepared by cyclic voltammetric method (CV) in the 0.1M pyrrole +0.01M SDS +0.05M $LiClO_4$ and different

% of MCNTs, (0.1, 0.2 and 0.3 % (w/v)).The electrochemical properties of Ppy and Ppy-composites were tested in 0.05M $LiClO_4$ using CV. The capacitance value for Ppy/SDS/MCNTs is found to be higher than the capacitance of Ppy/SDS. Moreover, when the % of MCNTs was increased in the solution, the capacitance values of the composites increased. The surface morphology of Ppy/SDS and Ppy/SDS/CNTs composites were studied using Scanning Electron Microscope and Atomic Force Microscope. The codeposition of CNTs into the polymer matrix increases the size of globular features of the polymer. So the root mean square roughness and average profile height of the polymer film were increased with the increase of MCNTs % in the deposition solution. The images obtained from both techniques reveal the incorporation of MCNTs in the Ppy/SDS matrix. Finally incorporation of MCNTs was again tested by impedance analysis method. The impedance values of Ppy/SDS/MCNTs were found to be lower than pure Ppy/SDS film. The above composite films were used for sensing uric acid. The Ppy/SDS/MCNTs film exhibits high catalytic activity for uric acid among the other films.

OP 40

Study of Aerosol Filtration Efficiency of Aerogel and Xerogel Coated Fabrics

S. Vaidheeswaran[a], S. Subramanian[a], Neha Y. Hebalkar[c], R. Divya[a]
[a]*Department of Textile Technology, Anna University, Chennai – 600025*
[b]*Centre for Nanomaterials, International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad – 500005*
E-mail: vaidheeswaran.sivanesan@gmail.com, ssubbu@annauniv.edu, neha@arci.res.in, divi_rb@yahoo.co.in

Abstract: The silica aerogel has the combined property for aerosol filtration, thermal insulation and noise insulation. The individual pore in the silica aerogel is ultra small (2–120 nm) where more volume is occupied by many number of interconnected network of smaller pores. The surface area to volume ratio of silica aerogel is higher in the order of 32000:1. Silica aerogel blocks cannot be used independently as aerosol filters because of its low physical strength. To use the silica aerogel for aerosol filtration application, it was reinforced with the textile fabrics. In the first part of study, silica aerogel powder, slurry was coated on the fabrics with different structures using binders and cross linking agents. But the aerogel fixation on the fabric was found to be poor due to the brittleness of the aerogel after drying. To overcome this problem, sol gel technology was used to develop silica xerogel on the fabric. Though the xerogel has 60% less pore volume compared to that of aerogel, the xerogel formation occurs after the coating of sol gel on the fabric. In the second part of study, different types of fabrics were coated with sol gel derived silica xerogel. Then filtration efficiency and air permeability of these samples were tested. Xerogel coated honeycomb structure retains the xerogel better and has higher filtration efficiency compared to all the other structure of fabrics developed.

OP41

Antibacterial Activity of *Nelumbo nucifera*Leaves Extract Mediated TiO_2Nanoparticles on Cotton

S. Gowri, M. Sundrarajan*
Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi -3, Tamil Nadu, India
E-mail: drmsgreenchemistrylab@gmail.com

Abstract: An innovative way of preparing titanium dioxide (TiO_2) nanoparticles by biological approach is presented instead of chemical methods that avoid the concerns of environmental contamination. In this study, TiO_2 nanoparticles were produced without any conventional precipitant and surfactant by the leaves extract of *Nelumbo nucifera* (lotus) since it has many biologically active functional materials. We hypothesize that the stabilized TiO_2 nanoparticles is believed to occur by the active ingredients of *Nelumbo nucifera* like proteins, amino acids, polyphenolic compounds etc. Structural, morphological and optical properties were characterized by XRD, SEM with EDX and UV-Vis studies. Further TiO_2 nanoparticles were treated on cotton fabric by pad dry cure method to evaluate its bacterial inhibition potential by agar diffusion method against S.aureus (gram positive) and E.coli (gram negative) bacterial pathogens.

Keywords: Titanium dioxide, Nanoparticles, *Nelumbo nucifera*, Cotton, Antibacterial activity

OP42

Comparative Study On The Dyeing Of Cotton, Silk And Polyester Fabrics By Conventional And Electrochemical Methods

K. Kalapriya[a], H. Gurumallesh Prabu[b]
[a]*Department of Chemistry, Kumaraguru College of Technology, Coimbatore-641006, India*
[b]*Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, India*
E-mail: hgprabu2010@gmail.com

Abstract: Dyeing of cotton, silk and polyester fabrics was carried out by both conventional and electrochemical methods. An attempt has been made to improve the dyeability by embedding the textile substrate on electrode by applying only the potential, but without the use of heat. The novelty in this study was the method of dyeing under eco-friendly means with less consumption of energy. Cotton fabric was dyed with Reactive, Direct and Vat dyes. Silk fabric was dyed with Acid dyes. Polyester fabric was dyed with Disperse dyes. The dye uptake was measured using Computer Color Matching (CCM) analysis. In addition, Cyclic Voltammetric experiments were carried out for the selected dyes to understand the redox behavior (anodic oxidation / cathodic reduction) for energy-efficiency relationship. Electrochemical dyeing method has resulted improved dyeability on silk fabric. Considering the dye uptake and washing fastness, Acid Red 73 dye produced better dyeability when compared with other dyes studied.

Keywords: Cotton, Silk, Polyester, Dyeing, Electrochemical

OP43

Effect of Azeotropic Solvent Mixture Pretreatment on the Physicochemical Behavior of Polyester/Cotton Composite Fabric

S.Laya[a],S. Vigneshwari[b], G.Gopu[c], B. Muralidharan*[a]
[a]Birla Institute of Technology and Science-Pilani, Dubai Campus, International Academic City, Dubai, U.A.E.
[b]Periyar Maniammai University, Thanjavur, Tamilnadu,India .
[c]Department of Industrial Chemistry, Alagappa UniversityKaraikudi, Tamilnadu, India
E-mail: bmdharan@gmail.com; muralidharan@bits-dubai.ac.ae

Abstract: Blending synthetic fibres with natural fibres can offer fascinating properties to the blend with excellent dimensional stability, wear resistance and durable pleat retention. A major factor in efficient commercial dyeing of fabric is simplicity in the dyeing process in a cost effective way. This paper will describe an investigation made on the process of pretreatment of polyester/cotton fabric to modify its physicochemical and dyeing behavior. Characterization of the treated fabric has been carried out with Scanning Electron Microscope (SEM), Fourier Transform Infra Red Spectroscope (FTIR), X-ray Diffraction Meter (XRD) and Differential Scanning Calorimeter (DSC) studies to assess the structural changes if any caused due to solvent pretreatments. Changes in dye uptake behavior of solvent pretreated materials were quantitatively measured. Saving in energy consumption and hence reduction in cost of dyeing could be achieved using the present approach. The observed results are presented.

Keywords: Energy Efficient Dyeing, Crystallites, Segmental Motion, Thermogram

OP44

Effect of Chitosan and Mordants on Dyeability of Cotton Fabrics with Natural Dye from Barks of Odina wodier. L

P.Saravanan[a], G. Chandramohan[b],S.Saivaraj[c]
[a]Department of Chemistry, Kings College of Engineering, Punalkulam, Thanjavur-613303,
[b]Department of Chemistry, A.V.V.M Sri Pushpam College, Poondi, Thanjavur-613503
[c]Department of Chemistry, Thirumalai Engineering College, Kanchipuram-631551
E-mail: saivaraj1984@gmail.com, chandramohan1956@gmail.com,p.v.saravana@gmail.com

Abstract: Natural dyes can be anything that comes from natural sources such as barks, flowers, leaves, roots, insects, shells, and mineral substances. They are used for food coloring, painting and textile dyeing. Using natural dyes in textile processing have been shown a greater interest because they are more-ecofriendly than synthetic dye and show a variety of colors from one natural dye depending on dyeing process and types of mordants. In present study, the cotton fabric was treated with chitosan at different concentrations to find a suitable concentration on dyeability with natural dye from barks of *Odina Wodier. L*. The influence of dyeing methods with mordants, i.e. pre-mordanting, post-mordanting and simultaneous mordanting was determined. The light and wash fastness of chitosan-treated samples were measured compared with untreated samples. Chitosan-treated cotton fabric improved both dyeability and fastness compared with untreated cotton fabric. The cotton fabrics treated with chitosan not only provided better depth of shade but also provided better wash fastness and light fastness than those of the untreated fabrics. The use of different mordants and mordanting methods affected the dye shade and depth of shade differently on the dyed fabrics both with and without chitosan. The range of colour developed on dyed materials were evaluated in terms of (L*a*b*) CIELAB Coordinates and the dye absorption on the cotton was studied by using K/S values.

Keywords: Natural dye, Odina wodier.L, chitosan, mordant and cotton fabric.

OP 45

Effect of Plasma and Cellulase Enzyme Treatments in Hydrophobic Finishing of Cotton Textiles

K. K. Samanta, S. Saxena, A. Arputharaj*, N.Vigneshwaran, T. N Gayatri, A.H Shaikh, R.Narkar R.R Chhagani

Chemical and Bio-chemical Processing Division,Central Institute for Research on Cotton Technology (CIRCOT)Matunga, Mumbai - 400019, India.

**E-mail: arajseeli@gmail.com*

Abstract: Bleached cotton textiles are hydrophilic in nature. But for some of the special applications like self cleaning hydrophobic cotton textiles are preferred. Surface roughness of textile plays vital role in determining the hydrophobicity of the surfaces. This work was carried out to find out the influence of atmospheric pressure plasma pretreatment and cellulase enzyme pretreatment for the improvement of roughness and hydrophobicity. A prototypeatmospheric pressure cold plasma reactor was indigenously developed used for surface treatment of woven cotton substrates. Stable plasma is generated in the presence of helium (He) 0.50 litre/minute,and He/Oxygen gases [0.45 lit/min helium and 0.05 lit/min oxygen] at a discharge voltage of 5 kV and frequency of 18-23 kHz between the two aluminium rectangular electrodes. Plasma treatment time of the fabric was kept at 2 minutes and 4 minutes in each type of gaseous atmosphere. Cellulase enzyme treatment was given using 0.5-5% (OWM) enzyme at 50°C at pH 4.5 for 60 mins. Pre-treated samples were hydrophobized with in 0.5% (W/V) stearic acid solution in methanol and padded with 80% pick up followed by curing at 120ºC. The surface analysis was performed using kawabata surface friction tester KES-FB4. Water contact angles (WCA) were measured with a 5-6µl deionized water droplet on a GTX Gonio meter. In terms of co efficient of friction (MIU) plasma treatment resulted more surface roughness than cellulase treatment. It was found out that plasma treatment reduced the WCA of cotton fabric while enzymatic pretreatment enhanced the WCA after stearic acid treatment.

Key words: Plasma, Cotton, Enzyme, Hydrophobicity

OP 46

Micro Encapsulation Of Herbal Extracts For Microbial Resistance In Spun Laced Non Woven Health Care Textile

K.Sakthivel, R. Nisha, R.Rajakumar

Department of Textile and Designing, Muthayammal College of Arts & Science, Rasipuram

Abstract:A number of crucial issue regarding medical products in general and health care and hygiene products, hence the products made of chemical compounds are toxic and create allergy or irritation to the skin. Non toxic antimicrobial finish has been imparted to the nonwoven fabric using herbal extract of turmeric. Micro encapsules are produced using herbal extract of turmeric as core material and sodium alginate and gelatine as wall material by using rotary disc physical method. The presence of micro encapsules evaluated by SEM (scanning electron microscopy) and the antimicrobial efficiency by disc diffusion method. The research says natural against chemical and disposable against reusable fabric. Hence nonwoven wipe is produced by spun lace techniques using naturally antimicrobial bamboo fibres. The wipes will create a leading choice in medical textile due to its cost efficiency

Key Words: Anti Microbial, Microencapsulation, Turmeric, Non-Woventextile.

OP 47

Preparation andCharacterization ofNanocapsules Containing Paraffin Wax asPhase Change Material and Application to Cotton Fabric

M.Karthikeyan[a], T.Ramachandran[c], O.L. Shanmugasundaram[b]
[a]*Department of Industrial Safety Engineering,* [b]*Department of Textile Technology, K.S.Rangasamy College of Technology, Tiruchengode-637215*
[c]*Principal, Karpagam Institute of Technology, Coimbatore*
Email: mkarthikeyan@ksrct.ac.in

Abstract:A thermoregulating fabric is an intelligent textile that has the property of offering suitable response to changes in external temperature or environmental stimuli. The thermoregulated textiles can be achieved by means of nanoencapsulated coated fabric. The objective of this study was to prepare nanocapsules containing paraffin wax and urea-formaldehyde as the core and shell material, respectively. SEM and FTIR were used to characterize the morphology and chemical structure of the nanocapsules. DSC and TG were used to study the thermo-regulated properties of the nanocapsules. The prepared nanocapsules were fixed onto the cotton fabric using pad-dry-cure method. The thermoregulated property of the nanocapsules coated textiles were studied using DSC. The other properties such as tensile strength, water absorption and abrasion resistance were also studied.

OP 48

Preparation of ZnO/Cotton Composite Fabric and Treatments with*Nyctanthes arbor-tristis* and *Ocimum tenuiflorum* Extracts for Improved Antibacterial Activity

S. Selvam[a], *M. Sundrarajan[a], S.Ravikumar[b]
[a]*Advance Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences, Alagappa University, Karaikudi -630 003, Tamilnadu, India.*
[b]*Department of Oceanography and Coastal Area Studies, School of Marine Sciences, Alagappa University, Thondi Campus -623 409, Tamilnadu, India.*
Email: sundrarajan@yahoo.com

Abstract: Smart textile fabrics have play vital for our human society via surgical cloths, wound cloths, sportswear, innerwear and kids cloths etc. ZnO/Cellulose cotton composite fabric has prepared using Pad-Dry-Cure method. Surface morphology and Hexagonal crystal structure of prepared ZnO nanoparticles were confirmed using SEM, TEM and XRD studies. The particle size of ZnO nanoparticles have characterized using DLS and exhibits the size distributions starting from 20 to 70 nm with average size of 35 nm. Then this composite fabric was treated with Nyctanthese arbor-tristis and Ocimum tenuiflorum extracts. This functionalization was characterized by FTIR, SEM and EDX studies. The antibacterial activities for ZnO, cotton, extracts, extract treated cotton fabrics, ZnO/Cotton and ZnO/Cotton composite extract treated fabrics were done against Staphylococcus aureus and Escherichia coli bacterium. The extract treated composite fabrics showed very good antibacterial activity. *Ocimum tenuiflorum* extract treated composite fabric exhibited better antibacterial activity than *Nyctanthese arbor-tristis* treated composite fabric. This improved antibacterial activity may be due to Eugenol and Carvacrol derivatives of tulasi extract. These types of composite fabrics may suitable for medicinal textiles.

Keywords: Cellulose, composite, antibacterial, modification, DLS.

OP 49

Synthesis of Chitosan-ZnO/Polyaniline Hybrid Composite by Chemical Polymerization Route

K. Pandiselvi, S. Thambidurai*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, Tamil Nadu, India.
Email: sthambi01@yahoo.co.in

Abstract: Composites of conducting polymers and chitosan have shown good properties as conducting and biocompatible material, for various applications. The biopolymer chitosan is very interesting due to its various characteristics such as biodegradability, chemical inertness, biocompatibility, high mechanical strength, good film-forming properties and low cost. Also polyaniline is one of the most extensively studied conducting polymers due to its high hydrophobic nature, and good environmental, thermal and chemical stability. However both are separately have some limitations such as poor mechanical strength, pH sensitivity, low solubility, etc. Moreover the nanocomposites of polyaniline with inorganic nanoparticles are another potential route to improve the performance of polymer composites. Among inorganic nanoparticles, ZnO have received great attention because of their unique catalytic, electrical, electronic and optical properties as well as their low cost and extensive applications in diverse areas. In this record, we prepare a chitosan-polyaniline/ZnO hybrid composite by simple polymerization and precipitation approach. The synthesized materials were characterized by different analytical techniques such as FTIR, UV-vis, SEM, EDXS, XRD, TG-DTA.

Keywords: Chitosan, Polyaniline, ZnO, hybrid composite, FT-IR, XRD.

OP 50

Chemical Synthesis and Characterization of Electrochromic Nano poly (*o*-anisidine-co-ethyl 4-aminobenzoate) Copolymer

R. Sasikumar[a], P. Manisankar[b]
Department of Chemistry, National Institute of Technology,Tiruchirappalli-15
Department of Industrial Chemistry, Alagappa University, Karaikudi –3 Tamil Nadu, India
E-mail: pms11@rediffmail.com, skumaratr@gmail.com

Abstract: The chemical oxidative copolymerization of *o*-anisidine with ethyl 4-aminobenzoate was carried out in aqueous 1 M $HClO_4$ solutions using potassium persulphate as an oxidant. The copolymer exhibited good solubility in many organic solvents. The copolymer was characterized by FTIR spectral data. X-ray diffraction studies showed the crystalline nature and nano crystallite size of the copolymer. SEM and TEM analysis revealed the surface morphology and nano size of the copolymer. Spectroelectrochemical studies of the copolymer carried out on an ITO plate. The conductivity of the copolymer was determined by four-probe conductivity meter.

Key words: Chemical synthesis, o-Anisidine, Ethyl 4-aminobenzoate (EAB), Copolymer.

OP 51

Electrochemical Studies Of Γ-Fe_2O_3-CH Composite Modified Carbon Paste Electrode

AL.Kavitha[a], **H.Gurumallesh Prabu**[b]*
[a]*Department of Science and Humanities, Kings College of Engineering, Punalkulam– 613303*
[b]*Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003, India*
E-mail: hgprabu2010@gmail.com

Abstract: γ-Fe_2O_3 nanoparticles were synthesized by microwave method and characterized. The average grain size was found to be 22-50 nm by XRD and AFM analyses. Chitosan was prepared from the crab shell and characterized.γ-Fe_2O_3-chitosan composite was prepared and used to prepare carbon paste modified electrode. This electrode was characterized by using XRD, FT-IR and SEM techniques. The electrochemical responses (cyclic voltammetry, impedance spectroscopy) of this γ-Fe_2O_3-CH composite (3:1) modified electrode has been studied in potassium ferrocyanide/KCl system. The cyclic voltammetric and EIS studies have indicated better electron transfer of carbon paste modified electrode when compared to bare, γ-Fe_2O_3, chitosan coated electrodes. The surface parameters like surface coverage (τ), Diffusion coefficient (D_0), and rate constant (k_S) were studied. The shelf-life of the developed electrode system was about 12 weeks under refrigerated conditions.

Keywords: Gamma iron oxide, Chitosan, voltammetry, EIS.

OP 52

Preparation and Characterization of Chitosan-Tungsten Oxide Nanoparticles by Acid Precipitation Method

R.Pandimurugan, **S.Thambidurai***
Department of Industrial Chemistry, Alagappa University,Karaikudi-630003, Tamil Nadu, India.
E-mail: sthambi01@yahoo.co.in

Abstract: The nanostructure transition metal oxides have attracted considerable attention in the past decade because of their unique chemical and physical properties leading to numerous potential applications. The high potential of photoconductive behaviour used in electro chromic and sensor devices. Tungsten oxide (WO_3) is the most promising candidate applied for electro chromic materials, gas sensors, and dye sensitized solar cells.Tungsten oxide nanoparticles have been prepared by diverse techniques like microwave hydrothermal method, surfactant mediated method, acidification method, precipitation method etc. Chitosan has been widely used, as it has various properties such as microbial resistance, non-toxicity, and biodegradabitility. In the present work, it is aimed to prepare Chitosan-WO_3 nanoparticles using chitosan as surfactant material and hydrochloric acid as precipitating agent. For this conversion, various concentrations of sodium tungstate and hydrochloric acid were used. The functional group was identified using FTIR and DRS-UV spectroscopy, crystallite size by XRD and the chemical composition was confirmed by energy dispersive analysis (EDAX). The surface morphology of Chitosan-WO_3 nanoparticles are confirmed by SEM analysis.

Keywords: Chitosan, WO_3 nanoparticles, XRD techniques, FTIR.

OP 53

Preparation of Adsorbent from Melia AzadirachSeeds and it's Characterisation

R.Vijayalakshmi[a], R. Venkatachalam[b], T. Periyathambi[b]

[a] Department of Chemistry, Kings college of Engineering, Punalkulam, Thanjavur-613303
[b]Department of Chemistry, A.V.V.M Sri Pushpam College, Poondi , Thanjavur-613503
E-mail: periyathambi@gmail.com, rvrv61@rediffmail.com, rvijichem@gmail.com

Abstract: The adsorbents are particularly useful found and commonly used owing to their large adsorption capacity, fast adsorption kinetics and relative ease of regeneration. Inexpensive sources and cost-effective preparation methods are in demand because of the importance of adsorption in pollution control. The present investigation was carried out the preparation of the adsorbent from *MELIA AZADIRACH* seeds by the method of biomass. The experiments were carried out with carbonisation temperature varied from 300°C to 600°C. The result shows that in all the cases, the increase in the carbonization temperature, the yield of adsorbent was decreased. The yield of adsorbent was observed to be good at carbonization temperature 400°C and carbonization time 2.0 h. The prepared adsorbent was characterized by FT-IR and Scanning Electron Microscopy (SEM) techniques. FT-IR study revealed shows that confirm the functional groups present in the prepared adsorbent. SEM image shows that the morphology of the adsorbent.

Keywords: Adsorbent, Melia Azadirach seeds, SEM, FT-IR.

OP 54

Removal ofReactive Dye by a Composite Metal Oxide Adsorbent Derived fromMetal Oxides

N. Kamila Banu, T. Santhi*
Department of Chemistry, Karpagam University, Coimbatore-641021, India,
E-mail: ssnilasri@yahoo.co.in

Abstract: Zn-Mn-Fe oxide nano particles can be synthesized using a simple solvent free, economic and eco friendly combustion method. The structural characterization of synthesized nano particles are carried out using XRD , SEM-Edax, FT-IR. The optical characterization was carried out using UV and Photoluminescence spectrofluorimeter. The XRD result shows that the nano particles are of hexagonal shape and the average crystal size of the Zinc oxide nano particle is in the range of 70 nm. The SEM analysis shows that the shape of the nano particles is of nano rods. The quality and purity of the metal oxide nano particles are confirmed using XRD and EDAX spectral analysis. The development of efficient adsorbents for the removal of Reactive

Dye from aqueous solution. Optimization of batch mode study carried out the effect of pH at highest adsorption in the 4 pH, with various contact time ,concentration of dye solution, dose variation of the adsorbent. The adsorption capacity of the laboratory prepared activated carbon was used as adsorbent for the removal of Reactive dye from aqueous solutions under varying conditions of initial concentration, carbon dosage and pH. . It indicated that Langmuir isotherm was fitted than Freundlich isotherm. The adsorption follows pseudo second order kinetics.

OP 55

Structure and Electrochemical Performances of Co-Substituted $LiCo_YLi_{X-Y}Mn_{2-X}O_4$Cathode Materials for the Rechargeable Lithium Ion Batteries

P. Mohan, K. Arunsunai Kumar, G. Paruthimal Kalaignan*
Advanced Materials Research Lab, Department of Industrial Chemistry,
Alagappa University, Karaikudi-630 003, Tamil Nadu, India
Email: pkalaignan@yahoo.com

Abstract: Spinel $LiMn_2O_4$ and Co, Li co-substituted $LiCo_yLi_{x-y}Mn_{2-x}O_4$ ($x = 0.20$; $y = 0.05$, 0.10 and 0.15) cathode materials were synthesized by sol-gel technique using aqueous solutions of metal nitrates and tartaric acid as chelating agent at 600 °C for 10 hours. The effect of Co, Li substitution on the structure and surface morphology of $LiCo_yLi_{x-y}Mn_{2-x}O_4$ has been examined by TG/DTA, X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM) analyses. X-ray powder diffraction analysis results have showed the change lattice parameters with increasing Co, Li contents suggesting the occupation of substituent within $LiMn_2O_4$ interlayer spacing. TEM and SEM analyses have showed that, $LiCo_{0.10}Li_{0.10}$-$Mn_{1.80}O_4$has smaller particle size and more regular morphological structure with narrow size distribution than those of pristine $LiMn_2O_4$. The electrochemical properties of the assembled $LiCo_yLi_{x-y}Mn_{2-x}O_4/Li/LiPF_6$ cells were evaluated for Charge/discharge studies at different rates, Cyclic voltammetry and Electrochemical impedance spectroscopic measurements. This co-substituted $LiMn_2O_4$ has improved specific capacity and capacity retention over pure spinel $LiMn_2O_4$. The co-substituted $LiMn_2O_4$ cathode materials have increased cyclability; however, the discharge capacity reduces. Among all the compositions, $LiCo_{0.10}Li_{0.10}$-$Mn_{1.80}O_4$cathode material has improved the structural stability and excellent electrochemical performances of the rechargeable lithium-ion batteries.

Key words: Positive electrode materials,XRD, XPS, TEM, Charge/discharge, EIS

OP 56

Synthesis andCharacterization of Polyaniline/Pd Nanocomposite

P. Boomi, H. Gurumallesh Prabu*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, India
E-mail: hgprabu2010@gmail.com

Abstract: Polyaniline/metal nanoparticles have attracted great interest for scientists and technologists due to their special physical and chemical properties. Palladium colloidal solution was synthesized by controlled chemical reduction of $PdCl_2$ with sodium borohydride and poly-N-vinyl-2-pyrrolidone in water. Polyaniline/Pd nanocomposite was synthesized by chemical oxidative polymerization method using Pd colloidal solution. The materials thus obtained were characterized by different techniques. XRD results indicated the incorporation of palladium nanoparticles into the polyaniline. SEM image revealed that the palladium nanoparticles are uniformly dispersed. The presence of Pd was confirmed by EDAX pattern. The HR-TEM image revealed the formation of polyaniline/Pd nanocomposite possessing round shape. Mean diameter was calculated to be 50 nm. The formation of polyaniline/Pd nanocomposite may be due to the electrostatic interaction between polyaniline and palladium nanoparticles.

Keywords: Polyaniline, Pd Colloidal solution, Composite, XRD, SEM, HR-TEM.

OP 57

UV Assisted Degradation of Reactive Red 2 Dye in Aqueous Solutions by Titanium Dioxide Impregnated Chitosan Beads

M. Hasmath Farzana, R. Karthik, S. Meenakshi*

Department of Chemistry,The Gandhigram Rural Institute, Gandhigram- 624 302E-mail: E-mail: E-mail: drs_meena@rediffmail.com

Abstract: The widespread usage of dyes in many industries has led to a tremendous increase in the production of colored wastes. It is well known that colored waste has a strong impact on the ecosystem and will lead to disturbances to the aquatic life.Photocatalytic degradation of the adsorbate via advanced oxidation process could offer a complete solution for the removal and breakdown of dye pollutants for a more effective treatment. Photocatalytic degradation of an anionic dye namely Reactive Red 2 (RR) was examined using titanium dioxide impregnated chitosan beads (TCB). The as-synthesized TCB is characterized by Fourier transform Infrared (FTIR) Spectral studies and Scanning Electron Microscope (SEM) and Energy Dispersive X-ray Analyser (EDAX). The photocatalytic activity of TCB for the degradation of the reactive dye is much higher than that of bare titanium dioxide whichcan be attributed due to the synergistic effect of chitosan (CS) and titanium dioxide (TiO_2). TiO_2 degrades the dye molecule into CO_2, H_2O and mineral salts fastly and needs continuous supply of dye molecules otherwise it would undergo recombination [1]. The mechanism of photocatalytic degradation of RR dye using TCB is as follows:

$$\text{TCB (CS-TiO}_2\text{)} + h\nu \longrightarrow \text{CS-TiO}_2(e^-_{CB}) + \text{CS-TiO}_2(h^+_{VB})$$

$$\text{CS-TiO}_2\,(h^+_{VB}) + \text{RR dye} \longrightarrow \text{Products}$$

$$\text{CS-TiO}_2\,(h^+_{VB}) + OH^- \longrightarrow \text{CS-TiO}_2 + OH^\bullet$$

$$\text{RR dye} + OH^\bullet \longrightarrow CO_2 + H_2O + \text{salts}$$

The chitosan adsorb dye molecules which continuously supply dye molecules for degradation by TiO_2 and thereby preventing the electron-hole recombination. Effects of experimental parameters such as irradiation time, catalyst dosage, pH, initial dye concentration, and coexisting anions of dyes were optimized. The degradation of dye obeys first order kinetics and is explained on the basis of Langmuir-Hinshelwood mechanism [2]. The mineralization of dye has also been confirmed by COD measurements.

Keywords: Photocatalytic degradation, Titanium dioxide, Langmuir-Hinshelwood, mineralization.

References
[1] S. Watson, J. Scott, D. Beydoun, R. Amal, J. Nanopart. Res. 7 (2005) 691–705.
[2] I. Bouzaida, C. Ferronato, J.M. Chovelon, M.E. Rammah, J.M. Herrmann,
J. Photochem. Photobiol. A: Chem. 168 (2004) 23–30.

OP 58

Transesterification of Biomass for Production of Alkyl Esters

A.Annam Renita, Amrendra Shukla, Nurshaun Sreedhar
Department of Chemical Engineering, Sathyabama University, Chennai-119.

Abstrats: Oil prices escalation and fossil fuel depletion has placed mankind in a perplexed position of combating with environmental issues. Public focus in now on environmental protection because of the detrimental effect ofpollution on the environment. A lot of research is being done on alternate fuels or biofuels. Biofuel is non – toxic, renewable and does not contribute to global warming. Because its primary feedstock is a vegetable oil or animal fat, biodiesel is considered as renewable. Since the carbon in the oil or fat originated mostly from carbon dioxide in the air, biodiesel is considered to contribute much less to global warming than fossil fuels. Alternate fuels can be produced for edible and non-edible oil sources. This paper focuses on the production of biodiesel from Jatropha Curcas , a non edible source which can be grown in large scale as the climate in India is conducive for its growth. Jatropha oil content varies depending on the types of species, climatic conditions and mainly on the altitude where it is grown. Production of biodiesel is done by transesterification with a base catalyst and an acid catalyst. Transesterification reaction is affected by reaction conditions, ratio of oil to alcohol, type and amount of catalyst, reaction time , temperature and purity of oil and its moisture content.

The selection of catalyst is done based on the presence of free fatty acid (FFA) content of the oil. For low FFA content, base catalyst is preferred while for high FFA content, acid catalyzed reaction is carried out. Since alkaline catalysts are less corrosive to industrial equipment, they are preferred over acid catalysts in industries. The main byproduct of this reaction is glycerine, which also has many interesting applications in food, pharmaceutical and cosmetic industries. The biodiesel is separated and washed. The optimum oil-to-methanol ratio, oil-to-catalyst ratio, temperature and duration of the process are estimated and the biodiesel yield is determined. A comparison is made between acid and base catalyzed transesterification. Additionally, the importance and potential of Jatropha curcas as a source of biodiesel is discussed.

Keywords: Pollution, Jatropha Curcas, Biodiesel, Acid Transesterification, Base Transesterification.

OP 59

Solvent Extraction of Rhodamine B from Aqueous Acidic Solution Using Phenol as an Extractant

G. Muthuraman* S. Elumalai
University of madras, Department of Chemistry,
Presidency College, India Chennai 600 005
Email: raman.gm@gmail.com

Abstract: The extraction behavior of cationic dye namely Rhodamine B from acidic aqueous solutions has been investigated using Phenol in xylene as a carrier. Rhodamine B was determined by UV visible spectrophotometry at 554 nm. The maximum extraction efficiency of RB from aqueous solution was found at pH= 1.0±0.1. The extraction of dye increases with increasing phenol concentration in organic phase. The stripping of dye from extractant was found to increase with increasing acetic acid concentration. Including other parameters was also examined effect of pH value, phenol concentration, effect of diluents, effect of equilibration time, effect of inorganic salts, effect of initial dye concentration, effect of temperature, stripping contact time and stripping phase ratio.

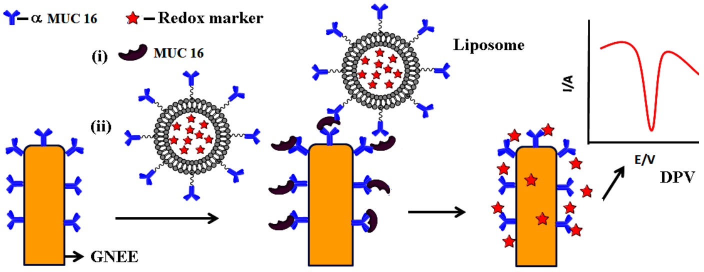
Key words: Rhodamine B, Waste water, stripping, organic phase.

PP 1

Ultrasensitive Detection of Ovarian Cancer Marker using Immunoliposomes and Gold Nanoelectrodes

S. Viswanathan[a,b]*, C. Rani[c], C. Delerue-Matos[b]
[a]Department of Industrial Chemistry, Alagappa University,Karaikudi 630 003, Tamilnadu, India
[b] REQUIMTE, Instituto Superior de Engenharia do Porto,R. S. Tomé, 4200-072 Porto, Portugal
[c]Department of Chemistry, Alagappa Government Arts college, Karaikudi 630 003,Tamilnadu.
E-mail: rsviswa@gmail.com

Abstract-The emerging science of cancer screening demands the sensitive methods for the detection of cancer markers. MUC16 is the established cancer marker used to follow women during or after treatment for epithelial ovarian cancer. In this work, we reported an electrochemical immunosensor for epithelial ovarian cancer marker mucin 16 (MUC16) using gold nanoelectrode ensembles (GNEE) and ferrocene carboxylic acid encapsulated monoclonal anti-MUC16 antibodies (αMUC16) tethered liposomes (αMUC16-FcL). GNEE were fabricated by electroless deposition of the gold within the pores of polycarbonate track-etched membranes. Afterwards, αMUC16 were immobilized on preformed self-assembled monolayers of cysteamine on the GNEE via cross-linking with EDC-Sulfo NHS. A sandwich immunoassay was performed on αMUC16 functionalized GNEE (iGNEE) with MUC16 and immunoliposomes. The differential pulse voltammetry (DPV) was employed to quantify the faradic redox response obtained from bound immunoliposomes on iGNEE. The dose response curve for MUC16 concentration was found between the range of 0.001 –300 U mL^{-1}. The lowest detection limit was found to be 5×10^{-4} U mL^{-1} (S/N = 3). Blood serum samples were analyzed and compared with commercial ELISA detection kits for MUC16.



PP2

A Facile Approach for the Preparation of Magnetic Gels

Jun Li[a,b], A. Gopalan[c], Kwang-Pill Lee[a,b,c*]
[a]School of chemical biology and pharmaceutical sciences,Capital Medical University, Beijing, CHINA, 100069
[b]Department of Chemistry Graduate School, Kyungpook National University,Daegu, SOUTH KOREA
[c]Department of Chemistry, Kyungpook National University, Daegu, SOUTH KOREA.
E-mail: kplee@knu.ac.kr

Abstrats: In this work, we used a simple one-step synthetic method for the preparation of novel nickel nanoparticles incorporated magnetic gels (Ni-GEL) in the mixed ionic

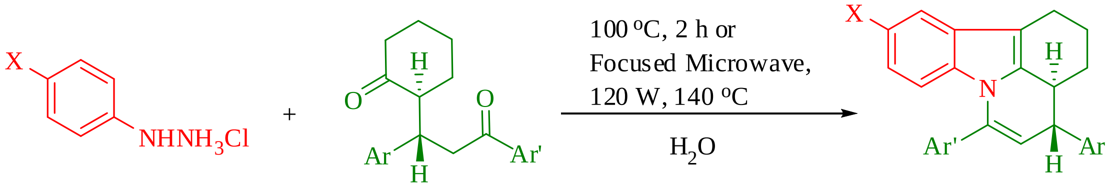
liquid medium. Nickel nanoparticles were insitu generated by reducing nickel chloride in polymer solution. The obtained Ni-GEL were characterized by field emission scanning electron microscope, X-ray diffraction, magnetic measurements and thermogravimetric analysis. For the comparison purpose, pristine nickel nanoparticles were also prepared and characterized for size and morphology. The Ni-GEL exhibited ferromagnetic properties at room temperature. The combined properties of the nickel nanoparticles and gels are expected to be utilized for applications.

PP 3

A facile, water mediated, microwave-assisted synthesis of 4,6-diaryl-2,3,3a,4-tetrahydro-1*H*-pyrido[3,2,1-*jk*]carbazoles by domino Fischer indole reaction and their *in vitro* antituberculosis studies

S.Chitra[a],N. Paul[b],S. Muthusubramanian*[c], P. Manisankar[d]
[a]*Department of Chemistry, Seethalakshmi Achi College for Women, Pallathur-630 107, Tamil Nadu, India.*
[b]*Department of Chemistry, Kerala Government Polytechnic College, Kozhikode, Kerala-673 604*
[c]*Department of organic Chemistry, School of Chemistry, Madurai Kamaraj University, Madurai-625 021, Tamil Nadu, India.*
[d]*Department of Industrial Chemistry, School of Chemistry, Alagappa University, Karaikudi-630 003*

Abstracts: A facile and efficient synthesis of series of 4,6-diaryl-2,3,3a,4-tetrahydro-1*H*-pyrido[3,2,1-jk]carbazoles was achieved in water with good yield by the reaction of diastereomerically pure 2-(3-oxo-1,3-diarylpropyl)-1-cyclohexanones with phenylhydrazine hydrochloride under microwave irradiation. The transformation presumably proceeds *via* a domino Fischer indole reaction. The structure of the compounds was arrived at from the detailed studies of ^{1}H and ^{13}C NMR spectra. Among the synthesized compounds, 6-4-bromophenyl)-10-fluoro-4-phenyl-2,2,3a,4-tetrahydro-1*H*-pyrido[3,2,1-jk]carbazole was found to be the most active with a minimum inhibitory concentration (MIC) of 1.4 µM against MTB.



Keywords: Domino Fischer indole reaction, Carbazoles, Cyclohexanones, NMR

PP 4

A Study of Antimicrobial, Antideterioration and Dyeing Properties of Selected Plant Extracts on Textile Fabrics

R. B.Divya lekshmi[a], D.Ravi[b]
[a]*Department of Biotechnology, Anna University, Regional centre, Coimbatore, Tamilnadu, India.*
[b]*PG and Research Department of Botany, Govt. Arts College, Coimbatore, Tamilnadu, India.*
E-mail:dravi.botany@gmail.com, rbdivya89@gmail.com

Abstract: The natural dyes have been prepared from the plant extracts for the textile application. The methanolic extracts from seven different plant extracts of *Punica granatum*, *Azadirachta indica*, *Curcuma longa*, *Aloe vera*, *Thymus vulgaris*, *Quercus infectoria* and *Bixa orellana* were studied for their antimicrobial and dyeing properties.

The qualitative analysis of antimicrobial activity was carried out by disc diffusion method against both gram positive and gram negative bacteria. Out of seven extracts tested against the selected pathogens *Quercus infectoria* and *Thymus vulgaris* shown higher zone of control against the pathogen when compared to *Punica granatum, Azadirachta indica, Curcuma longa, Aloe vera* and *Bixa orellana.* In a nutshell, the current investigation reveals that all the selected plant extracts possess antimicrobial activity and dyeing property. The cellulosic cotton fabrics were also evaluated for the antideterioration property from the extracts against cellulose degrading organisms. The wash durability of the impregnated properties to the fabrics was increased by a novel technique of microencapsulation/crosslinking technique. The surface morphological studies showed the difference in the microencapsulated and non microencapsulated fabrics.

Keywords: Plant extract, Textile, antimicrobial property, dyeing, antideterioration, microencapsulation, crosslinking.

PP 5

Liposome and Aunp Nano Composite forLabel Free DNA Sensing

M. Bhuvana, V. Dharuman*
Molecular Electronics Laboratory, Department of Bioelectronics and Biosensors
Science Block, 5th floor, Alagappa University, Karaikudi – 630 003, India
E-mail: dharumanudhay@yahoo.com

Abstract: Liposomes are widely used as a carrier for variety of drugs and biomolecules like DNA, RNA and proteins for gene therapy applications. Immobilization of spherical liposome on solid support is a great challenge because the liposomes often form bilayer on solid surface. In this work, Immobilization of 1, 2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE) liposome-gold nanoparticle (DOPE-AuNP) nano composite covalently on 3-mercaptopropionic acid (MPA) on gold surface is demonstrated for the first time for electrochemical label free DNA sensing. Spherical nature of the DOPE on the MPA monolayer is confirmed by the appearance of sigmoidal voltammetric profile, characteristic behavior of linear diffusion, for the MPA-DOPE in presence of [Fe(CN)6]3-/4- and [Ru(NH3)6]3+ redox probes. The DOPE liposome vesicle fusion is prevented by electroless deposition of AuNP on the hydrophilic amine head groups of the DOPE. Immobilization of single stranded DNA (ssDNA) is made via simple gold-thiol linkage for DNA hybridization sensing in the presence of [Fe(CN)6]3-/4-. The sensor discriminates the hybridized (complementary target hybridized), un-hybridized (non-complementary target hybridized) and single base mismatch target hybridized surfaces sensitively and selectively without signal amplification. The lowest target DNA concentration detected is 0.1 x 10-12 M. Cyclic voltammetry (CV), electrochemical impedance (EIS).

Key words*:* liposome, spherical structure, solid surface, DNA sensing, electrochemical.

PP 6

Adsorption of Eosin-Y from Aqueous Solutions using Nano Composite Resins

M.Ilayaraja, R.Sayee Kannan*
PG Research and Department of chemistry, Thiagarajar college, Madurai-625009, Tamil Nadu
E-mail: ilayarajam1985_tc@yahoo.com, rsamkannan@yahoo.co.in

Abstract: Titanium dioxide-Phenol-Formaldehyde Composite (TiO_2-PFC) NPs was utilized as low-cost adsorbent to remove anionic dye (Eosin-Y, EY) from aqueous solution. TiO_2-PFC NPs were characterized by using Scanning Electron Microscope (SEM), Thermo Gravimetric Analysis (TGA), X-ray diffraction spectrometer (XRD) and infrared spectrometer analysis (FTIR). The adsorption of (EY), whose isotherms are modeled according to Langmuir, Freundlich and Temkin, were studied at a variety of physical and chemical conditions. The data fitted very well with Langmuir and Freundlich isotherm. Batch adsorption models, based on the assumption of pseudo-first order, pseudo-second-order and intraparticle diffusion mechanism, showed that kinetic data follow closely pseudo first-order and intraparticle diffusion. In addition, various thermodynamic parameters, such as standard Gibbs free energy (ΔG°), standard enthalpy (ΔH°), standard entropy (ΔS°) were calculated. The adsorption process of EY dye onto TiO_2-PFC NPs was found to be spontaneous and endothermic process.

Keywords: Eosin-Y; Sorption isotherms; Kinetics; thermodynamics;

PP 7

$Ag_{0.333}V_2O_5$ Nanorods: Synthesis, Characterization and Electrochemical Sensing Property

R. Suresh[a], K. Giribabu[a], , R. Manigandan[a], S. Munusamy[a], S. Praveen kumar[a], S. Muthamizh[a], L. Vijayalakshmi[b],A. Stephen[c], V. Narayanan[a]*
[a]Department of Inorganic Chemistry, University of Madras, Guindy Campus,Chennai.
[b]Vidhya Sagar Women's College, Chengalpattu, Kancheepuram.
[c]Department of Nuclear Physics, University of Madras, Guindy Campus, Chennai.
E-mail: vnnara@yahoo.co.in

Abstract: In this study, $Ag_{0.333}V_2O_5$ nanorods weresynthesized by thermal decomposition method. The FT-IR spectrum of $Ag_{0.333}V_2O_5$ shows the bands at 827 and 1031 cm^{-1} which essentially of crystalline V_2O_5. Further, the bands observed in $Ag_{0.333}V_2O_5$ are all shifted to lower wave number than the V_2O_5. The optical property of the nanocomposite was studied using UV-Visible absorption spectroscopy. The XRD data also revealed that the $Ag_{0.333}V_2O_5$ obtained had an orthorhombic structure. There was no indication of any other impurities in the sample. The FE-SEM image of $Ag_{0.333}V_2O_5$ shows that the particles adopt rod-like particles with different sizes due to aggregation. The synthesized nanoparticles were used to modify glassy carbon electrode (GCE) and the modified electrode was used to detect uric acid (UA) by voltammetric techniques. The effects of Ag on the optical, morphological and electrochemical detecting property of V_2O_5 have also been studied.

PP8

Alkali and Dye Treated Lignite Fly Ash for the Removal of Cu(II) Ions from Aqueous Solution

T. S. Malarvizhi[a, *], **T. Santhi,**[a.]
[a]Department of Chemistry, Karpagam University, Coimbatore 641021, India
E-mail: malarvizhi_jsc@yahoo.com

Abstract: Many electroplating and printed circuit board factories discharge large amounts of poisonous heavy metals in their wastewater, with Cu(II) ions being one of the most common. These effluents must be decontaminated to avoid their toxicity and carcinogenicity. The removal of Cu(II) ions from an aqueous solution using two adsorbents which were alkali modified lignite fly ash (FAN), alkali and dye modified lignite fly ash (FAN-MO) were studied. The influence of the four parameters (solution pH, contact time, initial metal ion concentration and dose of the adsorbent) on the removal of Cu(II) ions at 27 ± 1°C was studied by batch mode. The removal of Cu(II) ions can be well fitted using the pseudo second order kinetics for both FAN and FAN-MO adsorbents than pseudo first order kinetics. The removal of Cu(II) ions satisfied only Langmuir isotherm model among other linear forms of Freundlich, Tempkin, D-R, Harkin-Jura and Frenkel Halsey isotherms. The percentage of removal of Cu(II) ions was higher at pH 3.0 for FAN (89.5%) and pH 5.0 for FAN-MO (93.8%). The maximum removal Cu(II) ions onto FAN and FAN-MO was achieved within 70 minutes. The adsorbent FAN-MO showed a more removal efficiency of Cu(II) ions than the adsorbent FAN. Influence of Ni(II) ions and Zn(II) ions in the removal of Cu(II) ions on FAN and FAN-MO showed certain decrease in the removal of Cu(II) ions.

PP 9

Alternate Coating for Cadmium

K.Shanmugasigamani, P.R. Thangavelu, KN Srinivasan, M.Selvam
CSIR-Central Electrochemical Research Institute, Karaikudi

Abstract: New environmental regulations over the world encourage the use of alternatives to cadmium plating for corrosion-protection systems used on steels. Cadmium is a sacrificial material that continues to provide galvanic protection even when breached to expose the underlying surface. It cannot in general be replaced by simple barrier coatings since, once a barrier coating is scratched, the underlying material corrodes .The problems with cadmium are somewhat different. Cadmium is an inherently toxic heavy metal poison that is quite easily leached and therefore poses environmental and health problems throughout its life cycle .Zn-Ni alloy is gaining importance to replace Cadmium for most of the industrial applications. Hence in this study, authors have optimized the bath for getting zinc nickel alloy deposition with nickel content in the range of 10-12 % from a non cyanide alkaline bath.Hull cell studies were carried out to optimize the solution composition, current density, temperature, agitation etc (i.e. operating conditions) for getting a deposition of 10-12 % Ni.. Galvanostatic polarization studies, impedance and surface roughness measurements were carried out to understand the mechanism of codeposition and evaluate the corrosion performance of the coatings. SEM, EDAX, XRD measurements were carried

out to characterize the deposit properties and structure. XRD results confirm the presence γ -phase of the alloy.Impedance and polarization studies revealed that CR of the deposit is equivalent to cadmium. .Hence it is good replacement of cadmium for many industrial applications.

PP 10

An Enzymatic Glucose Sensing at Polypyrrole-Ruthenium Oxide-Glucose Oxidase Composite

R. Vairam, J. Shankara Narayanan, V. Dharuman*
Molecular Electronics Lab, Department of Bioelectronics and Biosensors,Alagappa University,
Karaikudi -630 003, India
E-mail: dharumanudhay@yahoo.com

Abstract: Polypyrrole-ruthenium oxide-glucose oxidase (Ppy-RuO_2-Gox) composite was fabricated by simple electro deposition and pasting method. The surface was applied for direct glucose sensing in phosphate buffer.The surface was proved to show higher Michaelis-Menten kinetic constant i.e. K_M 37mM, than the RuO_2-GOx surface which was $K_{M,}$ 800 µM. The higher K_M for the Ppy-RuO_2-GOx is related to the efficient interaction between the RuO_2 particles in the Ppy and the outer membrane GOx. The Ppy-RuO_2-GOx senses glucose selectively in presence of other interferences uric acid, ascorbic acid than the Ppy-RuO_2 and RuO_2-GOx composites. The GOx plays a important role in restricting the interferences and diffusion of glucose towards the catalytic RuO_2 thus enhancing the dynamic range.Cyclic voltammetry (CV), chrono amperommetry (CA) and impedance spectroscopic (IS) techniques were employed for electrochemical interrogation. Scanning Electron microscopy (SEM), and X-ray diffraction (XRD) techniques were used for physicochemical characterization. The results suggest that the Ppy-RuO_2-GOx acts as an effective transducer for the development of enzymatic glucose sensors.

Keywords: Glucose sensor, Enzymatic, Glucose Oxidase, Rutheniun dioxide, Nafion

PP 11

An Investigation of Biodiesel Synthesis from *Jatropha Curcas* Oil using $Ce_{0.9}Ca_{0.1}O_{1.9}$Nanocomposite as Catalyst

G. Sahaana[b], A. Obadiah[a], Arun Dakshinamurthy[b], S. Vasanth Kumar[a,b]*
[a]*Department of Chemistry, Karunya University, Coimbatore - 641114, Tamilnadu, India.*
[b]*Department of Nanotechnology, Karunya University, Coimbatore - 641114, Tamilnadu, India.*
E-mail: kumar2359@yahoo.com

Abstract: Heterogeneous $Ce_{0.9}Ca_{0.1}O_{1.9}$ nanocomposite synthesized using co-precipitation method was employed as catalyst for the transesterification of *Jatropha curcas* oil. CeO_2 and CaO were also included as transesterification catalysts for comparative analysis. The three catalysts were calcined at different temperatures ranging from 200, 400, 600, 800 and 1000ºC to transform them into their active oxides, and characterized using Scanning Electron Microscope (SEM), X-ray Diffraction (XRD), Energy Dispersive Spectrometry (EDS), Particle Size Analyzer (PSA) and Fourier Transform Infrared Spectrometer (FT-IR). Gas Chromatography (GC) analysis of the transesterification products showed maximum Fatty Acid Methyl Ester (FAME) production when catalysts calcined at 600ºC and 800ºC were used. This study reveals that $Ce_{0.9}Ca_{0.1}O_{1.9}$ nanocomposite and CeO_2 are efficient catalysts for biodiesel synthesis.

Key Words: Biodiesel, Heterogeneous catalyst, Nanocomposite, Transesterification, *Jatropha curcas*, CeO_2, CaO, $Ce_{0.9}Ca_{0.1}O_{1.9}$

PP 12

An Investigation on the Modification of Dyeing Behavior of 100 % PET Spun Yarn.

S. Vigneshwari[a], S.Laya[d], R.Venkatachalam[b], J.Ethiraj[c],B. Muralidharan[d*]
[a]Periyar Maniammai University, Thanjavur, Tamilnadu ,India.
[b]A.V.V.M. Sri Pushapam College, Poondi, Thanjavur Dt.613 502, Tamilnadu, India
.[c]C.Byre Gowda Institute of Technology, Kolar, Karnataka, India.
[d]Birla Institute of Technology and Science-Pilani, Dubai Campus, International Academic City, Dubai, U.A.E.
E-mail: bmdharan@gmail.com; muralidharan@bits-dubai.ac.ae

Abstract: Polyester fibre has lot of commercial importance in the textile industry. Many approaches have been reported to improve its functional properties like antibacterial properties, reduced flammability, water absorbency, improved dyeing and mechanical properties. This paper presents a detailed study on the physico chemical modification of 100 % PET spun yarn. Modification of the fibre was carried out by treating the fibre with an azeotropic solvent mixture for different time intervals and the treated fibres were subjected to various analytical investigations such as the surface modification using Scanning Electron Microscopic studies (SEM), chemical modification using Fourier Transform Infra Red Spectroscopy (FTIR), Crystallinity studies using X-ray Diffraction Method (XRD) and thermal behavior by Differential Scanning Calorimetry (DSC). It has been observed that the azeotropic solvent mixture could enhance the dyeing behaviour of the fibre through solvent induced crystallization (SINC).

Keywords: azeotropic solvent mixture, SEM, DSC, FTIR, XRD, dyeability, Solvent induced crystallization

PP 13

Anion Induced Fluorescence Quenching Of Various Naphthalenediols

N. Radha[a], M. Swaminathan[b,*]
[a] Department of Chemistry, Alagappa Govt.Arts College, Karaikudi – 630 003, India.
[b] Department of Chemistry, Annamalai University, Annamalainagar 608002, Tamilnadu, India.

Abstract: Fluorescence quenching of four Naphthalenediols [1,5-; 1,7- ; 2,7-; & 2,3-(NDs)] was investigated by inorganic anions [Cl^-, Br^-, SO_4^{2-} SO_3^{2-}, $S_2O_3^{2-}$, CO_3^{2-}, NO_3^-, & HPO_4^{2-}] in different solvents. The Fluorescence quenching was found to be dynamic in all systems. The fluoresccence quenching of NDs by inorganic anions gave linear SV plots. The plots of log k_q values with singlet transition energy (E_s) of the fluorophore and with E_{CTTS} of the quencher are linear. Quenching mechanism involves the transfer of electrons from excited fluorophore to the inorganic anions.

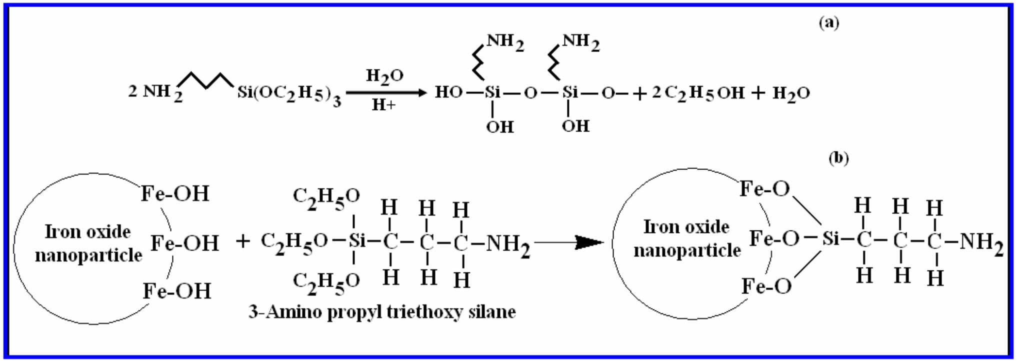
Key words: Fluorescence quenching, Naphthalenediols, Anionic quenching, Electron transfermechanism. Non-emissive exciplex, inorganic anions

PP 14

Anti-Cancer Drug Loading and Release Study of 3-APTES Coated Fe_3O_4 Nanoparticles

S. Sasikala, M. Ramalakshmi, P. Shakkthivel*
Sustainable Energy and Smart Materials Research Lab, Department of NanoScience and Technology, Alagappa University, Karaikudi – 630 003, INDIA
E-mail: apsakthivel@yahoo.com

Abstract: The 3-Aminopropyltriethoxy silane-coated magnetic nanoparticles (APTES-MNPs) were prepared as carriers for curcumin anti-cancer drug through co-precipitation method and Characterized using X-ray diffraction, FE-SEM, TGA, FTIR, VSM and UV-Visible spectrophotometer techniques. It was found that the synthesized APTES- MNPs were spherical in shape with an average size of 80±20 nm, low aggregation and good magnetic responsivity. The amount of APTES bound to the iron oxide nanoparticles were estimated by Thermogravimetric Analysis (TGA) and the attachment of APTES to the iron oxide nanoparticles was confirmed by FTIR analysis. The room temperature VSM measurements showed that magnetic particles were superparamagnetic character. Rapid drug loading in 2 hrs and controlled drug release ~80% in 48hrs are observed by UV-visible spectrophotometer. The present findings show that curcumin loaded APTES coated iron oxide nanoparticles are promising magnetic drug carriers to be used in magnetically targeted drug delivery.



PP 15

Bio-Approach: Insitu Generation of Zno Nanocrystals on Cotton Fabric and Evaluation of their Antibacterial Properties

P.Dhandapani, S.Kamalasekaran, Arun.S.Siddarth, S.Maruthamuthu, G.Rajagopal*
CSIR-Central Electrochemical Research Institute, Karaikudi- 630 006,Tamil Nadu, India
Email: dhadi.rajagopal@gmail.com

Abstact: In the present contribution, ZnO nanoparticles were synthesized through the formation of biologically activated ammonia from urea broth in presence of *Serratia ureilytica* (HM475278*)* and loaded into cotton fabric. The cotton fabric was immersed in biogenic zinc ammonium medium and heated at optimum temperature of 60°C for different durations of time (30, 60, 90 min). Characterization of the samples was done using analytical techniques such as SEM-EDAX, XRD, TGA, CHNS and UV-Vis. The evaluation of antibacterial activity was carried out against *E.coli* and *S. aureus.* Crystal

growth and morphological studies confirmed the attachment of ZnO NPs on the cotton fabric. Spherical to nanoflower shaped particles were obtained with increasing time duration from 30-90 min. Loading of ZnO NPs was further confirmed by shift in the absorbance wavelength as recorded by UV-Vis spectra. The antibacterial activity of loaded cotton fabrics was found to be substantially higher than the bare cotton samples. Wet film interfacial contact studies have shown greater antibacterial activity as a result of nanoparticle contact at the bio-interface, as observed by Epi- fluorescent microscopic observations.

PP 16

Biological Studies of Cu(II),Fe(III) &Co(II) Metal Complexes of Quinoxaline Derivatives

<u>*S.Jone Kirubavathy</u>[a],K.Arun Kumar[a],S.Chitra[b]
[a]*Assistant Professor,Kongunadu Arts and Science College,Coimbatore*
[b]*Associate Professor,P.S.G.R.Krishnammal College for Women,Coimbatore.*
Email: jonekirubavathi@gmail.com

Abstract: Quinoxaline and its derivatives are important nitrogen containing heterocyclic compounds of various biologically interesting properties with several pharmaceutical applications. Substituted quinoxalines are an important class of benzoheterocycles, which constitute the building blocks of wide range of pharmacologically active compounds having antibacterial,antifungal, anticancer, antitubercular, antileishmanial, antimalarial and antidepressant activities. The quinoxaline is described as a bioisoster of quinoline, naphthalene, benzothiophene and other aromatic rings such as pyridine and pyrazine. Because of the similarity between some antitubercular drugs and quinoxaline, as well as the presence of the quinoxaline moiety in some broad spectrum antibiotics, it was hoped that quinoxaline analogs would exhibit antitubercular activity. Some of quinoxaline analogues, such as 2,3-bis(2-pyridyl)-quinoxaline (DPQ) complexed with transition metals are of current interest in view of its binding to DNA.This may suggest that conjugation of biologically active peptides with quinoxaline analogs can lead to new therapeutic agents possessing interesting anticancer properties.The present work deals with the synthesis of quinoxaline derivative and their Cu(II),Fe(III),& Co(II) metal complexes.The synthesized ligand and their complexes were characterized using IR,UV,Molar Conductance,Metal Estimation and biological studies(antimicrobial and anti cancer).The Molar conductance show the complexes are non electrolytes.The geometry of the complexes were suggested from UV and the trial for single crystal is going on for the complete elucidation of the structure.The results of the anti microbial and anti cancer activity show that these complexes pharmacologically active.

Keywords:Quinoxaline,Biological study,metal complexes.

PP 17

Biosynthesis and Characterization of Cerium Oxide Nanoparticle using Fungi *Aspergillus niger*

N. Abinaya, K. Gopinath, S. Marcus, K. Rajeshwaran, S. Jeganath, M. Esakkirajan, A. Arumugam*
Department of Nanoscience and Technology, Alagappa University, Karaikudi - 630 004.
Department of Animal Health and Management, Alagappa University, Karaikudi - 630 004.
E-mail: sixmuga@yahoo.com

Abstract: The biosynthesis of nanoparticles has received increasing attention due to the growing need to develop safe, cost-effective, environmentally friendly technologies for nanomaterial synthesis. Synthesis of nonmaterials from micro organisms has proved to be an effective and alternate method for the novel production of nanomaterials. In this present investigation, we report the biosynthesis and characterization of cerium oxide nanoparticle from the fungu *Aspergillus niger*. Cerium oxide nanoparticles were synthesized using cerium chloride in a basic medium. UV, FTIR, RAMAN spectroscopy, XRD and TEM were performed to conform the formation of CeO_2 nanoparticles. UV visible spectroscopy was performed to study the optical property and band gap of the synthesized CeO_2 nanoparticles, which exhibit a well defined peak at around 295nm. FTIR spectrum indicates the presence of functional group in the resultant material and they are attributed to the reduction of CeO_2 Nps...XRD revealed the crystalline structure of the synthesized CeO_2 with face centered cubic geometry and the preferential orientation was found along the (111) plane. Further, the formation of cubic fluorite structure was supported by Raman spectroscopy. The Raman active mode for CeO_2 sample is 463.95 cm^{-1}. TEM studies of CeO_2 nanoparticles were found to be spherical in shape with an average diameter of 5nm. Further applications of the synthesized CeO_2 Nps were investigated such as Antibacterial activity which shows a significant inhibition towards both gram positive and gram negative bacterium. With the help of confocal microscopy biofilm activity was seen using CeO_2 Nps.Cyclic Voltometric (CV) analysis was also performed to check the possibility of electrochemical activity for sensor application in the synthesized CeO_2 Nps. Anti-larvicidal activity was carried out using the CeO_2 nanoparticles which showed to prevent the larvae of *A. aegypti* from growing. Bio-transformation of CeO_2 nanoparticles were carried out using *Vigana radiata.*

Keywords*: Aspergillus niger,*Cerium oxide, Biosynthesis, Larvicidal activity. Cyclic Voltometric analysis.

PP 18

Biosynthesis and Characterization of Cerium Oxide Nanoparticle using Fungi *Fusarium solani*

K. Gopinath, N.Abinaya, S.Marcus, K. ajeshwaran, S. Jeganath, A. Arumugam*
Department of Nanoscience and Technology, Alagappa University, Karaikudi - 630 004.
E-mail: sixmuga@yahoo.com

Abstract: The biosynthesis of nanoparticles has received increasing attention due to the growing need to develop safe, cost-effective, environmentally friendly technologies for nanomaterial synthesis. Synthesis of nonmaterials from micro organisms has proved to be an effective and alternate method for the novel production of nanomaterials. In this present investigation, we report the biosynthesis and characterization of cerium oxide nanoparticle from the fungi *Fusarium solani*. Cerium oxide nanoparticles were synthesized using cerium chloride in a basic medium. UV, FTIR, RAMAN spectroscopy, XRD and TEM were performed to conform the formation of CeO_2 nanoparticles. UV visible spectroscopy was performed to study the optical property and band gap of the synthesized CeO_2 nanoparticles, which exhibit a well defined peak at around 295nm. FTIR spectrum indicates the presence of functional group in the resultant material and they are attributed to the reduction of CeO_2 Nps...XRD revealed the crystalline structure of the synthesized CeO_2 with face centered cubic geometry and the preferential orientation was found along the (111) plane. Further, the formation of cubic fluorite structure was supported by Raman spectroscopy. The Raman active mode for CeO_2 sample is 463.95 cm^{-1}. TEM studies of CeO_2 nanoparticles were found to be spherical in shape with an average diameter of 5nm.

Keywords: *Fusarium solani,*Cerium oxide, Biosynthesis, Bio-reduction.

PP 19

Biosynthesis and characterization of Gold nanoparticles using aqueous extract of seaweed *Hypnea valentiae*

V. Sri Ramkumar[a], N.K. Ahila[b], E. Kannapiran[b]*

[a]*Department of Oceanography and Coastal Area Studies, School of Marine Sciences,*
Alagappa University, Thondi Campus, Thondi - 623409.
[b]*Dept of Zoology, Directorate of Distance Education, Alagappa University, Karaikudi - 630 004.*

Abstract: The expansion of consistent processes for the synthesis of metal nanoparticles is significant aspect of nanotechnology nowadays. The biosynthesis of gold nanoparticles using marine plants especially seaweeds are very scanty. In this study, the reduction of gold nanoparticles using the aqueous extract of seaweed *Hypnea valentiae* was investigated. The gold nanoparticles were synthesized by adding Chloroauric acid (10^{-3} M concentration) to the reaction vessel that contained the aqueous extract of *Hypnea valentiae*. The biosynthesised gold nanoparticles were characterized using UV-visible spectroscopy, X-ray diffraction pattern and Field emission scanning electron microscopy equipped with EDX analysis. FE-SEM analysis showed that particle sizes ranging between 20 and 60 nm diameter and X-ray diffraction pattern revealed cubic in structure. These results propose that the gold nanoparticles were effectively synthesized by the aqueous extract of seaweed *Hypnea valentiae* andit was stable.

Keywords: Biosynthesis, Gold nanoparticles, Seaweed, *Hypnea valentiae*, EDX analysis.

PP 20

Biosynthesis and Characterization of Silver Nanoparticles Using Fresh Water Cyanobacterium, *Oscillaporia Annae*

R.Sampath Ganesh, S.Muthukkumarasamy, K.Gurunathan*
Department of Nanoscience and Technology, Alagappa University, Karaikudi-630003
Email: kgnathan27@rediffmail.com

Abstract: Formulating cost effective, eco- freindly, energy efficient synthesis of metal nanoparticles is an important need recently. Apart from Eco-friendliness and easy availability and low cost cyanobacterial biomass production will be more advantageous when compared to other classes of micro organism. Biosynthesis nanoparticles would have greater commercial viability if the nanoparticles could be synthesized more rapidly in the reaction vessel.

We effort to report the extracellular biosynthesis of silver nanoparticles using fresh water cyanobacterium, *Oscillaporia annae* which reduces silver ions and stabilizes the silver nanoparticles by its inherent protein. The silver nitrate solution was incubated with washed fresh water cyanobacteria and changed into a yellow, indicating the formation of silver nanoparticles. The characteristics of the protein shell at 440nm were observed in UV spectrum for the silver nanoparticles in solution. While Fourier Transform Infra Red (FTIR) confirmed the presence of a protein shell which are responsible for the nanoparticles biosynthesis. Scanning Electron Microscopy (SEM and TEM) studies showed that the formation of agglomerated silver nanoparticles due to the capping agent in the range of 40nm. EDS spectrum of the silver nanoparticles was confirmed the presence of elemental silver signal in high percentage.

Keywords: Biosynthesis, Cyanobacteria, silver nanoparticles, *Oscillaporia annae.*

PP 21

Biosynthesis and characterization of ZnO:SnO$_2$ nanocomposites using *Fusarium solani.*

R.Azhagar samy[a],N. Nagarajan[a], K.S.Venkatesh[a], R.Ilangovan[a]*
[a]Nanoelectronics laboratory, Department of Nanoscience and Technology, Alagappa University,
Karaikudi 630 004, Tamil Nadu, India.
E-mail: rajangamilangovan@gmail.com

Abstract: The nano-composite material has broadened significantly to encompass a large variety of systems such as one-dimensional, two-dimensional, three-dimensional and amorphous materials, made of distinctly dissimilar components and mixed at the nanometer scale. ZnO:SnO$_2$ nanocomposites have been synthesized successfully by biosynthesis using *Fusarium solani*. The thermal property of the as synthesized nanocomposites was studied using TGA/DTA analysis.The XRD results revealed the presence of polycrystalline nature. The grain size of the nanocomposites was calculated using Debye Scherrer formula and the size is to be 27 nm .The presences of various functional groups were analyzed using FTIR spectra. The optical property of the nanocomposites was studied by UV-vis-NIR spectroscopy

Keywords: Zno: SnO$_2$; Nanocomposites; Biosynthesis; XRD; TGA/DTA; UV-vis-NIR;

PP 22

Bio-synthesis of Magnesium Oxide Nanoparticles Using *Phyllanthus emblica*Fruit Juice and their Biological Applications

<u>K.Ramanujam</u>, S.Selvam, M. Sundrarajan*
Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi -630 003, Tamil Nadu, India.
E-mail: drmsgreenchemistrylab@gmail.com

Abstract: Bio-synthesis of magnesium oxide nanoparticles (MgO) were prepared by a novel, low cost, environment friendly and simple method. Face centre cubic phase of (MgO) nanoparticles were carried out using *Phyllanthus emblica* fruit juice as a precipitant and capping agent. The hydroxide precipitate at room temperature, followed by calcinations at 450 ºC .X-ray Diffraction (XRD) and Scanning Electron Microscopy (SEM) with EDX studies confirmed the crystalline nature and morphology of MgO nanoparticles. The synthesized MgO nanoparticles were treated with cotton fabric and it is confirmed by SEM with EDX analysis. Antibacterial activity of the synthesized MgO nanoparticles and the coated cotton fabric were evaluated against *S.aureus* and *E.coli* bacteria.

Keywords: Bio-synthesis, *Phyllanthus emblica*, MgO, Antibacterial activity

PP 23

Biosynthesis of MgO Nanoparticles using Banana Stem Plant Extract

<u>R. Rajiv gandhi</u>, J. Suresh, S. Gowri, M. Sundrarajan*
Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi, Tamil Nadu, India.
E-mail: drmsgreenchemistrylab@gmail.com

Abstract: A green, Low cost and environment friendly aqueous extract of banana stem plant is employed for the synthesis of magnesium oxide nanoparticles using the starting material magnesium nitrate [$Mg(NO_3)_2.6H_2O$). In this biosynthesis, the effect of stabilization of MgO nanoparticles and the role of banana stem extract on the hydrolysis of magnesium nitrate for the conversion of $Mg(OH)_2$ were discussed. Biosynthesized MgO nanoparticles were characterized using XRD, SEM, TEM with SAED pattern and FT-IR studies. XRD studies display that the MgO nanoparticles is well crystallized in the form of cubic phase structure. SEM investigations reveal the morphology of nanoclusters and cubic structure for MgO. TEM images correlates well with the morphology and size determined from SEM images. To the best of our knowledge, banana stem plant mediated biosynthesis of MgO nanoparticles has not been reported.

Keywords: Banana stem, Biosynthesis, Hydrolysis, MgO Nanoparticles.

PP 24

Biosynthesis of Silver Nanoparticles usingTribulus terrestris Leaf Extract and their Optical and Electrical Properties

S. Ashokkumar[a] , S. Ravi[b*]
[a]Department of Physics, Annamalai University, Annamalainagar-608002, Tamil Nadu, India
[b]Department of Engg. Physics, Annamalai University, Annamalainagar-608002, Tamil Nadu, ndia
E-mail: ambedravi@gmail.com

Abstract: Nanoparticles synthesis is an evergreen research field of 21st century in which the connotation of the biomediated experimental process is highly imperative. Biomediated silver nanoparticles were synthesized with the aid of an eco-friendly biomaterial, namely, aqueous Tribulus terrestris extract. Silver nanoparticles were synthesized using a rapid, single step, and completely green biosynthetic method employing aqueous Tribulus terrestris leaf extracts as both the reducing and capping agent. Silver ions were rapidly reduced by the aqueous Tribulus terrestris leaf extracts, leading to the formation of highly crystalline silver nanoparticles. Formation of the silver nanoparticles was verified by surface plasmon spectra using an UV−vis spectrophotometer. Morphology and crystalline structure of the prepared silver nanoparticles were characterized by TEM and XRD techniques, respectively. FT−IR analysis suggests that the obtained silver nanoparticles might be stabilized through the interactions of carboxylic groups, carbonyl groups and the flavonoids present in the silver nanoparticles.

Key words:, Biosynthesis, Silver nanoparticles, Optical properties, Tribulus terrestris extract.

PP 25

Cathodic Electrodeposition of Titanium Dioxide Thin Films and Their Application to dye-sensitized solar cells

S. Karuppuchamy[a],P. Shakkthivel[b], Y. Andou[c]
[a]Department of Energy Science, Alagappa University, Karaikudi, Tamilnadu-630 003
[b]Department of Nanoscience and Technology, Alagappa University, Karaikudi, Tamilnadu-630 003
[c]Eco-Town Research Center, Kyushu Institute of Technology, 2-4 Hibikino, Wakamatsu-ku,
Kitakyushu, Fukuoka 808 0196, Japan

Abstract: Nanostructured semiconductor oxide materials have recently attracted a much attention owing to their excellent optical, chemical, photoelectrochemical and electronic properties. Among the metal oxides, nanocrystalline titanium dioxide (TiO_2) is one of the most investigated materials due to its important applications in environmental cleanup, photocatalysis, dye-sensitized solar cells, and gas sensors. For these industrial applications, the preparation of optically transparent TiO_2 films in a large area and the improvement of their photo-functional properties would be crucial tasks. So far thin films of transparent TiO_2 are classically deposited from the vapor phase. However, these methods have high costs, and the preparation of films in a large area is technically difficult. Electrodeposition is a promising technique for the preparation of transparent nanocrystalline semiconductor oxide thin films in large area substrates. Therefore, our recent research has been focused on the development of nanostructured TiO_2 films by simple and low-cost electrochemical method. In this study,

we report a widely applicable and relatively simple approach for the successful preparation of nanocrystalline TiO_2 thin films. Further, the promising applications of electrodeposited TiO_2 films will also be discussed.

PP 26

Characterization of Chitosan/SnO_2 Hybrid Nanocomposite

S. Rajaboopathi, K. Pandiselvi, S. Thambidurai*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, Tamil Nadu, India.
E-mail: sthambi01@yahoo.co.in

Abstract: Chitosan, 2-amino-2-deoxy-(1, 4)-d-glucopyranan, is a basic polysaccharide easily produced from the shells of crabs, shrimps, and prawns. It is used in a wide range of applications such as waste water treatments, separation membranes, drug delivery systems, and biosensors. Over recent years, hybrid materials based on chitosan have been developed, including metal oxide nanoparticles and oxide agents, due to excellent properties of individual components and outstanding synergistic effects simultaneously. In this regard nanocrystalline SnO_2 has been used in a variety of applications such as gas sensors, electrodes for lithium ion batteries, dye-sensitized solar cells, catalysts and super capacitors. In this study, a simple precipitation method was adopted to prepare a new chitosan/SnO_2 composite. The molecular level interaction between chitosan and SnO_2 was characterized by Fourier transform infrared spectroscopy (FT-IR) and UV-vis spectroscopy (UV-vis). Moreover the morphological study was analyzed by scanning electron microscopy (SEM).

Keywords: Polyaniline, Metal oxide, hybrid composite, FT-IR, UV-vis spectra.

PP 27

Chemical Composition and *In-vitro* Anti-oxidant Activity of Essential Oil from *Ruta graveolens*

A. Lakshmanan, N. Muniyappan, N.S. Nagarajan*
Department of Chemistry, Gandhigram Rural Institute-Deemed University, Gandhigram-624 302
E-mail: lakshmanan.org@gmail.com

Abstract: Essential oils are extracted from various parts of plants such as roots, leaves, seeds, barks and flowers. Recent research showed that approximately 3000 plant species contain essential oils, out of which only 300 are commercially important. The plant *Ruta graveolens,*knownasArupatham thalai in Tamil. belongs to Rutaceae family . The Essential oil was obtained by the hydrodistillation of fresh leaves (2 kg) of *Ruta graveolens* using a Clevenger apparatus for 5 hours. (yield 2% v/w). When the essential oil was subjected to GC-MS analysis, 58 phytoconstituents were identified. The major five phytoconstituents identified are dl-Limonene (70.74%), Trans-Caryophyllene (4.54 %), α-Copaene (4.01 %), β-Myrcene (2.51%) and α-Humulene (1.32 %). The essential oil when analysed by DPPH method and H_2O_2 method showed nearly 82 % anti-oxidant activity when compared to the standard. The results showed that the essential oil can be used in biotechnological fields as a natural preservative ingredient in food and pharmaceutical industries.

PP 28

Chemical Synthesis and Characterization of Strontium OxideNanoparticles

R. Stanley[a], **A. Samson Nesaraj**[b*]
[a]*School of Nanosciences and Technology, Karunya University, Coimbatore – 641 114, India.*
[b]*Department of Chemistry, Karunya University, Coimbatore – 641 114, India.*
Email: drsamson@karunya.edu

Abstract: Chemical synthesis of SrO nanoparticles (NPs) was carried out at room temperature via precipitation of $Sr(OH)_2$ from aqueous media using $Sr(NO_3)_2$ as a starting precursor and NaOH as a precipitant. The $Sr(OH)_2$ precursor was converted into SrO nanoparticles through calcination at 800°C for 2 hours. Strontium oxide (SrO) nanoparticles were characterized by XRD and the peaks are quite agreeable with the pure phase cubic structure. The XRD pattern confirmed the crystallinity and phase purity of the sample. Photoluminescence measurements revealed the systematic shift of the emission band towards the lower wavelength thereby ascertaining the quantum confinement effect. Photoluminescence spectra of pure SrO were investigated, showing emission peaks around 406 nm. UV-Visible spectra have shown absorption peaks around 242 nm. The SEM results revealed that the resultant nanoparticles are porous and agglomerated with polycrystalline nano entities.

Keywords: Strontium nanoparticles - chemical synthesis – characterization

PP 29

Coating of Ag on to Polypropylene Nonwoven for Antibacterial Activity

S. Ananda Babu, H. Gurumallesh Prabu*, M. Anandan
Department of Industrial Chemistry, Alagappa University, Karaikudi- 630003, India
E-mail: hgprabu2010@gmail.com

Abstract: This work was aimed to testify AgNP synthesized from $AgNO_3$ by a novel reduction process using *Calotropis procera* plant extract as a reducing as well as capping agent. The AgNP thus synthesized was coated on polypropylene (PP) nonwoven material without the use of any synthetic binder to impart antibacterial activity. In order to understand the nature of coating, the uncoated PP and extract coated PP were characterized by FT-IR and SEM analyses. From the SEM images, the coating of biomass on to PP was clearly observed as bright spots. The uncoated and coated PP was subjected to EDX analysis. Peaks were observed for Ag (weight % of Ag = 2.72). Antibacterial efficiency of uncoated PP and coated PP was investigated by estimating the number of viable bacteria cells in the *S. aureus* and *E. coli* suspension after being contact with substrate for two different time durations such as 24 h and 48 h. Significant antibacterial efficiency was observed for all substrates. The difference in the percentage of inhibition was significant at 24 h and almost saturated at 48 h. Higher bacterial inhibition efficiency was obtained against *S.aureus* for *Calotropis procera* extract containing Ag (60.9 %) than with the neat extract inhibition efficiency (46.3 %). The advantages in this method are cost effective and eco-friendly methods of preparing AgNP as well as coating.

Keywords: AgNP, polypropylene, *Calotropis procera*, antibacterial.

PP 30

Cobalt Oxide Nanoparticles Synthesis using Greener Solvent

M. Ramalakshmi, **M. Sundrarajan***
Advanced Green Chemistry Lab, Department of Industrial Chemistry, Alagappa University,Karaikudi – 630003
E-mail: drmsgreenchemistrylab@gmail.com

Abstract: Room temperature ionic liquids are attractive environmentally benign solvents for organic, inorganic and electrochemical applications. Cobalt oxide (Co_3O_4) nanoparticles were synthesized in 1-n-butyl-3-methylimidazolium trifluoromethane sulfonate ionic liquid medium with and without the addition of oxidizing agent (H_2O_2) by precipitation method. The crystallinity, structure, morphology and magnetic properties of the synthesized Co_3O_4 nanoparticles were studied through various techniques such as X-ray diffraction, Fourier transform infrared spectroscopy, Field emission scanning electron microscopy and Vibrating sample magnetometer studies. The synthesized Cobalt oxide nanoparticles are cubic spinel and exhibit weak ferromagnetic in nature and it is very much useful in biomedical and electrochemical applications. **Keywords:** cobalt oxide, synthesis, nanoparticles, ionic liquid

PP 31

Comparitive Studies on the Corrosion Inhibition Performance of Polymers Containing Azo/Azomethine Groups in the Backbone for Mild Steel in Acid Medium

A. Kiruthika, **K.Parameswari, S.Chitra**
Department of Chemistry, PSGR Krishnammal College for women, Coimbatore.
E-mail: parampps@yahoo.co.in

Abstract: The corrosion behavior of mild steel in 1M sulphuric acid solution containing various concentrations of polyesters formed by the condensation reaction between adipoyl chloride/ terephthaloyl chloride and 4, 4' -bis (hydroxyl thioureaazo) biphenyl diamine monomer [BTTP, BTAP]/ schiff base formed between 4, 4'-diamino biphenyl and 4-hydroxy benzaldehyde [BBTP, BBAP] were studied using weight loss, Impedance spectra and Potentiodynamic polarization methods. The protection efficiency increased with increase in inhibitor concentration. The effect of temperature on the corrosion behavior of mild steel was studied in the temperature range 303 K -333 K for 1M H_2SO_4 containing an optimum concentration of 1000ppm of the synthesized polymers. Polarization studies show that the polymers function as mixed inhibitors but predominantly control the cathodic reaction. AC impedance spectra and SEM reveal the formation of a protective film on the metal surface. The adsorption of the polymers on the steel surface was in agreement with Langmuir isotherm. Studies show that polymers BTTP, BBTP [with more aryl rings] are better inhibitors than BTAP and BBAP.

Keywords: Polyesters, Schiff base, polarization, impedance, Scanning electron microscope

PP 32

Computational and Experimental Study of Process Optimization by Central Composite Design for Fabrication of Electrospun PVDF Membrane and Utilization of this Polymer based Electrolyte for DSSC

Priyanka Pandey, M. Sethupathy, P. Manisankar*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003, Tamil Nadu, India
E-mail: pms11@rediffmail.com

Abstract: A computational approach was developed to screening the perfect diameter of electrospun (ES) nanofiber membrane from liquid electrolyte polymer. Response surface methodology based on a three-level, three-variable central composite design (CCD) and one-step ES method was used to model the average diameter of poly(vinylidene fluoride) (PVDF) membranes. Three independent variables like polymer concentration (10-20% W/V), distance (10-20 cm), and voltage (15-20V) were transformed into coded values, and quadratic model was built to predict the responses. The significance of the independent variables and their interactions tested by the analysis of variance (ANOVA), t and F-test statistics. The adequacy of the proposed model tested by correlation between experimental and predicted values of the response and predicted errors were explained. The coefficient determination of the model was 0.923. The predicted value of fiber diameters conforms to the experimental results. The PVDF ES membranes were viewed under a scanning electron microscope (SEM) to observe the fully interconnected cross membrane with nanosize distribution. A minimum fiber diameter of 170 nm was established and validated by experiments after optimization of experimental conditions. PVDF electrospun nanofiber electrolyte exhibits conductivity, 0.242×10^{-4} Scm^{-1} at 25°C without any specific modification. After designed experiment, optimized diameter of electrospun nanofiber membrane further evaluated for porosity (83.6%), electrolyte uptake (310.0 %) and photovoltaic performances like Jsc = 1.49 mA cm^{-2}, V_{oc} = 0.64 V, FF = 0.58 and efficiency (η = 0.57 %) of the DSSC devices using electrospun PVDF electrolyte were evaluated for the fabricated dye sensitized solar cell. The significant results from this study clearly indicate that polymer electrolytes based on PVDF ES membranes can very well be used for DSSCs.

Keywords: Computational approach, Response surface modeling, Central composite design, Electrospinning, Poly(vinylidene fluoride), DSSC

PP 33

Coordination Chemistry and Biological Property of7-diphenylaminocinnamyl-8-hydroxyquinoline

C.Muthukumar[a]*, A.Sabatiyan[b]
[a]*PG & Research department of Chemistry, J.J.College of Arts and Science, Pudukkottai- 622422*
[b]*Department of Chemistry, Shivani Engineering College, Tiruchirapalli-620009*

Abstract: A new Mannich base, 7-diphenylaminocinnamyl-8-hydroxyquinoline (DPCHQ) was synthesized by condensation of diphenylamine, cinnamaldehyde and 8-hydroxyquinoline in 1:1:1 molar ratio at room temperature and characterized by physico-chemical and spectral studies. Chelates of DPCHQ with Mn(II), Co(II), Ni(II), and

Cu(II) ions were prepared and characterized by elemental analyses, NMR, IR and UV-Visible spectral studies. The complexes prepared were of the general formula $MCl_2.2DPCHQ$ and they were all non-ionic. DPCHQ was found to act as a neutral bidendate ligand, bonding through the hydroxyl oxygen of 8-hydroxyquinoline and nitrogen atom of the diphenylamine moieties in all the complexes prepared. Based on the magnetic moment values and UV-Visible spectral data, octahedral geometry was assigned for all the complexes. The antimicrobial studies (Agar well diffusion method) of all metal complexes and ligand showed that they possessed good activities towards the microbes used.

PP 34

Corrosion and Structural Studies of Electroless NC-Ni-P Deposits from Sodium Acetate Bath with Heat Treatment

N.Latha[a], V.Raj[b], P.Manisankar[c]
[a]PG& Research Department of Chemistry, Kandaswami Kandar's College,
Paramathi Velur - 638 182
[b]Advanced Materials Research Laboratory, Department of Chemistry, Periyar University,
Salem - 636 011
[c]Department of Industrial Chemistry, Alagappa University, Karaikudi – 630 006
Email: manisankar@rediffmail.com, lathaankl@gmail.com, alaguraj2@rediffmail.com

Abstract: Nanocrystalline nickel phosphorus (NC-Ni-P) deposits is formed from electroless deposition method at various deposition times from acidic sulphate-sodium acetate bath with heat treatment at 400ºC for 1h is described. Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM) and X-ray diffractometer (XRD) were employed to study the surface morphology and structure of the heat treated Ni-P deposits. Corrosion behavior of the bare and heat treated specimens were studied by Tafel and Electrochemical impedance spectroscopy (EIS). AFM, SEM observation revealed that compact, dense, uniform spherical nodular structure present in the heat treated Ni-P deposit. During heat treatment, depending on the plating time, XRD patterns of NC-Ni-P alloys crystallized to Ni_3P and FCC Ni and some intermediate phases such as NiP_2, Ni_5P_2, Ni_5P_4 and $Ni_{12}P_5$ etc. The electrochemical studies in 3 wt.% sodium chloride solution indicate that the nanocrystalline Ni-P coating exhibited better corrosion resistance than the bare aluminium alloy substrate.

Keywords:NC-Ni-P, SEM, XRD, AFM, Corrosion.

PP 35

Corrosion Inhibition Effect of Mild Steel in 1M Hcl by N'-(2-Hydroxybenzylidene) Benzohydrazide with Iodide Ions

P. Mohan, K. Kalaiselvi, G. Paruthimal Kalaignan*
Advanced Materials Research Lab, Department of Industrial Chemistry, Alagappa University,
Karaikudi-630 003, Tamil Nadu, India
Email: pkalaignan@yahoo.com

Abstract: The effective corrosion inhibitor namely, N'-(2-hydroxybenzylidene) benzohydrazide (HBBH) was synthesized by using benzohydrazide and salicylaldehyde as starting materials. The functional groups of this compound were analyzed by FTIR and UV-Visible spectral studies. The inhibition efficiency of N'–(2-hydroxybenzylidene) benzohydrazide on the mild steel in 1 M HCl was investigated by weight loss and electrochemical methods. The free energy of activation for corrosion was found to be 41.57 and 27.12 kJmol^{-1} in the absence and presence of 1.05 mM HBBH respectively. The adsorption of HBBH molecules on mild steel surface has obeyed Langmuir adsorption isotherm and formed a stable complex. Potentiodynamic polarization curves revealed that, inhibitor acted as a mixed type inhibitor and the inhibition efficiency of 89.72% was obtained. The synergistic effect was attributed to improve the adsorption of HBBH by the co-adsorbed iodide ions. The surface analysis study was confirmed the mild steel corrosion and its film formation by the HBBH.

Keywords: Acid inhibition; Impedance Spectra; Langmuir Adsorption; Polarization; Synergism.

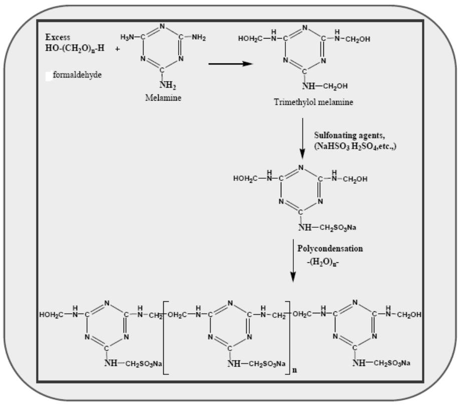
PP 36

Corrosion Inhibition of Mild Steel by Sulfonated Melamine Formalin in Sulfuric Acid Solution

J.Thiruppathy, V.K. Subramanian*
Vivekananda College, Tiruvedagam, Madurai
E-mail: chemwin3@gmail.com

Abstract: Corrosion is a fundamental process playing an important role in economics and safety, particularly for metals.The use of organic inhibitor is one of the most practical methods for protecting metals against corrosion especially in acidic media. The corrosion inhibition of mildsteel by Sulfonated melamine formalinin sulfuric acidsolution at various temperatures using electrochemical technique. The thermodynamic functions of dissolution and adsorption processes can be calculated from experimental polarization data and the interpretation of the results can be predicted. The inhibiting action of melamine formalin resin on the corrosion of mild steel in sulfuric acid can be studied by weight loss and potentiodynamic polarization methods.The result showing that Inhibition efficiency increases with the inhibitor concentration.

Key words: Melamine, formaldehyde, sulfuricacid, sodiumbisulphite; corrosion inhibitors; thermodynamics.



PP 37

Electrochemically synthesised Ni-Benzenetricarboxylate (Ni based MOF) coated electrode for supercapacitor application

R. Senthil Kumar, **R. Muthukannan, M. Anbu Kulandainathan***

CSIR-Central Electrochemical Research Institute, Karaikudi-6

**anbu@cecri.res.in*

Abstract: In current decay, most of the researcher´s huge interest in the development of energy storage devices with both high energy density and high power density. Being supercapacitor is one of the most promising candidates, as they typically have higher power densities and longer cycling life than batteries. They can complement or replace batteries in electrical energy storage and harvesting application. Currently three kind of material was investigated for supercapacitor application such as high surface area activated carbon, noble or transition metal oxide and conducting polymer.The properties of a suitable material for supercapacitors must include good electrical conductivity, high surface area and tailored pore size. Especially, nanoporous carbon materials possess excellent chemical, physical and thermal stability, and are very interesting materials for energy conversion and storage. Instead of these nanoporous carbon based materials, metal–organic frameworks (MOFs) as a new family of porous materials comprised of metal cation/clusters bonded by organic linkers and as a kind of emerging nanoporous material have attracted attentions due to their fascinating architectures and topologies, high specific surface area, tunable pore sizes for quick mass transfer and ion diffusion and wide potential applications such as gas storage and separation, catalysis, drug delivery and so on.

In the present work we are demonstrating for the first time the supercapacitive behavior of an electrochemically synthesised Ni based MOF coated electrode. Metal organic frameworks can have very high surface areas and tailored pore sizes depending on the ligands. The Ni-based MOF showed a good pseudocapacitor behavior with energy density of about 2.15 Wh kg^{-1} and specific capacitance up to 1206.76 mF g^{-1}. The present study demonstrates that the Ni-based MOFs is a potential candidate for supercapacitor application and also opens the door for further investigation with MOF nanocomposites (with different dopants like graphene, carbon nanotubes and conducting polymer) as an electrode material for electrochemical energy storage devices.

PP 38

Cost Effective Dyeing Process for Dyeing of PET/VISCOSE Composite Yarns using Disperse and Reactive Dyes

S. Vigneswari[a], **R.Venkatachalam**[b],**J.Ethiraj**[c], **B. Muralidharan**[d]*

[a]*Periyar Maniammai University, Thanjavur, Tamilnadu ,India.*

[b]*A.V.V.M. Sri Pushapam College, Poondi, Thanjavur Dt.613 502, Tamilnadu, India.*

[c]*C.Byre Gowda Institute of Technology, Kolar, Karnataka, India.*

[d]*Birla Institute of Technology and Science-Pilani, Dubai Campus, International Academic City, Dubai, U.A.E.*

Email: bmdharan@gmail.com; muralidharan@bits-dubai.ac.ae

Abstract: In blends of polyester with viscose, the properties of the two fibres are different but complementary providing an overall property like crease recovery, dimensional stability, strength, abrasion resistance and easy-care properties, moisture absorption, antistatic characteristic and reduced pilling. Cellulosic fibres especially viscose staple have been used to get blends with synthetic-polymer or more expensive wool fibres, but in these blends the balance of physical properties is as important as the economic factor. Viscose and especially polynosic fibre are more suitable than cotton for this in view of the generally higher luster and softness of the polynosic fibre blends. The present study is focused to devise a different method to improve the properties of polyester/viscose composites through solvent treatments and thereby enhance the dyeability of the blended fibre even at lower dyeing temperatures. 67:33 polyester/viscose yarns were treated with two different azeotropic solvent mixtures and then subjected to dyeing and various analytical studies such as Scanning Electron Microscopy, Fourier Transform Infra red Spectroscopy, and Differential Scanning Calorimetry and X - Ray Diffraction techniques. It was found the solvents could modify the physico-chemical and dyeing behaviour of the fibre. Energy saving to the tune of 40% was achieved and hence cost of dyeing brought down. The observed results are presented.

Key words:PET-Viscose blend, polynosic fibre, dyeability, segmental motion

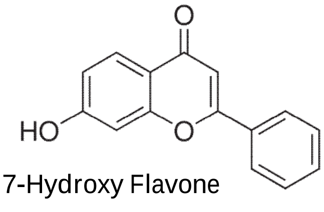
PP 39

Determination of Antioxidant capacity of Flavonoids extracted from Medicinal Plants by Electrochemical and UV-Vis techniques

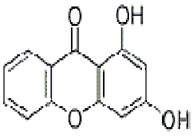
R. Deepa[a], A. Daniel Arul Raj[b], R. Gandhidasan[c], V. S. Vasantha[d]*
[a] Madurai Kamaraj University, Madurai- 625 021, India
[b] Alagappa University, Karaikudi, Tamil Nadu, 630 003, India
[c] KLN Engineering college , Sivagangai, Tamil Nadu,630 561, India
[d] Madurai Kamaraj University, Madurai- 625 021, India
E-mail id: vasantham999@yahoo.co.in

Abstract: In our work, the antioxidant capacity of Flavonoids (4-methoxy dalbergione, 1,3-dihydroxy xanthone (1,3-DX), Mansanone-D (MD), 7-Hydroxy Flavone, Anthragallol-1-methyl ether (AMD) extracted from different Medicinal Plants was studies using cyclic voltammetry and UV-Vis techniques. The antioxidant capacity was determined in the presence of DPPH (2,2 diphenyl-1-picrylhydrazyl radical) as targeting radical in both methods. The Cyclic voltammetry method depends on the scavenging effect of the radical as monitored by the decrease in current accompanying an increase in the concentration of the flavonoids. Similarly, in UV-Vis technique, the scavenging effect of the flavonoids as monitored by the decrease in absorption intensity of DPPH$^{\cdot}$on addition of different concentrations of the flavonoids. The antioxidant activity coefficient of the flavonoids was estimated from the linear part of plots of change in current density and absorption intensity vs flavonoids concentrations obtained from cyclic voltammetry and UV-Vis techniques, respectively. The antioxidant capacity index (IC_{50}, corresponding to 50% consumption of DPPH$^{\cdot}$) was also calculated from the proportional current decrease for a relative comparison among the flavonoids. From the experimental results show that the larger the percentage decreases in current density the higher is the antioxidant capacity. The anodic current of the Flavonoids are decrease in the following order**M-D > AMD > 1, 3-DX**

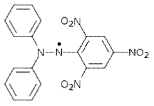
Structure of flavonoids:



7-Hydroxy Flavone



1,3-Dihydroxyxanthone



2,2-diphenyl-1-picrylhydrazyl(DPPH)

PP 40

Development of New Polymer Composite Membranes based on Sulfonated Poly(Ether Ether Ketone)

Se-Hee Lee[a], M.Francklin Phillips[b], A.Gopalan,[a,b*],Kwang-Pill Lee[a,b]
[a]*Department of Nano-Science & Technology, Kyungpook National University*
[b]*Department of Chemistry Education, Kyungpook National University*
E-Mail: agopalan@knu.ac.kr

Abstract: New hybrid organic-Inorganic composite membranee based on sulfonated poly (ether ether ketone) (SPEEK) and functionalized silica (SiO_2 (f)) were prepared for various conditions such as percentage compositions of the SPEEK and silica.The prepared SPEEK-SiO_2(f) composite membranes were characterized using Fourier transform IR spectroscopy, x-ray diffraction and thermogravimetric analysis. Surface morphology of the composite membranes was analyzed using scanning electron microscopy. Other properties related to conductivities (ion exchange capacity, proton conductivity, absorptivity (water and methanol absorption) and durability were also evaluated for the composite membranes. These composites showed good conductivities and durabilities and expected to be used in the development of newer proton exchange membrane for fuel cells.

PP 41

Development of a Lithium Ion Battery using a New Cathode Material

R.Sathiyamoorthi[a]*, P.Shakkthivel[b]
[a]*Dept. Of Chemistry, N.S.N. College of Engineering and Technology, Karur – 639 003, India*
[b]*Dept. Of Nanoscience and Technology, Alagappa University, Karaikudi – 630 003, India*
E-mail: ramasathi25@yahoo.com

Abstract: Improvement of the energy density and power density of the lithium-ion batteries is urgently required with the rapid development of electric vehicles and portable electronic devices. Various cathode materials are being tried to enhance the performance of cathode materials in Li-ion cells. The spinel $LiMn_2O_4$ is one of the most promising cathode materials due to its low cost, nontoxicity, and improved safety compared with commercial $LiCoO_2$. Developing nanostructured electrode materials represents one of the most attractive strategies to dramatically enhance battery performance, such as capacity, rate capability and cycling life. The synthesis and electrochemical characteristics of $LiCr_xCo_{0.5-x}Mn_{1.5}O_4$ as cathode materials for rechargeable lithium batteries were investigated. The average crystal size was below 100 nm and chromium substitution did not alter the crystal sizes. Electrochemical studies such as cyclic voltammetric and charge-discharge studies revealed that $LiCr_{0.1}Co_{0.4}Mn_{1.5}O_4$ cathode material performed well in Li-ion cells.

Keywords:Lithium ion battery,Nano materials, Combustion method, XRD, FESEM, Electrochemical studies

PP 42

Development of Amine Functionalized Co-Polymeric Resin for Selective Removal of Fluoride from Aqueous Solution

S. M. Prabhu[a], N. Viswanathan[b], S. Meenakshi[a*]
[a]*Department of Chemistry, The Gandhigram Rural Institute, Gandhigram - 624 302*
[b]*Department of Chemistry, University College of Engineering- Dindigul, Dindigul - 624 622*
E-mail: drs_meena@rediffmail.com

Abstract: This study describes the development of new synthetic co-polymeric resin modifiedbyAcrylonitrile/divinylbenzene/vinylbenzylchloride-ethylenediamine(AN/DVB/VBC-ED) for the removal of fluoride in water. Fluoride sorption experiments were carried out in batch mode. AN/DVB/VBC-ED resin possessed higher defluoridation capacity (DC) of about 3629 mgF$^-$/kg. The fluoride removal studies were carried out to optimize the various equilibrium parameters viz., contact time, pH, co-anions, different initial fluoride concentration and temperature. The characteristic of the adsorbent, before and after fluoride adsorption was examined using FTIR, SEM and EDAX techniques. The experimental data have been analyzed using Freundlich and Langmuir isotherms and the best fit isotherm model was identified as Freundlich isotherm. Thermodynamic parameter such as $\Delta G°$, $\Delta H°$ and $\Delta S°$ indicates the nature of fluoride sorption is spontaneous and endothermic. The sorption process was found to be controlled by pseudo-second-order and particle diffusion models. To test the efficacy, the performance of the adsorbent material was studied with water samples collected from a fluoride endemic region.

Keywords: Polymeric matrix; Fluoride; Sorption; Isotherms; Kinetic studies

PP 43

Development of Hybrid Nano-ZnO Coatings for Corrosion Protection of Mild Steel

P. Saravanan[a], S. Ananda Kumar[b]
[a]*Department of Chemistry, St. Joseph's College of Engineering, Chennai 600119, India*
[b]*Department of Chemistry, College of Engineering Guindy, Anna University, Chennai 600025, India*
E-mail: sri_anand_72@yahoo.com

Abstract: The ban on harmful substances on antifouling paints paved an avenue to the development of new antifouling strategies. Alternative coatings should be as effective as conventional paints but with lower toxicity. In the present study, a commercially available epoxy resin modified with Nano zinc oxide (nZnO) and was examined in order to get information on its antifouling and anti-corrosive properties. Epoxy nano-composite coating was synthesized using nZnO (in the amount of 2.5 wt%, 5.0% and 7.5wt %) and diglycidyl ether of bisphenol A (DGEBA) type of epoxy resin. The structural confirmation of these materials was ascertained from FT-IR spectral studies. Epoxy/nZnO systems were applied over mid steel strips of standard sizes to evaluate their physic-mechanical, chemical resistance andfield exposure test performance. The anti-corrosive properties of the nano composite were investigated using salt spray and electrical impedance spectroscopy (EIS) methods. The surface morphology images were taken by SEM analysis and this study indicate that nZnO particles were dispersed homogenously through the polymer matrix. The results showed improved antifouling and anticorrosive properties of epoxy based nano composite coating compared to that of pure epoxy coating and commercial antifouling paint coating.

Keywords: Antifouling paint, Biocide, Epoxy resin, Coating on steel, Barnacle, SEM

PP 44

Development of Multiwalled Carbon Nanotube based Sensor for the Determination of Methyl Violet 2B in Textile Effluents

M. Valarmathi[a], A. Gomathi[b], P. Manisankar[c*]
[a]Department of Chemistry, Government Thirumagal College, Gudiyattam, India.
[b]Department of Chemistry, Sri K.G.S Arts College, Srivaikuntam - 628619, India.
[c]Department of Industrial Chemistry, Alagappa university, Karaikudi - 630003, India.
E-mail: manisankar@rediffmail.com

Abstract: The suitability of multiwalled carbon nanotube modified glassy carbon electrode for the investigation of electrochemical behavior of Methyl violet 2B was ascertained using cyclic voltammetry. Influence of pH, scan rate and concentration on the voltammetric responses were studied and the optimum pH for the electrochemical study was found to be 1.0. The irreversible oxidation process observed for the dye was adsorption controlled. The surface characterization of the modified electrode in the absence and presence of dye was done by scanning electron microscopy (SEM) and the existence of nanosized multiwalled carbon nanotube (MWCNT) modification was understood. A systematic study of the experimental parameters that affect differential pulse stripping voltammetry (DPSV) was carried out and the optimized experimental conditions were arrived at. Under optimized conditions, stripping voltammetry procedure was developed for the determination of dye and the limit of detection (LOD) was 0.12 μg mL^{-1} on this modified electrode. The developed nano sized MWCNT based sensor was successfully used for the trace determination of this textile dye in textile effluents.

Keywords: Methyl violet 2B dye, multiwalled carbon nano tubes, Glassy carbon electrode, Cyclic voltammetry, Differential pulse stripping voltammetry.

PP 45

Development of Nanostructured Hybrid Materials for Energy Applications

S. Karuppuchamy[a],P. Shakkthivel[b], H. Matsui[c]

[a]Department of Energy Science, Alagappa University, Karaikudi, Tamilnadu 630 003, India
[b]Department of Nanoscience and Technology, Alagappa University, Karaikudi, Tamilnadu-630 003, India
[c]Department of Applied Chemistry, Faculty of Science and Engineering, Kinki University, 3-4-1, Kowakae, Higashiosaka, Osaka, 577-8502, Japan
Email:skchamy@gmail.com

Abstract: Nanostructured hybrid materials are the most attractive and promising candidates for several industrial applications due to their several fascinating properties. In recent years, nano-sized metal oxide/carbon based hybrid materials are mostly studied for energy related applications. We have actively involved in the preparation of new and novel nanostructured composite materials from metal-organic moiety hybrid copolymers and inorganic metal compound/organic polymer complexes by calcination for hydrogen energy and solar cell applications. In the present work, a nano-structured hybrid materials of zirconium based metal oxide were successfully synthesized by the heat-treatment of Zr(acac)$_4$/epoxy resin complex. The compositions of the resulting hybrid materials were determined using inductively coupled plasma spectroscopy, elemental analysis, and surface characterization by X-ray diffraction and transmission electron microscopy. The ultraviolet-visible, X-ray photoelectron spectra and electron spin resonance spectra (ESR) of the composites were also measured. ESR spectra of the composite materials suggest that they have visible light-responsive catalytic ability.

PP 46

Development of Natural Fiber Reinforced Polymer Composites

S. Karuppuchamy[a],A. Arun[a], Y. Andou[b], Y. Shirai[b], M. A. Hassen[c]

[a]*Department of Energy Science, Alagappa University, Karaikudi, Tamilnadu-630 003, India*
[b]*Eco-Town Collaborative R&D Center for the Environment and Recycling, Kyushu Institute of Technology, 2-4 Hibikino, Wakamatsu-ku, Kitakyushu, Fukuoka 808 0196, Japan*
[c]*Department of Bioprocess Technology, Faculty of Biotechnology and Biomolecular Sciences, University Putra Malaysia, 43400 Serdang, Selangor, Malaysia*
Email: skchamy@gmail.com

Abstract: The oil palm Empty Fruit Bunch fiber (EFB) (size in the range from 0.1 to 500 micron) has been prepared by using wet and dry grinding methods. The prepared fibers were blended with polypropylene to obtain EFB-Polypropylene plastic composite denoted as EFB-plastic composite. The surface morphology of the pretreated fibers was analyzed using scanning electron microscopy. Thermal and mechanical properties of the pre-treated fibers and obtained EFB-plastic composites were investigated. The EFB-plastic composite fabricated using wet grinded fiber shows the superior mechanical properties.

Keywords: Biocomposite; Empty Fruit Bunch; Mechanical Property

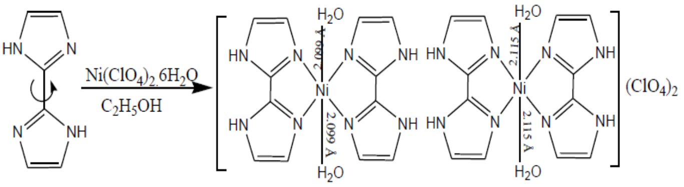
PP 47

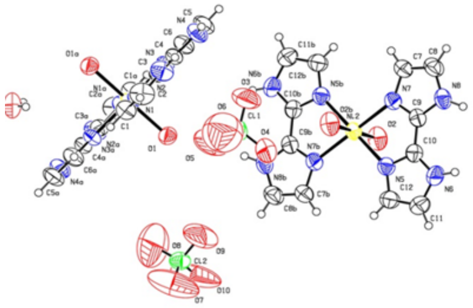
DNA Interaction Studies of Dimeric Nickel(II) Complex with 2,2′-Biimidazole

A. Jayamani[a], V. Thamilarasan[a], N. Sengottuvelan[b*]
[a]*Department of Industrial Chemistry,* [b*]*DDE, Alagappa University, Karaikudi-630003*
Email: nsvelan1975@yahoo.com

Abstract: A dimeric Nickel(II)complex $[Ni(H_2biim)_2(H_2O)_2](ClO_4)_2.H_2O$ with 2,2′-biimidazole (H_2biim) ligand has been synthesized and characterized. The nickel(II) complex was structurally confirmed by single crystal X-ray diffraction analysis. The nickel(II) complex has a dimeric six coordinated octahedral structure crystallize in triclinic crystal system with P-1 space group. The cyclic voltammograms of complex exhibited one quasireversible reduction wave (E_{pc} =-0.61 V) and an irreversible oxidation wave (E_{pa} = 1.28 V) versus Ag/AgCl in DMF solution. The interaction of the complex with Calf-Thymas DNA (CT-DNA) has been studied using spectroscopic

techniques. The complex is an avid DNA binder with a binding constant value of 1.03 x 10^{-5} M. The complex showed efficient oxidative cleavage of supercoiled pBr 322 DNA in the presence of hydrogen peroxide as oxidizing agent. The DNA cleavage by complex was inhibited by quenchers; viz. DMSO, KI, NaN_3 and EDTA which reveals that hydroxyl radical or singlet oxygen is involving in the cleavage process. The complex showed *invitro* antimicrobial activity against four bacteria and two fungi and the activity is greater than that of the free ligand.





Synthetic route of $[Ni(H_2biim)_2(H_2O)_2](ClO_4)_2.H_2O$ORTEP view of the $[Ni(H_2biim)_2(H_2O)_2](ClO_4)_2.H_2O$

PP 48

Dual Transition Metal Ions Doped $LiMn_2O_4$ as Cathode Material for Lithium Ion Batteries

J. Suganya[a], M. Ramalakshmi[a], K.Gurunathan[a], S.Karuppuchamy[b], P. Shakkthivel[a]*
[a]Sustainable Energy and Smart Materials Research Lab, Department of NanoScience and Technology, [b]Department of Energy Science, Alagappa University, Karaikudi – 630 003, INDIA
Email: apsakthivel@yahoo.com

Abstract: A series of spinel-doped lithium manganese oxides, $LiMn_{2-X-Y}Ti_XFe_YO_4$ ($0.01 \leq X \geq 0.1$, $Y=0.05$), were synthesized by combustion method. The synthesized samples have been characterized using several advanced techniques, such as X-ray powder diffraction (XRD), thermal analysis (TG), Fourier transform infrared analysis and Field emission Scanning electron microscopy (FE-SEM). The X-ray diffraction pattern showed that all the samples crystallize with the spinel crystal structure (S.G Fd3m). The cubic unit cell parameter increases with the Ti content, but for the dual doped material, the cell parameter value decreased. The crystallite size value of undoped $LiMn_2O_4$ shows 43 nm and the doped samples exhibit between 14-21 nm. The FE-SEM results exhibit the above trend. The FT-IR results confirm the formation of metal oxide formation indicates Ti and Fe is well incorporated into the spinel lattice. The electrochemical performances of the samples are characterized by electrochemical impedance spectroscopy (EIS), cyclic voltammetry (CV) and charge-discharge profile.

PP 49

Dyeing and Antibacterial Properties of *Nyctanthes arbor- tristis* Extracts Treated Jute Yarn

S.Santhiya, S.Selvam, M.Sundrarajan*
Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi -630 003, Tamil Nadu, India.
Email: drmsgreenchemistrylab@gmail.com

Abstract: Jute yarn was treated with Nyctanthes abror -tristis plant extracts from various parts such as bark, leaves, flowers and root. In this work, this plant extracts were extracted and dyed on jute yarn. The color strength, washing and light fastness of natural extracts dyed yarn was studied. The dyed yarns showed good color strength and also exhibit good fastness grade. Nyctanthes abror -tristis plant is a herbal plant and their extract have medicinal activities. Antibacterial activity of herbal extracts, dyed jute yarn was studied using Staphylococcus aureus and Escherchia coli bacterium. This type of jute materials may recommended for agricultural packing materials, home appliances and sanitary wares etc.,

Keywords: Jute, Nyctanthes arbor –tristis, antibacterial, herbal, dyeing, medicinal

PP 50

Dye–Sensitized Solar Cells using Electrospun Polymethyl Methacrylate (PMMA) Polymer Electrolyte Nanofiber Membrane

M. Sethupathy[a], S. Ravichandran[b], V. Sethuraman[a], P. Muthuraja[a], P. Manisankar[a]*
[a]*Department of Industrial Chemistry, Alagappa University, Karaikudi – 630 003, Tamilnadu India.*
[b]*Electroinorganic Division, CECRI, Karaikudi – 630 006, Tamilnadu, India.*
E-mail: pms11@rediffmail.com, sethudssc@gmail.com

Abstract: Even though the dye-sensitized solar cells (DSSCs) using organic liquid electrolytes have received significant attention because of their low production cost, simple structure and high power conversion efficiency, it has a major drawback of short-term stability due to volatility of organic solvent in the electrolyte. In order to overcome this problem, polymer electrolytes having higher stability have been introduced instead of liquid electrolytes. In this work, DSSCs were fabricated using polymer electrolytes based on electrospun polymethyl methacrylate (PMMA) nanofibers and their photovoltaic performances were evaluated. The electrospun PMMA nanofibers were prepared by optimizing various experimental parameters such as; polymer concentration, applied voltages, and tip to collector distances (TCD). The electrospun PMMA membrane was soaked in organic electrolyte containing 0.6 M 1-hexyl-2,3-dimethylimidazolium iodide, 0.1 M LiI, 0.05 M I_2, and 0.5 M 4-*tert*butylpyridine in ethylene carbonate and propylene carbonate (1:1 wt %). The thin fiber morphology with an average diameter of about 200 - 450 nm was observed for electrospun membrane from SEM images. The ionic conductivity of gel polymer electrolyte is 1.53×10^{-3} Scm^{-1} at room temperature. The electrolyte uptake of PMMA membrane reached to a maximum of ~295%. A quasi-solid-state dye-sensitized solar cells was fabricated and an open-circuit voltage (*V*oc) of 0.54 V, a fill factor of 0.12, and a

short-circuit current density (Jsc) of 0.22 mA cm^{-2} at an incident light intensity of 100 mW cm^{-2} were observed. The power conversion efficiency of the fabricated DSSC device was 0.014% which is comparable to the existing DSSC devices reported already.

Keywords: Electrospinning, Dye-sensitized Solar Cell, PMMA, Ionic Conductivity, Power conversion efficiency.

PP 51

Effect of Salt Concentration on Pvac Based Solid Polymer Electrolyte for Secondary Battery Applications

K.Kesavan[a], Chithra M. Mathew[a], S.Rajendran*[a], M.Ulaganathan[b]
[a]School of Physics, Alagappa University, Karaikudi, Tamilnadu-630003, India.
[b]Energy Research Institute @ NTU (ERI @ N), Nanyang Technological University,
Singapore- 637 553, Republic of Singapore.
E-mail address: sraj54@yahoo.com

Abstract: Polymer lithium ion batteries have been attracting considerable attention for their potential applications in personal communication devices, small portable electronic and electric vehicles (EV). Solid polymer electrolyte, used as both electrolyte and separator between the electrodes, has various advantages in comparison to the liquid one, such as no leakage of electrolyte, suppression of lithium dendrite growth, flexible geometry, improved safety, and ease of manufacturing, etc. [1–4]. Poly (ethylene oxide) (PEO) based polymer electrolytes usually exhibited very low ionic conductivity of the order of 10^{-7} Scm^{-1}, because of high crystallinity and poor motion performance of the PEO backbones. Polyvinylidenefluoride-hexafluoropropylene (PVdF-HFP) has been widely used in different polymer electrolytes. It has relatively high dielectric constant [5, 6], and possesses good mechanical strength. Poly (vinyl acetate) PVAc has been selected as the second polymer component for preparing polymer electrolyte, because it has an amorphous nature which can permit faster ionic mobility and improves the flexibility of the electrolyte. The polymer electrolyte films consisting of fixed ratio of PVAc and (PVdF-HFP) with various concentrations of $LiBF_4$ were prepared by solvent casting technique. The prepared electrolyte exhibits ionic conductivity of the order of 10^{-4} Scm^{-1} and structural analysis has been confirmed by XRD analysis.

References

[1] K.M. Abraham, M. Alamgir, Solid State Ionics 70–71 (1994) 20.
[2] J.B. Kerr, S.E. Sloop, G. Liu, Y.B. Han, J. Hou, S.Wang, J. Power Sources 110 (2002) 389.
[3] J.J. Xu, H. Ye, Electrochem. Commun. 7 (2005) 829.
[4] A. Manuel Stephan, K.S. Nahm, Polymer 47 (2006) 5952.
[5] L. Shi, R. Wang, Y.M. Cao, J. Membr. Sci. 305 (2007) 215.
[6] T.C. Wen, H.H. Kuo, A. Gopalan, Solid State Ionics 147 (2002) 171.

PP 52

Effect of Surface Modifying Macromolecules on the Performance of Cellulose Acetate Ultrafiltration Membranes

P. Kanagaraj, A. Nagendran*
Polymeric Materials Research Lab, Alagappa Govt. Arts College, Karaikudi – 630 003
E-mail: shivaninagendran@gmail.com

Abstract: In recent years, membrane separation processes have developed from laboratory device to an industrial process with considerable technical and commercial impact. In many cases, membrane processes are faster, more efficient and economical than conventional separation techniques. This paper deals with the preparation of flat sheet asymmetric blend ultrafiltration (UF) membranes by phase inversion method. The modified UF membranes were prepared with different compositions of cellulose acetate (CA) and surface modifying macromolecule (SMM). SMM is a simple blending method which uses the concept of surface segregation in polymer science. SMM when introduced as an additive in a base polymer will migrate to the surface and change the chemistry of the surface while maintaining its bulk properties. The SMM used in this study consist of polyurethane main chain end-capped with hydroxyl benzene sulfonate was synthesized using a two-step solution polymerization method. CA/SMM blend membranes were prepared at different compositions from 100/0 to 95/5wt% in a total of 17.5wt% polymer and 82.5wt% solvent. The prepared membranes were characterized for their UF performances such as compaction factor, pure water flux, water content, membrane hydraulic resistance and morphology. The prepared membranes were also characterized for their separation performance with proteins such as bovine serum albumin (BSA). The results indicate significant improvement in the performance characteristics of the blend membranes with the addition of SMM.

PP 53

Electrocatalysis of Mediated Oxygen Reduction at Glassy Carbon Electrode Modified with Riboflavin and Hydroxyl Derivatives of 9, 10-Anthraquinones

S.Valarselvan[a],P.Manisankar[b]*
[a]*Department of Chemistry, H.H. The Rajah's College, Pudukkottai, Tamilnadu, India*
[b]**Department of Industrial Chemistry, School of Chemistry, AlagappaUniversity, Karaikudi-630003, Tamilnadu, India.*
Email:pms11@rediffmail.com

Abstract: The electrochemical behavior of Riboflavin at glassy carbon electrode modified with one mono and four di hydroxyl derivatives of 9,10-anthraquinone was investigated by cyclic voltammetry, chronoamperometry and chronocoulometry techniques. The morphological character of AQ/RB/GCE was examined using scanning electron microscopy (SEM). The influence of pH on the shift in oxygen reduction potential and enhancement in peak current led to the selection of pH 7.0 as the optimum working pH. Anthraquinones combined with riboflavin showed excellent electrocatalytic activities towards O_2 reduction in the neutral pH 7.0 with an over-potential of about 388 – 718 mV lower than the plain GCE. The involvement of two electrons in dioxygen reduction was confirmed from chronocoulometric and hydrodynamic voltammetric studies. The heterogeneous rate constants, mass specific current and the diffusion coefficients were determined by rotating disk voltammetry. The stability of the modified electrodes was ascertained in acidic and neutral media.

Key words: Electrocatalytic reduction, cyclic voltammetry, oxygen reduction, riboflavin modified electrodes, anthraquinones.

PP 54

Electrochemical Behaviour of Mg-Ni-Nb Alloy Synthesised by High Energy Ball Milling

M.Dinesh[a], B.Padmavathy[a], A.Venkateswari[b],S.Kumaran[c]

[a] B.Tech., III Year, Centre For Education-Central Electrochemical Research Institute, Karaikudi.
[b]Department of Metallurgical and Materials Engineering,NIT, Tiruchirappalli.
[c]Associate professor, Department of Metallurgical and Materials Engineering, NIT,Tiruchirappalli.
Email id: dineshmanoharan93@gmail.com, padmacecri@gmail.com

Abstract: Mg-Ni-Nb alloys have excellent properties and corrosion resistance and thus they find applications in secondary batteries and hybrid electric vehicles. The hydriding and dehydriding kinetics of these alloys are faster as compared to other Mg alloys and shows good corrosion resistance in the aqueous KOH solution. Mg-Ni-Nb alloy can be fabricated by mechanical alloying technique virtually eliminates segregation and reduces the number of processing steps. Powder compaction method is the technique to offer finer structure of the sample which is chosen for this study. The aim of the present work is to fabricate the Mg-Ni-Nb alloys and study the electrochemical & corrosive properties of the alloy for hydrogen storage application. The structural changes associated with the compound were studied by XRD diffraction analysis. The morphology of the compound was studied with the help of SEM. The electrochemical characteristics of the alloy were characterized for their ability to store hydrogen at room temperature by using constant current to charge and discharge the electrode. Addition of Nb in Mg-Ni alloy decrease the charge and mass transfer resistance, that results in considerable improvement in discharge capacity and rate dischargability.

A study was carried out for determining the electrochemical characteristics of the magnesium based alloy which could be used for hydrogen storage techniques. The samples were ball milled and then mixed thoroughly with Ni powder and cold pressed using the universal testing machine to form pellets. It was inferred from the X-ray Diffraction analysis that all the alloys after 30 hours of ball milling consist mainly of Mg_2Ni. A Nanostructured $Mg_{67}Ni_{32}Nb_1$ alloy was prepared by mechanical alloying. The XRD showed formation of Mg_2Ni and Nb_2O_5 phases during milling. The $Mg_{67}Ni_{33}$composition has better discharge capacity than $Mg_{67}Ni_{32}Nb_1$ because dielectric oxide layer forms on the electrode surface so it prevent the further electron transfer to the solution .Impedance figure shows that formation of semicircle on composition $Mg_{67}Ni_{33}$ it indicate magnesium nickel combination has high absorption- capacity than $Mg_{67}Ni_{32}Nb_1$.SEM analysis shows that the average particle size of alloys was ranging from 1-10μm.The discharge capacity of alloy was decreased due to presence of Nb_2O_5.

PP 55

Electrochemical Determination of Norfloxacin Using Molecularly Imprinted Polymer - Multi-Walled Carbon Nanotubes - Modified Glassy Carbon Electrode

Hélder da Silva[a],Joana da Silva[a], Joao Pacheco[a],Subramanian Viswanathan[a,b], Cristina Delerue-Matos[a]
[a]REQUIMTE, Instituto Superior de Engenharia do Instituto Politécnico do Porto
Rua Dr António Bernardino de Almeida, 431, 4200-072 Porto Portugal
[b]Department of Industrial Chemistry, Alagappa University, Karaikudi 630 003.
vircru@gmail.com

Abstract: A novel sensitive electrochemical sensor with selective binding sites for Norfloxacin (NFX) detection is reported, by combining a molecular imprinted film (MIP) to improve selectivity and multi-walled carbon nanotubes (MWCNT) to increase sensitivity.A glassy carbon electrode (GC) was first modified by deposition of a suspension of MWCNT on the electrode's surface. A molecular imprinted polypyrrole (PPy) film was prepared by electrodepositing of NFX and electropolymerization of pyrrole. A control electrode (NIP) without the template (NFX) was also prepared. Several experimental parameters were studied and optimized. The sensor was characterized by cyclic voltammetry (CV) and square wave voltammetry (SWV). The sensor presented a linear behavior, between peak current intensity and logarithm concentration, from 10^{-3} to 10^{-7} M. The results were accurate (with recoveries higher than 93%), precise (with standard deviations less than 6%) and the detection limit was 0.17 µM. The developed method is selective, fast and easy to operate. The MIP sensor was successfully applied in the analysis of NFX in urine and river water samples.

Keywords: Norfloxacin, Electrochemical sensor, Molecularly Imprinting Polymer, Multi-walled Carbon Nanotubes

---

PP 56

Electrochemical Rehabilitation of Dye Contaminated Soil

M.Vaijayanthi, K.Siva, P.Manisankar, S.Viswanathan*
Department of Industrial Chemistry, Alagappa University, Karaikudi –630 003
E-mail: rsviswa@gmail.com

Abstract: Billions of kilograms of dyes are produced per annum and are used in diverse applications including textile dyes, paints, pigments, printing inks and food colouring in general about 20% of dye leses would have entered the envirnment. Dyes contaminated soil shown potential to have a long life in the environment. The four major transformation pathways of dyes are oxidation, hydrolysis, conjugation and reduction. In my study AR 73 contaminated soil was rehabililated by degrading the dye, using electrooxidation; NaCl is used as an electrolyte. Electrochemical degradation of dye from soil sample is characterized using UV spectrometer, Cyclic voltammetry &GC-MS.

Keywords: Acid Red 73 Dye, Soil, Electrooxidation

PP 57

Electrochemical Remediation of Soil contaminated with Nitro Explosives

K.Siva, M.Vaijayanthi P.Manisankar, S.Viswanathan*
Department of Industrial Chemistry, Alagappa University, Karaikudi –630 003
E-mail: rsviswa@gmail.com

Abstract: The main aim of this work is to develop an approach that was taking into account in order to identify the optimal solutionfor the remediation of nitro explosive contaminated soils. The technologies used in the experimental work arebased on electrochemical oxidation.Sand-packed vertical flow column were used in laboratory experimental to simulate in situ electrochemical treatment zone fordecomposition of explosives residues in soil. The flow recirculation electrolyser, the catalytic anode and cathode were fixed at a distance 0.45 cm, were used to genratereactive species to degrade nitro explosives by combination of NaCl hydrolysis and direct electrolysis. The coloumn experiments(0.5mg of nitro explosive 1 kg of soil) with flow rate 10 l/hr and current density of 1 A/dm^2- 5 A/dm^2 was used to determine the treatment feasibility and the niro explosive decomposition.

Keyword: Nitro Explosives; Soil condamination; Electrochemical Remediation

PP 58

Electrodeposition of POM-TiO$_2$Composite and its Photocatalytic Activity

S. Clara Anthoniamma, H. Gurumallesh Prabu*, K. Bharathi Yazhini
Department of Industrial Chemistry, School of Chemical Sciences, Alagappa University, Karaikudi-630003, India
E-mail: hgprabu2010@gmail.com

Abstract: Titanium dioxide (TiO$_2$) as a photocatalyst has been investigated extensively by various researchers due to its low cost, non-toxicity, high stability and great efficiency in degrading organic pollutants in textile wastewater that are difficult to remove. Polyoxometalates (POMs) have also been studied as a homogeneous photocatalyst and often similarly compared with its heterogeneous counterpart, TiO$_2$. POMs act as an excellent candidate for delaying the fast electron hole recombination on the surface of TiO$_2$ and to improve the photocatalytic activity due to its intrinsic electronic attribute. In this study, POM-TiO$_2$ nanocomposites were synthesised using Titanium tetraisopropoxide, phosphotungstic acid and nitric acid under continuous stirring for 3 h at 70^{o}C. Anodic electrodeposition was carried out on ITO plate for 30 min and then annealed. The annealed plates were characterised using XRD, SEM, UV-DRS, FT-IR and AFM analyses. The XRD results showed distinct peaks corresponding to the anatase TiO$_2$. The SEM images reveal the homogenous incorporation on the ITO substrate without cracks and pinholes. Photocatalytic experiments were carried out to evaluate the effectiveness of the TiO$_2$-POM composite films for the decomposition of aqueous solutions of Direct Blue 1dye at a concentration level of 10^{-4} M. Significant dye degradation was observed. The coated plates showed longer shelf-life with good reproducibility and better degradation efficiency.

Keywords: TiO$_2$, POM, ITO, photocatalyst, dye degradation

PP 59

Electro-Enzymatic Glucose Sensor Based on Pectin-TiO_2 Nanocomposite and Glucose Oxidase Modified Carbon Paste Electrode

G.Revathy, S.K.Suja
Lady Doak College, Madurai.
E-mail: grevathy89@gmail.com

Abstract: Diabetes mellitus is a metabolic disease marked by high levels of blood glucose that can lead to serious complications, including kidney failure, blindness, cardiovascular disease and premature death [1,2].About 200 million people [3] in the world are affected with Diabetes mellitus. So periodical testing of physiological blood glucose levels to avoid Diabetic emergencies is important for the conformation of effective treatment. The development of highly sensitive [4,5], low-cost, simple, portable, reliable glucose sensors having an excellent selectivity is of social concern [6]. Due to specificity and catalytic advantages, enzymes have found wide spread use as sensing elements in glucose biosensors [7]. The most important sensing material used in glucose biosensor is glucose oxidase. Glucose Oxidase is a flavin containing glycoprotein which catalyzes an oxidation of β-D-glucose to δ-gluconolactone and hydrolyzes spontaneously to gluconic acid [8]. Various methods are available for the immobilization[9] of glucose oxidase enzyme into glucose sensor. They are cross linking[10] with glutaraldehyde, chemical immobilization on carbon carriers and entrapment in polymer layers, metal matrices or electrochemically grown polymer films on the electrode surface. In our study, the biopolymer, pectin was used as a carrier for TiO_2 nanoparticles and dopped in Carbon paste for the immobilization of glucose oxidase. Pectin was extracted from citrus peels and was used for the study. The polymer nanocomposite was prepared by solvent casting method and the formation was confirmed by SEM and IR studies. This Pectin-TiO_2 nanocomposite was mixed with carbon paste in order to prepare the biosensor. The sensitivity was studied using potassium ferri/ ferro cyanide system in cyclic voltammetry and enhanced sensitivity was observed for CPE/Pectin-TiO_2 nanocomposite. The enzyme GOx was immobilized on the prepared electrode surface and its redox behavior was tested in phosphate buffer using cyclic voltammetry and it was observed that CPE/Pectin-TiO_2/GOx has very good sensitivity by comparing it with bare CPE/GOx, CPE/Pectin/GOx, CPE/TiO_2/GOx. The surface properties like surface excess concentration, diffusion coefficient, rate of electron transfer process were also calculated. So CPE/Pectin/TiO_2/GOx was found to be a goodelectro-enzymatic sensor for glucose.

References:

1. Jonathan C.Claussen, et.al. “Electrochemical glucose biosensor of platinum nanospheres connected by carbon nanotubes” J Diabetes Science technology 4(2010) 312-319.
2. Mauro Pasta, et.al. Mechanism of glucose electrochemical oxidation on gold surface M. Pasta et al. / Electrochimica Acta, 55 (2010) 5561–5568.
3. Dawei Pan, Jinhua Chen,et.al. Amperometric glucose biosensor based on immobilization of glucose oxidase in electropolymerized o-aminophenol film at Prussian blue-modified platinum electrode. Electrochimica Acta, 49 (2004) 795–801.
4. Jingpeng Wang, et.al. Nonenzymatic Electrochemical Glucose Sensor Based on Nanoporous PtPb Networks. Anal. Chem. 80(2008) 997-1004.
5. Arun Prakash Periasamy, et.al. Amperometric glucose sensor based on glucose oxidase immobilized on gelatin-multiwalled carbon nanotube modified glassy carbon electrode
6. Bioelectrochemistry 80 (2011) 114–120.

7. G.Sivasankarri, et.al. “Non-Enzymatic ampherometric glucose biosensor based on copper hexacyanoferrrate –film modified-GNP-Graphite composite modified electrode” IJPBS 2(2012) 188-195.
8. Byung – Wook Park,et.al. Surface modification of gold electrode with gold nanoparticles and mixed self assembled monolayers for enzyme biosensors. Korean J.chem.eng, 28(2011) ,64-70.
9. Caglar Ozdemir , et al. Electrochemical glucose biosensing by pyranose oxidase immobilized in gold nanoparticle – poly aniline/AgCl/gelatin nanocomposite matrix. Food chemistry, 119(2010) , 380-385.
10. Joowook Lee, Su-Moon Park. Direct electrochemical assay of glucose using boron-doped diamond electrodes. J. Lee, S.-M. Park / Analytica Chimica Acta ,545 (2005) 27–32.
11. Ting-Kai Huang, et.al. Glucose sensing by electrochemically grown copper nanobelt electrode. Journal of Electroanalytical Chemistry, 636 (2009) 123–127.

PP 60

Electron Transfer Reactions of Ruthenium(III)-Polypyridyl Complexes with Sulfur Substituted Cysteine Amino Acids

D.Thiruppathi, P. Karuppasamy, T.Rajendran, V.K.Sivasubramanian, M.Ganesan*

Department of chemistry, Vivekananda College, Tiruvedakam West – 625 214, Madurai

Abstract: The oxidation of sulfur substituted cysteine amino acids with ruthenium(III)-polypyridyl complexes, generated from the photochemical oxidation of Ru(II) complexes with molecular oxygen was studied. It was observed that the colour of the solution readily changed from orange-yellow to green during irradiation. The formation of $[Ru(NN)_3]^{3+}$ complexes was confirmed by recording the absorption spectrum of the irradiated solution. The kinetics of electron transfer reaction between Ru(III)-polypyridyl complexes with sulfur substituted cysteine amino acids have been studied spectrophotometrically under pseudo first order condition with excess of amino acids. The rate controlling step in the electron transfer process is confirmed from the absorption spectrum of the transient sulfide radical cation. The spectrophotometric kinetic study shows that the reaction is of total second order, first order in Ru(III) complex and in the sulfur substituted cysteine. The reaction rate is susceptible to the change of ligand in $[Ru(NN)_3]^{3+}$ and the structure of sulfur substituted cysteine amino acids. To study the electron transfer reaction in the present case Marcus theory has been applied. The agreement between calculated and experimental value is satisfactory. Thus the successful application of Marcus theory of ET to this system supports the operation of single ET in the rate controlling step of the reaction.

References:

1. M. Ganesan, V. K. Sivasubramanian, S. Rajagopal, R. Ramaraj, Tetrahedron, 2004, 60, 1921-1929.
2. M. Ganesan, V.K. Sivasubramanian, T. Rajendran, K. Swarnalatha, S. Rajagopal, R. Ramaraj. Tetrahedron.2005, 61, 4863–4871.
3. N.S. Venkataramanan, S.Rajagopal, M. Vairamani, J.Inorg. Biochem. 2007, 101, 274–282.
4. Bobrowski, K.; Hug, G.L.; Pogocki, D.; Marciniak, B.; Schoneich, C. J. Am. Chem.Soc. 2007, 129, 9236-9245

PP61

Enhanced Catalytic and SERS Activities of DNA Templated Au Nanowires Synthesized using Self-Assembled Au Nanoparticles

Subrata Kundu, M. Jayachandran

Electrochemical Materials Science (ECMS) Division, CSIR-Central Electrochemical Research Institute, Karaikudi-630006, Tamilnadu, INDIA
E-mail: kundu.subrata@gmail.com, skundu@cecri.res.in

Abstract: The controllable synthesis of zero and one dimensional (1-D) nanomaterials have received tremendous attention due to their special optical, electronic, transport, and mechanical properties on confinement. At present there are limited techniques exist to organize nanoparticles (NPs) in precise 1-D patterns. Among the various noble metal nanostructures, especially gold (Au) nanomaterials have attracted great interest due to their fascinating physical and chemical properties and promising applications in catalysis, nanoelectronics, sensing, biomedicine, and surface enhanced Raman scattering (SERS) studies. Different routes like chemical self-assembly, scanning probe lithography, laser etching or microcontact printings are capable to organize NPs into 1-D pattern but not easy and straightforward. Templated routes for the fabrication of well-defined 1-D patterns can be faster and cheaper and results in smaller and uniform dimensions. In this present study, we report for the first time, the photochemical formation of self-assembled Au NP arrays into Au Nanowires on DNA and their enhanced catalytic and SERS activities. The catalytic and the SERS activities were examined with suitable organic molecules. The SERS result shows that the observed enhancement factor (EF) was greater than 10^7. This enhanced catalytic and SERS activities of the material might be useful for future applications in different types of organic catalysis reactions and variety of SERS based detection of bio-molecules, sensor etc.

PP 62

Enhanced the Solubility and Salvation Behavior of Poorly Soluble Anthrarufin Assist with Β-Cyclodextrin

S. Mohandoss, D. Sindhu, T. Stalin*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, Tamilnadu, India
E-mail : tstalinphd@rediffmail.com

Abstract: The inclusion complex process is main role has been enhanced the solubility and salvation behavior of poorly soluble Anthrarufin (ARF) with β-cyclodextrin (β-CD). In addition, the binary solvents with β-cyclodextrin give the better solubility than solvents alone. Both pH and buffer solutions used to adjust the pH had a very significant effect on ARF solubilities and the apparent binding constants of the ARF:β-CD complexes. The stoichiometric ratio was proposed and their binding constant was calculated by using Benesi-Hildebrand method.

Keywords: β-cyclodextrin, Anthrarufin, Inclusion complex, pH and buffer, Binary solvents, Solubility

PP 63

Environmentally Polluted Fly Ash Material Modification to $So_4^{2-}Bi_2o_3$: Fly-Ash Nano Green Catalyst and its Synthetic Applications

K.Thirumurthy, P.Mayavel, G.Thirunarayanan*, S.Dineshkumar
Department of Chemistry, Annamalai University, Annamalainagar 608002 India
E-mail : k.thiruchem@gmail.com;drgtnarayanan@gmail.com

Abstract: In India, thermal power plants generated about 160 MT of fly-ash per year and it's expected to increase to 300MT/year by 2016-2017. Fly ash producing numerous environmental problem in our society. About 46% of Fly-ash has been reused in various industrial applications and techniques but remaining fly-ash was dumping in land and it cause serious environmental problem such as fibrosis of lungs, silicosis, and pneumonitis bronchitis. The Rectification of environmental problem by the fly ash disposed as waste material and it should be recycling, bringing in environmental benefits and economic returns to concern. The authors have modified the fly-ash as modification to $SO_4^{2-}Bi_2O_3$ fly-ash: nano green catalyst and it will use in organic synthetic application. The Modified $SO_4^{2-}Bi_2O_3$ fly-ash: nano catalyst was characterized by FT-IR, XRD, DSC, SEM, FE-SEM, and TEM (conformation of Nano catalyst). This green catalyst was successfully tested for solvent free synthesis of chalcone and imines under microwave irradiation method. This modified nano green catalyst have been reusable for further reaction runs, easily separable from the reaction mixture as single substance, inexpensive, environmentally safe. The synthesized chalcone and imines were confirmed by physical constants and spectral data.

PP 64

Enzyme Entrapment by Using CPE/Pectin -AgNanocomposite Modified Electrode

K.Nivethitha Lakshmi[a], S.K.Suja[a], P.Sujatha Devi[b]
[a]*Lady Doak College, Madurai.*
[b]*Central Glass and Ceramic Research Institute, CSIR, Kolkatta.*
E-mail: vnivethithaish@gmail.com

Abstract: There has been growing interest in glucose biosensors [1,2,3] since diabetes mellitus is a serious health problem around the world that might trigger off heart disease, blindness and kidney failure. So far its management often relies on periodically controlling concentration of the glucose in the blood stream. So, the development of highly sensitive [4], low-cost, simple, portable, reliable glucose sensors having an excellent selectivity is of social concern [5]. Due to specificity and catalytic advantages, enzymes have found wide spread use as sensing elements in glucose biosensor [6]. The most important sensing material used in glucose biosensor is glucose oxidase. Glucose Oxidase is a flavin containing glycoprotein which catalyzes an oxidation of β-D-glucose to δ-gluconolactone and hydrolyzes spontaneously to gluconic acid [7]. Various methods are available for the immobilization [8] of glucose oxidase enzyme into glucose sensor. In our study, the biopolymer, pectin was used as a carrier for Ag nanoparticles and dopped in Carbon paste for the immobilization of glucose oxidase. Pectin was extracted from citrus peels and was used for the study. Silver nanoparticles were synthesized from $AgNO_3$ using bovine serum albumin as a reducing agent and it was characterized

using TEM, UV and XRD studies. The polymer nanocomposite was prepared by solvent casting method and the formation was confirmed by UV and IR studies. This Pectin-Ag composite was mixed with carbon paste in order to prepare the biosensor. The sensitivity was studied using potassium ferri/ ferro cyanide system in cyclic voltammetry and enhanced sensitivity was observed for CPE/Pectin-Ag nanocomposite. The enzyme GOx was immobilized on the prepared electrode surface and its redox behavior was tested in phosphate buffer using cyclic voltammetry and it was observed that CPE/Pectin-Ag /GOx has very good sensitivity by comparing it with CPE/GOx, CPE/Pectin/GOx and CPE/Ag/GOx. The surface properties like surface excess concentration, diffusion coefficient, rate of electron transfer process were also calculated. So CPE/Pectin-Ag/GOx was found to be a goodbiosensor for glucose.

Reference

1. Takuya Kohma, et.al. Preparation of selective micro glucose sensor without
2. permselective membrane by electrochemical deposition of ruthenium and glucose oxidase. Electrochemistry Communications 9 (2007) 1012–1016
3. Jonathan C.Claussen, et.al. “Electrochemical glucose biosensor of platinum nanospheres connected by carbon nanotubes” J Diabetes Science technology, 4(2010), 312-319.
4. Dawei Pan, Jinhua Chen,et.al. Amperometric glucose biosensor based on immobilization of glucose oxidase in electropolymerized o-aminophenol film at Prussian blue-modified platinum electrode. Electrochimica Acta , 49 (2004) 795–801.
5. Duan Feng, et.al. Electrochemical glucose sensor based on one-step construction of gold nanoparticle–chitosan composite film. Sensors and Actuators B , 138 (2009) 539–544
6. G.Sivasankarri, et.al. “Non-Enzymatic ampherometric glucose biosensor based on copper hexacyanoferrrate –film modified-GNP-Graphite composite modified electrode” IJPBS 2 (2012) 188-195.
7. Byung – Wook Park,et.al. Surface modification of gold electrode with gold nanoparticles and mixed self assembled monolayers for enzyme biosensors. Korean J.chem.eng, 28(2011) ,64-70.
8. Caglar Ozdemir , et al. Electrochemical glucose biosensing by pyranose oxidase immobilized in gold nanoparticle – poly aniline/AgCl/gelatin nanocomposite matrix. Food chemistry 119(2010), 380-385.
9. Joowook Lee, Su-Moon Park. Direct electrochemical assay of glucose using boron-doped diamond electrodes. J. Lee, S.-M. Park / Analytica Chimica Acta 545 (2005) 27–32.

PP 65

Estimation of pH, Temperature and Cultural Media on Decolorization and Detoxification of Cationic Dye through *Agaricus Bisporus*

Priyanka Pandey, P. Manisankar*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003, Tamil Nadu, India
E-mail: pms11@rediffmail.com

Abstract: Cationic dye is a major pollutant, widely employed in textile industries. It is carcinogenic, toxic and more harmful than anionic dyes and causes aesthetic damage. Crystal violet (CV) is a triphenylmethane cationic class dye and it is also used as a biological stain. A vast array of biological materials, especially bacteria, algae, yeasts and fungi have received increasing attention for complete dye removal due to their good performance, low cost and availablity. In present study, a white-rot fungus, *Agsricus bisporus* (*A. bisporus*) was employed for the decolorization of CV under different environmental and nutritional conditions. *A. bisporus* was capable of decolorizing the recalcitrant triphenylmethane dyes with an optimal efficiency of decolorization obtained at fourth days of culture. An unexpected outcome of this study is the strain of *A. bisporus* effectively degrades CV up to 83% at optimized parameters like 1.0% glucose and 0.3% beef extract at pH 6.0 with inoculum size 6% w/v, 100 rpm agitation rate at 25 to 35°C temperature. In addition, during decolorization, the production of laccase and peroxidase enzymes showed a direct correlation with dye removal. Furthermore, alkaline comet assay had been used to evaluate the toxicity of treated dye, which illustrate that the average olive tail moment (OTM) and % tail DNA for untreated dyes was 3.09±0.21 and 17.69%, which reduced up to 0.76±0.09 and 8.70%, respectively after ten days. It is concluded that *A. bisporous* can be used successfully for the removal of cationic dye such as CV under optimized process conditions and this method can be extended to the degradation of CV in textile industrial wastewater systems.

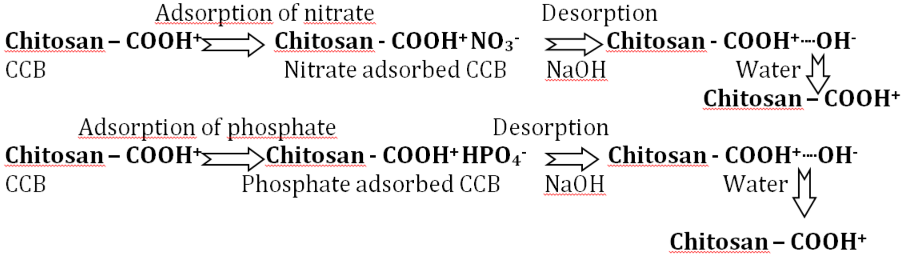
Keywords: *Agaricus bisporus;* Crystal violet; Decolorization; Detoxification

PP 66

Evaluation of Nitrate and Phosphate Removal Efficiency of Carboxylated Cross-Linked Chitosan Beads

A. Sowmya, S. Meenakshi*
Department of Chemistry, Gandhigram Rural Institute, Gandhigram, Tamil Nadu, India
E-mail: drs_meena@rediffmail.com

Abstract: Nitrate and phosphate are the key nutrients for biological organisms, but their presence in water bodies more than the permissible limit leads to environmental problems which also affect human through food chain. So the removal of these nutrients is requisite if it exceeds the limit. In this study, adsorption of nitrate and phosphate from aqueous solution on the carboxylated cross-linked chitosan beads (CCB) was investigated in batch mode. Effects of various parameters such as contact time, dosage of adsorbent, pH of the aqueous solutions, competitive co-anions and temperature on the sorption capacity of the sorbent were studied. The reuse of sorbent was evaluated by sequential sorption-desorption cycles using 0.1 M NaOH as regenerant.Three isotherms namely Langmuir, Freundlich and Dubinin-Radushkevich were applied to experimental equilibrium data at different solution temperatures and the isotherm constants were calculated using linear regression analysis, whereas the pseudo-second order equation was used for the kinetic data. ΔH^o values revealed that the adsorption of nitrate is exothermic process and adsorption of phosphate is endothermic process. The sorbent was characterised by SEM, EDX and FTIR.



Scheme: The possible mechanism of anion adsorption/desorption on CCB

PP 67

Extracellular Biosynthesis and Characterization of Titanium dioxide Nanoparticles using *Fusariumsolani*

S.Preethi, K.S.Venkatesh, N.S.Palani, R.Ilangovan*
Nanoelectronics laboratory, Department of Nanoscience and Technology, Alagappa University,
Karaikudi 630 004, Tamil Nadu, India.
Email: rajangamilangovan@gmail.com

Abstract: The development of eco-friendly and biocompatible technologies for the synthesis of nanoparticles is considered to be a great important for expanding its various biological application such as drug delivery, gene therapy, antibacterial agents, biosensors etc. TiO_2 nanoparticles have been synthesized successfully using *Fusariumsolani*fungus extraction as bio solvent. The thermal property of the as-synthesized powder was analyzed through TGA/DTA analysis and temperatures of the organic substances evaporation were identified. The crystallization temperature was found out from the DTA curve. X-ray diffraction pattern revealed the presence of TiO_2 in tetragonal crystal system with Anatase phase. The grain size was calculated by Debye scehrrer's formula and it was found to be 15 nm. The optical property of the nanoparticles was studied by UV –Vis-NIR Spectra. The different functional group vibrations resulted by the fungi were studied using FT-IR analysis.

Keywords: TiO_2, Fusarium *solani*, Biosynthesis, XRD, TGA/DTA, UV-Vis-NIR, FT-IR

PP 68

Extracellular Bio-synthesis of Gold Nanoparticles using Fungi *Phomopsis* Sp.

K. Rajeshwaran, K. Gopinath, Marcus S. Sam, N. Abinaya, A. Arumugam*
Department of Nanoscience and Technology, Alagappa University, Karaikudi -630 004. India.
E-mail: sixmuga@yahoo.com

Abstract: The present investigation indicates the extracellular synthesis of gold nanoparticles from *Phomopsis* Sp. culture filtrate. The biosynthesized gold nanoparticles were characterized by UV-vis, FTIR, XRD and TEM analysis. The UV- Vis spectra of the fungal culture filtrate medium containing gold ion showed peak at 527 nm corresponding to the plasmon absorbance of gold nanoparticles. Fourier transform infrared spectroscopy (FTIR), provides an evidence for the presence of heterocyclic compound and proteins in the culture filtrate, which increases the stability of the synthesized gold nanoparticles. The X-ray analysis respects the Bragg's law and confirmed the crystalline nature of the gold nanoparticles. Transmission electron microscopy (TEM) showed that the gold nanoparticles are spherical in shape with the size range from 10 to 20 nm. The fungus *Phomopsis* Sp. has a fast growth rate, rapid capacity of metallic ions reduction, NPs stabilization and facile and economical biomass handling. Extracellular biosynthesis of gold nanoparticles could be highly advantageous from the point of view of synthesis in large quantities, time consumption, eco-friendly, non-toxic and easy downstream processing.

Keywords:*Phomopsis* sp, Biosynthesis, Gold nanoparticles, Extracellular biosynthesis, Eco-friendly, Bio-reduction.

PP 69

Fabrication of Antibacterial Cotton by Microcapsules of Syzygium Aromaticum Essential Oil

A.Rukmani[a], **M.Sundrarajan**[b]*
[a]Department of Chemistry, Seethalakshmi Achi College for Women,Pallathur-630107, India.
[b]Advanced Green Chemistry Lab, Department of Industrial
Chemistry, School of Chemical Sciences, Alagappa University, Karaikudi -3,Tamil Nadu, India.
Email: drmsgreenchemistrylab@gmail.com, rukmanisac@gmail.com

Abstract: Natural textiles like cotton are more suitable for microbial attack as their enrichness in humidity and nutrients facilitate the growth of microorganism. The pathogens growth can be controlled or prevented using the recently developed environmentally benign methods. The microencapsulation, an effective technique was used to imbibe fragrance, insect repellents, antimicrobials, and phase change materials etc on textiles for their sustained and controlled release from the wall material at the time of need. In this study the microcapsules of Syzygium aromaticum essential oil (clove oil) was prepared using biodegradable polymer gum acacia as wall material by coacervation method. The light microscopic analysis proved the formation of microcapsules of clove oil. The microcapsules were impregnated on cotton by pad-dry cure method and the scanning electron microscopic analysis evidences the fastening of the capsules on fabric. Fourier Transform Infrared analysis of cotton, clove oil and microcapsule impregnated cotton confirmed the existence of clove oil on fabric. The development of antibacterial characteristic on the cotton fabric was analyzed by agar diffusion method for gram negative bacteria E.coli. The pathogen growth was inhibited by the bactericidal action of the eugenol in the essential oil.

Keywords: Clove oil, Coacervation, Gum acacia, Microcapsules, Syzygium aromaticum

PP 70

Fabrication of Bimetallic Ag&Cu Nanowires Electrodes towards H_2O_2Reduction

Jeena Susan Easow, **T. Selvaraju***
Department of Chemistry, Karunya University, Coimbatore-641114
Email: selvaraju@karunya.edu

Abstract: Bimetallic nanowires, either as alloys or as structures, exhibit unique electronic, optical and catalytic properties as compared to pure metallic nanowires. Ag and Cu nanowires are widely used in optical, biological devices, catalysis and sensors. In the present work, Ag@Cu bimetallic nanowires have been synthesized by seed mediated growth method. Cetyltrimethylammonium bromide (CTAB) was used as a surfactant in the growth solution containing copper precursors. Anodic stripping voltammetry, SEM, XRD and electrochemical impedance measurements were used for the characterization of Ag@Cu bimetallic nanowires. Finally, the electrocatalytic reduction of H_2O_2 is achieved in phosphate buffer solution (pH 7.2) using Ag@Cu bimetallic nanowires coated glassy carbon (GC) electrode. The comparative study shows an efficient electrocatalytic reduction of H_2O_2 is achieved at Ag@Cu bimetallic nanowires coated GC compared to plane GC, Ag nanowire coated GC electrodes. The pH is optimized as 7.2 using Ag@Cu bimetallic nanowire coated GC electrode towards H_2O_2 reduction.

Chronoamperometry is used to study the linear correlation between 1 mM and 10mM H_2O_2 and detection limit (3μM) is achieved at Ag@Cu bimetallic nanowires coated GC electrode.

PP 71

Dyeing of Silk Fabric using *Nyctanthes arbor- tristis* Extracts and their Antibacterial Activity

<u>Vishnu V Gopal,</u> S.Selvam, M.Sundrarajan*

Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences, Alagappa University, Karaikudi -630 003, Tamil Nadu, India.

Email: drmsgreenchemistrylab@gmail.com

Abstract: Nyctanthes abror -tristis plant is medicinal plant and its various parts such as bark, leaves, flowers and root. In this study the bark, leaves and flowers of this plant extracts were extracted. These extracts were used for dyeing of silk fabrics. The color strength, washing and light fastness of natural extracts dyed fabrics were tested. The silk dyed fabrics exhibit good color strength and also exhibit good fastness grade. Antibacterial activity of herbal extracts, dyed fabrics were studied using Staphylococcus aureus and Escherchia coli bacterium.

Keywords: Nyctanthes arbor –tristis, antibacterial, silk, dyeing, herbal, medicinal

PP 72

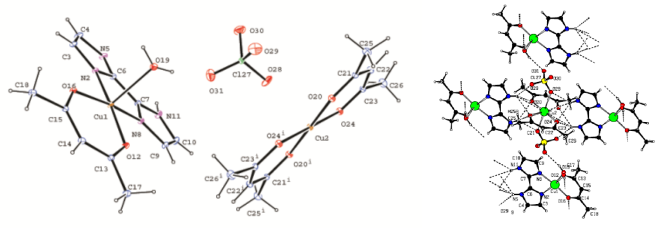
Synthesis, Structural, Electrochemical and DNA Interaction Studies of Mixed Ligand Copper(II) Complex

<u>S. Nagasubramanian</u>, V. Thamilarasan, N. Sengottuvelan*

DDE,Department of Industrial Chemsitry, Alagappa university, Karaikudi - 630 003

E-mail: nsvelan1975@yahoo.com

Abstract: Mixed ligand copper(II) complex $[Cu(biim)(acac)H_2O)]ClO_4$ $[Cu(acac)_2]$ with acac and biim ligands [acac = acetylacetone, biim = biimidazole] have been synthesized and characterized. Single crystal x-ray diffraction analysis of the complex showed two different copper centers having distorted square-pyramidal CuN_2O_3 and square planar CuO_4 coordination geometry. Electrochemical studies of the complex evidenced that two quasi-reversible one electron-transfer reduction waves (E^1_{pc} = -0.91 V, E^2_{pc} = -1.55 V) in the cathodic region. The interaction of complex with DNA has been studied to explore their potential biological activity. The DNA binding properties of the complex with calf thymus (CT) DNA was studied by spectroscopic titration. The complex shows binding affinity to CT DNA with binding constant (K_b) values in the order of 10^{-5} M. The Copper complex also exhibit strong DNA cleavage activity in presence of reducing agent (3-mercaptopropionic acid). The synthesized complex has significant oxidative chemical nuclease activity which could induce scission of pBR322 supercoiled DNA effectively to linear form and the cleavage mechanism proceeding by a hydroxy radical. Microbial studies revealed that the complex is useful as antibacterial and antifungal agents.



ORTEP view and Crystal Packing diagram of $[Cu(biim)(acac)H_2O)]ClO_4$ $[Cu(acac)_2]$.

PP 73

Synthesis, Structures and Anti Bio-Gram Assay of Intercalative Binders: *In Vitro* DNA Binding and Redox Potential Evaluation

M. Selvaganapathy, N. Raman*
Research Department of Chemistry, VHNSN College, Virudhunagar-626 001, India
E-mail:ramchem1964@gmail.com

Abstract: Few novel hexadentate Cu(II), Ni(II), Co(II) and Zn(II) complexes bearing essential amino acid as a main ligand and bioactive 2,2′-bipyridine as a co-ligand were synthesized and characterized by elemental analysis, magnetic susceptibility, IR, UV-vis, ^1H and ^{13}C NMR spectral techniques. The *in vitro* DNA binding studies of all the complexes with CT DNA was carried out by various biophysical techniques which revealed that all the complexes bind to DNA through intercalative mode. The electron transfer mechanism of the mixed ligand metal complexes was investigated by the aid of cyclic voltammetry.The cyclic voltammogram of the complexes was recorded in DMSO solution and in presence of CT DNA in DMSO/buffer (containing 50 mM NaCl, 5 mM Tris buffer(pH 7.2 at 25°C) solution, the CV shows that the complexes bind to CT DNA by the intercalative binding mode which has also been verified by DNA solution viscosity measurements. Microbial property of these complexes as antibacterial agents has been investigated against Gram-negative and Gram-positive bacterial strains, namely *S. aureus* and *B. subtilis* (as Gram positive bacteria) and *P. aeruginosa*, *E. coli* and *S. typhi* (as Gram negative bacteria). The study shows that the complexes are better antibacterial agents than the free ligand.

PP 74

The Characteristics of Electrodeposited Ti-Ni Alloy

G.Meenakshi*, T.Vasudevan
**Head, Department of Chemistry, Seethalakshmi Achi College for Women,Pallathur – 630107*
E.mail: g_meenakshi@rediffmail.com

Abstract: Electrodeposited Ti-Ni alloys possess an attractive surface appearance and are highly corrosion and tarnish resistant as compared with the single metals involved. It can replace the conventional nickel-chromium coatings in many applications. Tartrate bath was tried as an alternate eco-friendly bath to replace the usual sulphate bath – prone to oxidation, fluoride bath which is hazardous, needs special equipment and also has effluent problem, fluoborate and pyrophosphate baths – costly for the electrodeposition of tin-nickel alloy. In the present work, the physical characteristics of tin-nickel alloy deposits such as adhesion, porosity, hardness and wear resistance were determined by the standard test methods. Surface morphology and structure of tin-nickel alloy deposits were examined by SEM and X-ray diffraction technique.

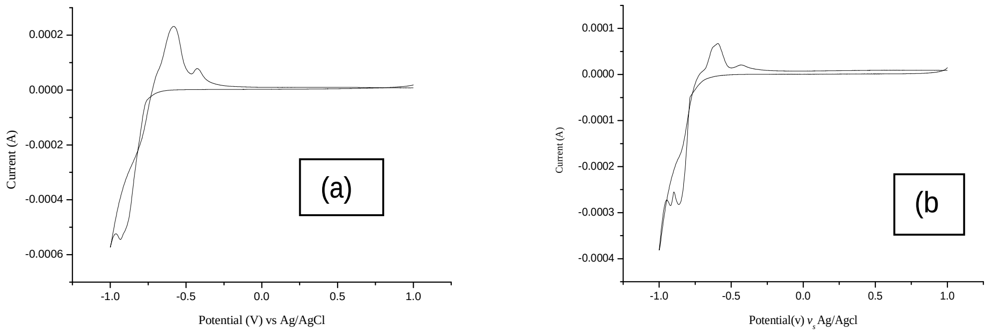
Keywords: Tin-Nickel alloy, alloy plating.

PP 75

The Formation of CdZnS Thin Film and its Characterization

N.Anandhan*[a], S.Senthilkumar[a], V.Dharuman[b], J.Sankara Narayanan[b], T.Marimuthu[a], G.Ravi[a],G.Sivakumar[c]
[a] *Department of Physics, ,Alagappa University, Karaikudi- 630004.*
[b] *Department of Bioelectronics and Biosensors, Alagappa University, Karaikudi- 630004.*
[c] *Department of Physics(CISL), Annamalai University, Annamalai Nagar,Chidambaram-608 002.*
**Email: anandhankn@gmail.com*

Abstract: In the present investigation, cyclic voltammetery study was carried out for the different mole fractions of $ZnCl_2$, $CdCl_2$, $Na_2S_2O_3$. From The obtained data, plots were drawn and the reduction potential had been identified then it was used to deposit the materials in the form of CdZnS thin film by using electrodeposition technique .The deposited thin films were analyzed using analytical techniques like XRD, FTIR and UV–VIS spectrometers. The obtained results discussed with the previous data.



Cyclic Voltammogram of 0.001 M $ZnCl_2$, $CdCl_2$ and $Na_2S_2O_3$ mixture at scan rate 5mV/s (a). pH 2.5 and (b) pH3.

PP 76

Water Quality Assessment and Monitoring in and Around Sivaganga District

M.Kalaiselvi[a], V.Sethuraman[a], V.Ramasamy[a], B. Muralidharan[b]*
[a]*Periyar Maniammai university, Thanjavur,*
[b]*BITS Pilani, Dubai Campus, Dubai -UAE*
E.mail: muralidharan@dubai.bits-pilani.ac.in,bmdharan@gmail.com

Abstract: Water quality standards for surface waters vary significantly due to different environmental conditions. Different uses raise different concerns and therefore different standards are considered. Natural water bodies will vary in response to environmental conditions. WHO recognizes that very stringent standards cannot be used universally and so a range of guideline values for more than 60 parameters have been elaborated. Most nations have their own guidelines or standards. The control exerted by local regulatory authorities may differ from place to place depending on the local situation. The present study focuses its attention on collection and analysis of bore well water samples from few panchayat unions of Sivaganga district, Tamilnadu . The study period corresponds to 2010 to 2012. Laboratory tests were conducted to assess various physico chemical characteristics such as Turbidity, Electrical conductance, Total Hardness, TDS, pH, chlorides, ammonia nitrite, nitrate, sulphate, phosphate contents. The observed results are analyzed and presented.

PP 77

Transesterification of Palmolein Oil to Biodiesel using Ba/Ti/Na Nanocomposite Catalysts

Karthick Sarvasakthi, Shakkthivel Piraman*
Sustainable Energy and Smart Materials Research Lab, Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003, Tamilnadu, INDIA
Email:apsakthivel@yahoo.com

Abstract: Biodiesel production is worthy of continued study and optimization of production procedures due to its environmentally beneficial attributes and its renewable nature. Heterogeneous transesterification is considered to be a green process. Here, we have synthesized novel solid Ba/Ti/Na Nanocomposite catalysts by Sol-Gel method. The synthesized nanocatalysts were characterized through X-ray diffraction (XRD), Fourier transform infrared microscopy (FT-IR) and Field Emission – Scanning Electron Microscopy (FE-SEM) techniques. Subsequently, using this novel Solid heterogeneous catalyst, transesterification of palmolein oil with methanol, with respect to the reaction variables such as temperature, reaction time, catalyst loading and methanol/oil molar ratio carried out and used for large scale biodiesel production. At the end, the comparison of biodiesel productivity was confirmed using Thin Layer Chromatography (TLC).

PP 78

1-methyl-2,6-diphenyl-piperidin-4-one Oxime as Corrosion Inhibitor for Mild Steel in HCl Medium

K. Tharini[a], K.Raja[a], A.N.Senthilkumar[b]*
[a]*P.G. & Research Department of Chemistry, Government Arts college, Trichirappalli - 620 022, India*
[b]*P.G. & Research Department of Chemistry, Alagappa Government Arts College, Karaikudi - 630 003, India.*
E-mail: ansent@gmail.com

Abstract: A novel corrosion inhibitor namely 1-methyl-2, 6-diphenyl piperidin-4-one oxime (MDPO) has been synthesized and its inhibitive performance towards the corrosion of mild steel in 1M hydrochloric acid (HCl) was tested by weight loss study, electrochemical methods, SEM and theoretical studies. The weight loss studies were conducted at three different temperatures such as 30°C, 40°C and 50°C for various concentrations (0, 25, 50,100, 200 and 300 ppm) for 2h duration. The study revealed that inhibition efficiency increases with increase of MDPO concentration and decreases with increase of temperature. It was studied that MDPO adsorbs over alloy surface obeying Temkin's isotherm. The calculated values of free energy of adsorption (ΔG_{ads}) support physisorption mechanism. Electrochemical parameters such as corrosion potential (E_{corr}), corrosion current (i_{corr}) and Tafel slopes (b_a& b_c) were determined using Tafel plot. The results showed that increase in concentration of MDPO decreases corrosion current and behave as mixed mode inhibitor. AC impedance measurement as determined by Nyquist plot revealed that charge transfer resistance increases with increase of concentration, whereas double layer capacitance decreases with increase of concentration tribute each other. SEM studies revealed the film forming ability of MDPO in HCl medium. Quantum chemical studies exemplified that the electrons present in the phenyl ring of MDPO assist largely in the corrosion control process.

Keywords:1-methyl-2,6-diphenyl-piperidin-4-one oxime, Polarization, Impedance, SEM and Quantum chemical studies.

PP 79

Urban Water Pollution and Socioeconomic Implications – A Case Study

<u>K.K. Sivakumar</u>[a], M.S. Dheenadayalan[b]

[a]Research Scholar, PG and Research Department of Chemistry, GTN Arts College, Dindigul, Tamil Nadu. INDIA.

[b]Professor and Head, PG and Research Department of Chemistry, GTN Arts College, Dindigul.

E-Mail: sivakumarccet@gmail.com

Abstract: River Amaravathy is a tributary of Cauvery River. With urbanization and population pressure, it is increasingly getting polluted due to direct disposal of solid waste and colored water. Polluted water from this drains into the Cauvery River which is the main source of drinking water for Trichy Corporation and the other downstream cities and suburbs. The objective of this study was to assess the socio-economic implications of water pollution in River Amaravathy. A structured questionnaire survey was conducted with a randomly selected sample of 70 households within the 15 village administrative areas (VAA) of both upstream and downstream area to collect primary data. Various peoples were interviewed to collect necessary data to identify impacts of water pollution on them and their opinion on pollution of River Amaravathy water. Focused group discussions and a number of key informant interviews were also held to gather relevant information. The results show that the level of water pollution is becoming high in River Amaravathy due to unplanned and inadequate waste disposal facilities (for both industrial and domestic) and indifferent attitude of the people. The study revealed that occurrence of diseases, provision of breeding grounds for mosquitoes, and emission of unpleasant odor are the major impacts of water pollution. Despite 85 % of the community having a good educational background, they continue to dispose and discharge solid and liquid wastes into the stream. Though there are a large number of Government stakeholders directly or indirectly involved in water resources management of the area, the degree of interactions and collaborations among them vary widely. This study recommends that there should be a community based management system to minimize the pollution of water in River Amaravathy and thereby to minimize the socio economic impacts of water pollution in the downstream water protection.

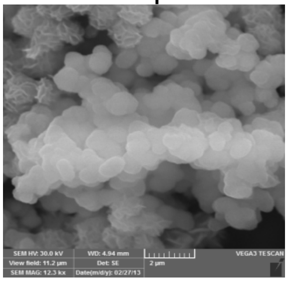
Key words: River Amaravathy, Cauvery River, Water Pollution, Social Impact

PP 80

Fabrication of Cobalt Sulphide nanostructure on Indium doped Tin Oxide Coated Glass Plate

S. Karthikaikumar[a], G. Balasubramani[b], A. Elangovan[b], P. Kalimuthu[a*]
[a]*Department of Chemistry, Gandhigram Rural Institute, Gandhigram, Dindigul – 624 302.*
[b]*Department of Chemistry, Thiagarajar College, Madurai - 9.*
E-mail: pakalimuthu@gmail.com

Abstract: Dye Sensitized Solar Cell (DSSC) is an example of photovoltaic cell that converts solar energy (photons) into electrical energy. DSSCs have been studied intensively by the researchers all over the world due to their low cost and high efficiency [1]. A typical DSSC consists of three main components: dye-sensitized TiO_2 photoanode, electrolyte with I^-/I^{3-} redox couple and catalytic counter electrode. Generally the platinum nanoparticle is used to achieve the catalytic redox reaction of I^-/I^{3-} couple. Finding an alternate to the expensive platinum nanoparticle is an important task to minimize the cost of the device. It has been reported that Cobalt Sulphide (CoS) is a suitable alternate for platinum nanoparticle [2-3]. Therefore, in this study we fabricated CoS nanostructure on Indium doped Tin Oxide (ITO) plate by chemical bath deposition method. In this method CoS is directly allowed to coat on ITO plate while it was forming. The formed CoS nanostructure was examined using Scanning Electron Microscopic (SEM) technique. From the SEM image, it is clear that CoS formed on ITO plate. Energy Dispersive X-ray analysis (EDX) study of surface is also confirm clearly that the formation of Cobalt Sulphide on ITO plate.



SEMimage of CoS coated on the ITO plate.

References:
1. O' Regan, B.; Gratzel, M. Nature 1991, 353, 737.
2. Wang, M.; Anghel, A. M.; Marsan, B.; Cevey Ha, N. L.; Pootrakulochote, N.; Zakeeruddin, S. M.; Gratzel, M. J. Am. Chem. Soc. 2009, 131, 15976.
3. Lin, J-Y.; Liao, J-H.; Wei, T-C. Electricalchemical and Solid-State Letters, 2011, 14, D41- D44.

PP 81

Fabrication of Graphene Oxide - Gold Nano Sheets andCharacterization forDetection of Glucose

K. Jayakumar, K.Ganapathy,V. Dharuman*
Department of Bioelectronics and Biosensors, Alagappa University, Karaikudi – 630 003, India
E-mail:dharumanudhay@yahoo.com

Abstract: Graphene two dimensional mono atomically thin lattice sp2 hybridized carbon are used widely electronics, catalysis, energy storage devices and biosensors. Recently, graphene-nano metal composites attract greater interest in sensor and capacitor applications due to enhanced surface area and high conductivity, however, preparation method of graphene sheets have significant effect on their behavior. Hence, in the present work, we have attempted to prepare Graphene-gold nano particle composite by electrochemical method on glassy carbon electrode. For this the GO is obtained by modified Hammers method [1]. In-situ formation of GO and gold nano particle is made using cyclic voltammetry (CV) in mixture of GO and $AuCl_4.3H_2O$ at the ratio and at a scan rate 50mv. The deposition of GO-AuNP is confirmed by change in the CV parameters. The electrode modification and the interaction between the gold nano particle and RGO layer are characterized by Fourier Transform Infrared (FTIR), Raman spectroscopy (RS), Field Emission Scanning Electron Microscopy (FE-SEM), and Atomic Force Microscopy (AFM). The chronoamperometric techniques were used for detection of glucose in phosphate buffer.

Keywords: Graphene oxide, Gold nano particle, impedance, Glucose.

PP 82

Fabrication of Polyaniline-Polyphenol Oxidase based Biosensor for Catechol

V.Sethuraman, M.Sethupathy P.Muthuraja, P. Manisankar*
Department of Industrial Chemistry, Alagappa University, Karaikudi – 630 003.Tamilnadu, India.
E-mail: pms11@rediffmail.com, sethur182@gmail.com

Abstract: Aniline was polymerized by amperometic method at 0.7V using conventional three electrode set-up having glassy carbon electrode with the 3 mm diameter working electrode, Ag/AgCl reference and platinum wire counter electrode. The thickness of the polymer deposition was optimized by varying the time. The enzyme, polyphenol oxidase was immobilized on polyaniline using glutaradehyde as cross- linking agent. For this, the polyaniline modified electrode was dipped in a phosphate buffer of pH 7.0 containing 2.5% wt of glutaraldehyde and polyphenol oxidase for 30 mins and incubating for 24h at 4ºC. Finally the enzyme electrode was washed with the same buffer to remove loosely bounded cross linked enzyme on the polymer surface. The difference in the FESEM images of the modified electrode before and after immobilization of the enzyme confirmed the presence of cross-linked enzyme on the polyaniline. Since the enzyme has good activity in the pH range 5.0-8.0, the influence of pH on the differential pulse voltammetric (DPV) response was studied in the pH range 5.0-8.0. Highest current response was observed at pH 6.0 for $50\mu mol.dm^{-3}$ catechol. The oxidation peak potential was found to be -0.12V at pH 6.0. These results were confirmed

by carrying out the cyclic voltammetric studies also. DPV experiments were carried out by varying the concentration of catechol by keeping constant optimum conditions and the peak currents were measured. Each experiment was repeated for five times and the average value was taken for calibration. Linearity between the concentration and DPV peak current was observed in the concentration range 5– 80 μmoldm^{-3} at 25^{0}C with the rsd 2.4%. The lowest limit of determination was found to be 2.5 μmoldm^{-3}.
Keywords: Amperometric Polymerization, Polyaniline, Polyphenol oxidase. Differential Pulse Voltammetry, Biosensor, Catechol.

PP83

Facile Synthesis of Highly Efficient, Sun shine and Reusable Photocatalyst, Cadmium Sulphide Loaded Ag-ZnO, towards Naphthol Blue Black Dye Degradation

B. Subash, P. Dhatshanamurthi M. Swaminathan, M. Shanthi*
Photocatalysis Laboratory, Department of Chemistry, Annamalai University, Annamalainagar 608002.
E-mail: shanthimsm@gmail.com

Abstract: The different wt% of CdS loaded Ag-ZnO were prepared by simple precipitation-decomposition method and used for the degradation of Naphthol Blue Black dye (NBB) under natural sun light. 2 wt% of CdS Ag-ZnO was found to be more efficient. Hence this catalyst was characterized by X-ray diffraction (XRD), transmission electron microscope (TEM) images, field emission scanning electron microscope (FE-SEM) images, energy dispersive spectra (EDS), diffuse reflectance spectra (DRS), photoluminescence spectra (PL), X-ray photoelectron spectroscopy (XPS) and BET surface area measurements. The photocatalytic activity of 2 wt% CdS loaded Ag-ZnO was compared with other single metal doped, undoped and commercial catalysts. 2 wt% CdS loaded Ag-ZnO is found to be more efficient than Ag-ZnO, CdS-ZnO, Ag-CdS, CdS, commercial ZnO, prepared ZnO, TiO_2-P25 and TiO_2 (Merck) at pH 9 for the mineralization of NBB dye under solar light. The influences of operational parameters such as the amount of photocatalyst, dye concentration, initial pH on photo mineralization of NBB have been analyzed. The mineralization of NBB has been confirmed by Chemical Oxygen Demand (COD) measurements. A degradation mechanism is proposed for the efficient degradation of NBB dye by CdS-Ag-ZnO at pH 9 under solar light. This catalyst is found to be reusable.

PP 84

Fungus Mediated Biosynthesis of SnO_2 Nanoparticles using *Aspergillus niger*and their Characterization

V.Karthika, K.S.Venkatesh,V.Thirumal, R.Ilangovan*
Nanoelectronics laboratory, Department of Nanoscience and Technology, Alagappa University, Karaikudi 630 004,Tamil Nadu, India.
Email: rajangamilangovan@gmail.com
Abstract: Tin oxide is the one of the effective gas sensor materials because of its various unique properties. Recently biosynthesis of Tin oxide has earned a rich attention for the synthesis of nanoparticles. The SnO_2 nanoparticles have been synthesized successfully using *Aspergillus niger* as bio reducing agent. The thermal property of the as

synthesized powder was analyzed through TGA/DTA analysis .The X-ray diffraction pattern revealed the presence of tin dioxide with tetragonal crystal system and its size was about 4nm. The broad XRD peak indicates the presence of nanoparticles ..The optical property of the nanoparticles was studied by UV –Vis-NIR Spectra. The different functional group vibrations resulted by the fungi were studied using FT-IR analysis.

Keywords: SnO_2, *Aspergillus niger*, Biosynthesis, XRD, TGA/DTA, UV-Vis-NIR, FT-IR

PP 85

Glucose Sensing at Graphene Oxide – Zro using Glassy Carbon Nano Composite Modified Electrode

C. Anjalidevi, J. Shankara Narayanan, V. Dharuman*
Molecular Electronics Laboratory, Department of Bioelectronics and Biosensors, Science Block 5th floor, Alagappa University,Karaikudi – 630 003- India
E-mail: dharumanudhay@yahoo.com

Abstract: Graphene has recently attracted tremendous interest because of its unique thermal, mechanical, and electrical properties. One of the promising applications of graphene is electrochemical sensing. Selective and sensitive detection of Glucose is important in the fields of food safety, pharmaceutical development, and medical diagnostics.Here we demonstrate the glucose sensing using graphene oxide and Zirconium oxide composite on attached to glassy carbon electrode. The GCE-GO-ZrO showed high potential for the development of simple non-enzymatic sensors than those reported based on the other metal oxides for the detection of Glucose. Electrochemical characterization has been made using Impedance Spectroscopy (IS), Cyclic Voltammetry (CV) and Chronoamperometry (CA) techniques. The composite is highly selective in presence of potential interferences like ascorbic acid, uric acid, catechol and dopamine.

Keywords: Graphene oxide, glucose sensing, ZrO, nanocomposite.

PP86

Gold Nanoarrays-Based Chronocoulometric Genosensor for GMO Control in Food and Feed

M. Fátima Barroso[a,b], M. Freitas[a,c], S. Amaya-González[a,c], Subramanian Viswanathan[a,d], N. de-los-Santos-Álvarez[c], A. J. Miranda-Ordieres[c], M.B.P.P. Oliveira[b], M. J. Lobo-Castañón[c], C. Delerue-Matos[a]
[a]*REQUIMTE, Instituto Superior de Engenharia do Porto, Rua Dr. António Bernardino de Almeida, 4200-072 Porto, Portugal*
[b]*REQUIMTE, Departamento de Ciências Químicas, Faculdade de Farmácia da Universidade do Porto, R. Jorge Viterbo Ferreira 228, 4050-313 Porto, Portugal*
[c]*Departamento de Química Física y Analítica, Universidad de Oviedo, Av. Julián Clavería 8, 33006 Oviedo, Spain*
[d]*Department of Industrial Chemistry, Alagappa University, Karaikudi 630 003, Tamilnadu, India*
E-mail: rsviswa@gmail.com

Abstract: During the past decade, the development of biotechnology has revolutionised agriculture by the introduction of genetically modified organisms (GMO) that confer new crop protection traits, such as herbicide tolerance, insect resistance and others. Despite the advantages presented by the GMO plants, their use as food/feed ingredients

is not accepted worldwide, especially in Europe where consumers are very concerned about their safety.

In this study a three dimensional (3D) gold nanostructure-based genosensor was developed for the detection of a specific sequence of MON810 maize event in food and feed. The developed genoassay consisted in a direct label-free DNA sensor coupled to chronocoulometric measurement using an intercalator ruthenium complex.

Acknowledgements: This work was supported by Spanish Government (Project PRI-AIBPT-2011-0769) and Fundação para a Ciência e a Tecnologia (FCT) from Portugal (Project No.38/12) and Grant PEst-C/EQB/LA0006/2011.S.A.G and N.S.A. thanks to Spanish Government for a FPI grant and a Ramón y Cajal contract, respectively. M.F.B. is grateful for the post-doc fellowship (SFRH/BPD/78845/2011) financed by POPH–QREN–Tipologia 4.1–Formação Avançada, by Social European Fund and Ministério da Ciência, Tecnologia e Ensino Superior.

PP87

Gold-Silver Core-Shell Nanorods Embedded in Amine Functionalized Silicate Matrix Modified Electrode for Nitrite Sensor Applications

S. Jayabal, R. Ramaraj*
School of Chemistry, Centre for Photoelectrochemistry, Madurai Kamaraj University, Madurai
E-mail: ramarajr@yahoo.com

Abstract: The gold-silver bimetallic nanorods exhibit interesting properties with tunable optical properties which strongly depend on their shape anisometry. The core-shell bimetallic nanostructures can be achieved through deposition of a metal on the surface of core made of another metal. The bimetallic Au/Ag core-shell nanorods exhibit interesting optical properties that differ from those of the Au NRs because of their stronger extinction coefficients and a blue shift in their longitudinal surface plasmon resonance band. In the present work, a facile synthetic method was developed for the preparation of bimetal core/shell Au/Ag nanorods embedded in amine functionalized silicate sol-gel matrix (Au_{core}/Ag_{shell}-TPDT NRs) and characterized by UV-visible spectroscopy, diffuse reflectance spectroscopy, transmission electron microscopy, energy-dispersive X-ray spectroscopy, X-ray diffraction analysis and cyclic voltammetry. The application towards the electrochemical detection of nitrite ions was studied. The electrocatalysis and amperometric sensing of nitrite ions at physiological pH using the Au_{core}/Ag_{shell}-TPDT NRs modified electrode were investigated in detail. The amperometric current increased linearly with increasing the nitrite ions concentration in the range 100 nM to 1 µM and the lowest detection limit was estimated as 60 nM. The amperometric sensor was constructed without incorporating any mediator and it showed enhanced electrocatalytic activity towards the detection of nitrite ions due to the synergetic catalytic effect of Au core and Ag shell. The GC/Au_{core}/Ag_{shell}–TPDT NRs modified electrode was found to sense 100 nM nitrite ions in the presence of 1000-fold excess concentration of common interferences.

PP 88

Green Biogenic Approach for Synthesis of Alumina Ceramic Nanoparticles using *Punica granatum linn* Extract

M. Sundrarajan*, S.Jegatheeswaran, S. Selvam
Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi-630 003, India.
*E-mail:*drmsgreenchemistrylab@gmail.com

Abstract: Advanced green nanotechnology is producing nanomaterials and products without harming to our environment and human health. Although nanomaterial may be synthesized using chemical approaches, it is now possible to include the use of biological materials as a simple, non-toxic, eco-friendly 'green material'. Generally various inorganic metal oxides have potential applications such as antimicrobial properties, UV protector, pigment, sunscreen, thickness in textile and production of ceramic materials. Many plant extracts such as neem, lemon gross, aloe vera, parijataka are employed as reducing and stabilizing agents, which focus on the green chemistry principles. In this report biosynthesis of alumina nanoparticles using precursor of aluminum sulfate and peel extract of *Punica granatum linn* (pomegranate) by sol-gel method. Therefore, amorphous nanoparticles have unique physico-chemical properties differed from those of the crystalline counter parts leading to their potenzial applications. The ceramic nanoparticles have characterized using XRD, FT-IR, SEM and EDX analysis. The antibacterial activity of ceramic material was measured against *Escherichia Coli* and *Staphylococcus Aureus*. This study exhibited good antibacterial effect with the absence of adverse side effects.

Keywords: Biosynthesis, alumina nanoparticle, ceramics, pomegranate, antibacterial activity.

PP 89

Green Synthesis and Characterization of 5-ethyl-2,4-diaryl-1-pyrroline-*N*-oxides

S. Sankari [a], P. Manisankar[b]*,S. Muthusubramanian[c]*
[a]*Department of Chemistry, Sri Sarada College for Women, Salem – 636 016,Tamil Nadu, India.*
[b]*Department of Industrial Chemistry, Alagappa University, Karaikudi – 630 003,Tamil Nadu, India.*
[c]*Department of Organic Chemistry, School of Chemistry, Madurai Kamaraj University,*
Madurai – 625 021, Tamil Nadu, India
E-mail: muthumanian2001@yahoo.com, pms11@rediffmail.com

Abstract: Novel 5-ethyl-2,4-diaryl-1-pyrroline-*N*-oxides were synthesized by the Michael addition of chalcones to nitroalkanes followed by the reductive cyclization of γ-nitroketones with zinc and aqueous ammonium chloride.The Michael reaction has attracted much attention as one of the most important carbon–carbon (C–C) bond formation reactions in organic synthesis. Being a completely atom-efficient process, Michael addition of chalcones to nitroalkanes is a green protocol. This remarkably simple method, where aqueous solvent is used in both Michael addition and the subsequent cyclization of γ-nitroketones is an attractive greener option amongst the many possible methods available for these reactions.

Keywords: Michael addition, γ-nitroketones,reductive cyclization, pyrroline-*N*-oxides

PP 90

Green Synthesis of Gold Nanoparticles using *Terminalia arjuna* Bark Extract

S.Jeganath, N.Abinaya, K.Gopinath, S.Marcus, K.Rajeshwaran, A. Arumugam*
Department of Nanoscience and Technology, Alagappa University, Karaikudi - 630 004. India.
E-mail:sixmuga@yahoo.com

Abstract: Integration of green chemistry principle to nanotechnology is one of the key issues in nanoscience research in the rapid synthesis of stable monometallic Au nanoparticles and also having spectacular mophologies. Our method was clean,nontoxic and environmental friendly. Here we report of an extracellular synthesis method for the preparation of Au nanoparticle in water using the bark extract of *Terminalia arjuna* which is found to have reducing activity, it also acts as a capping agent. When $HAuCl_4$ is exposed to aqueous *T. arjuna* bark extract Au nanoparticles are formed. Plant bark extract –mediated nanoparticles were characterized to confirm the shape, size, crystallinity and content using UV-Visible spectroscopy, Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD) and transmission electron microscopy (TEM) analysis. The reduction of aqueous $AuCl_4$ ions during the reaction with the *T. arjuna* bark extract may be easily followed by UV-Visible spectroscopy. XRD pattern shows the crystalline nature of the green synthesized gold nanoparticles. FT-IR measurements were carried out to identify the possible molecules in the *T. arjuna* bark extract responsible for the reduction of $AuCl_4$ ions and also the capping agent responsible for the stability of the biogenic nanoparticle solution. The morphology and size of the particles were determined by TEM. Hence the present study has aimed at synthesizing gold nanoparticles in aqueous medium using *T. arjuna* bark extract as a reducing and stabilizing agent of chlorauric solutions. The extract rapidly reduces chloraurate ions leading to the formation of highly stable gold nanoparticles in solution.

Key words: Green synthesis, gold nanoparticles, *Terminalia arjuna,* Bark extract, XRD, TEM.

PP 91

Green synthesis of Silver Nanoparticles using Terminalia *arjuna* Bark Extract

Marcus S. Sam, K. Gopinath, K. Rajeshwaran, N. Abinaya, A. Arumugam*
Department of Nanoscience and Technology, Alagappa University, Karaikudi - 630 004.
E-mail:sixmuga@yahoo.com

Abstract: Integration of green chemistry principle to nanotechnology is one of the key issues in nanoscience research in the rapid synthesis of stable monometallic Ag nanoparticles and also having spectacular morphologies. Our method was clean, nontoxic and environmental friendly. Here we report of a green synthesis method for the preparation of Ag nanoparticle in water using the bark extract of *Terminalia arjuna* which is found to have reducing activity. *T. arjuna* contains arjunetin, leucoanthocyanidins and hydrolysable tannins, which are found to be responsible for the bio- reductions of Ag NPs. The formed Ag NPs were characterized by UV-vis, FTIR, XRD and AFM analysis. UV–visible spectra of the aqueous medium containing

nanoparticles showed plasmon resonance peak at around 420 nm. FTIR spectra indicates the presence of different functional groups in the resultant material which contains bio-molecule and they are attributed for reduction as well as capping of Ag NPs. XRD revealed the crystalline structure of the synthesized Ag NPs with face centered cubic geometry and the preferential orientation along (111) plane. The calculated crystalline sizes are in the range of 20 to 50 nm and the spherical nature of the Ag NPs was ascertained by surface analysis.
Keywords: *Terminalia arjuna*, Silver nanoparticles, Bio- synthesis, Bio-reduction.

PP 92

Green Synthesis of ZnO Nanoparticles using *Pongamia pinnata* Leaf Extract and their Antibacterial Activity

S. Ambika, S. Selvam, M. Sundrarajan*
Advanced Green Chemistry Lab, Department of Industrial Chemistry, School of Chemical Sciences,
Alagappa University, Karaikudi-630 003, India.
E-mail:drmsgreenchemistrylab@gmail.com

Abstract: The green synthesis of hexagonal phase ZnO nanoparticles were carried out using a novel synthesis medium with *Pongamia pinnata* leaf extract. *Pongamia pinnata* leaf extract display a wide range of biological activities such as anti-inflammatory, antifilarial, analgesic, antifungal and antiseptic properties. The hydroxide precipitate was obtained at room temperature from precursor and leaf extract and ZnO nanoparticles are formed at 450°C by calcination. The synthesized nanoparticles were characterized and confirmed by X-ray Diffraction (XRD), Scanning Electron Microscope (SEM) with EDX and Fourier Transfer Infrared spectroscopy (FT-IR) spectroscopy analysis. Antibacterial studies were also done on gram positive (S.aureus) and gram negative (E.coli) bacteria by agar diffusion method. Since this method produced relative yield in simple method, low cost and eco-friendly.
Key words: Green synthesis, *Pongamia pinnata*, Nanoparticles, Zinc oxide, Antibacterial activity.

PP 93

Inclusion Complexation between Amitriptyline and β-Cyclodextrin: Characterization in Liquid and Solid State

M.Viswalingam[b], R. Rajamohan[a]*
*[*a]Department of Chemistry S.K.P. Institute of Technology, Tiruvannamalai-606 611, India*
[b]Department of Chemistry, Arunai Engineering College, Tiruvannamalai-606 611, India.
E-Mail: rajmohanau@gmail.com

Abstract: Amitriptyline is a tricyclic antidepressant (TCA). It is the most widely used TCA and has at least equal efficacy against depression as the newer class of Selective serotonin reuptake inhibitor (SSRI) according to a study from early 2001.As well as reducing depressive symptoms, these types of tricyclics also ease migraines, tension headaches, anxiety attacks and some schizophrenic symptoms. It is also known to reduce aggression and violent behavior. The interaction between Amitriptyline [AP] and β-Cyclodextrin [β-CD] have been studied in liquid and solid state. The formation of host-guest inclusion complex between AP and β-CDx was revealed by absorption and steady state emission spectroscopy.The binding constant with 1:1 molar ratio was calculated using Benesi-Hildebrand equation. The stoichiometry of the inclusion complex between AP and β-CD was also confirmed by the plots of Job's continuous variation method using absorption data. For solid state studies, binary system of AP with β-CD was prepared byco-precipitation method. Differential scanning calorimetry (DSC), scanning electron microscope (SEM), X-ray diffractrometry (XRD) and FT-IR spectral studies have been used for the characterization of the inclusion complex in the solid state

PP 94

Inclusion Complexation of Lomustine Drug with β-Cyclodextrin : Solubility and*In vitro* Dissolution Studies

A. Shanmugapriya, T. Stalin*
Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003, Tamil Nadu, India
E-mail: tstalinphd@rediffmail.com

Abstract: In medicinal field, poor aqueous solubility of many well-designed drugs hinders its active functions. Hence developing newer protocols for the solubility enhancement of drugs are necessary. In this report, poor aqueous solubility of a brain tumor drug namely Lomustine, an alkylating nitrosourea compound was enhanced by inclusion complex formation via. Inclusion of Lomustine with β-cyclodextrin (β-CD) was studied for its enhanced aqueous solubility and dissolution rate in both solution and solid states. Solid state inclusion complexes were prepared in three different methods; Physical Mixture (PM), Kneading (KM) and Co-precipitation (CP) methods. The stability constant (Ks) for the inclusion complexes are calculated from phase solubility studies including their Stiochiometric ratio and solubility type of the inclusion complex was stabilize. Dissolution medium of pH~7.4 maintained with phosphate buffer is used to carry out the *in vitro* dissolution rate studies of prepared solid inclusion complexes. Similar studies were carried out for the pure drug in regard of comparative analysis. Inclusion complex of lomustine drug with β-CD results that drug dissolution rate and aqueous solubility was obviously increased when compared with pure lomustine drug.
Key Words: Lomustine, β-Cyclodextrin, Phase solubility, Dissolution rate.

PP 95

Influence of Additives on Electrodeposition of Nanocopper

S.Ramalingam[a],M.Balamurugan[a],P.Manisankar[b]
[a]Department of Chemistry, Kalasalingam University, Krishnankoil-626 126.
[b]Department of Industrial Chemistry, Alagappa University. Karaikudi-630 003.
E-mail:sramalingam03@yahoo.co.in

Abstract: In the present study, we examine the influence of the two additives gelatin and thiourea on the electrodeposition of copper from acidified copper sulphate bath on to stainless steel substrate by DC electrodeposition method with optimised bath composition and conditions. The current efficiency and throwing power of the bath has been found to increase by the addition of additives compared to additive free electrodeposition. The microhardness of the electrodeposits with additives enormously increased compared to additive free electrodeposits. The XRD analysis shows that the average crystallite size calculated is 1.4 nm for electrodeposited copper. Both, the additive free electrodeposited copper and with additives was pure crystalline fcc. The scanning electron microscopy results showed that the electrodeposits were smoother and brighter for electrodeposited copper with additives compared to additive free electrodeposits.

Keywords: Electrodeposition, Additives, Microhardness, XRD measurements, SEM.

PP 96

Influence of Carbon Monoxide,Carbon Dioxide and Methanol as fuel impurities on PEM Fuel Cell Performance

N.Nachiappan[a,b], **G. *Paruthimal* Kalaignan** [b], **G.Sasikumar**[c]
[a]Department of Applied Chemistry, Sri Venkateswara College Of Engineering
Pennalur, Sriperumbudur – 602105, Tamilnadu, India
[b]Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003
[c]Chennai Institute of Technology, Chennai-600 069
E.mail: nachiappan@svce.ac.in

Abstract: Polymer electrolyte membrane (PEM) fuel cells are considered to have the highest power density of all the fuel cells and they have been favoured for applications such as Electric vehicles, Portable power , backup power etc.,. PEM fuel cell mainly consists of anode and cathode containing platinum / platinum alloy electrocatalyst and Nafion membrane as the electrolyte. They operate on hydrogen fuel, which is generally produced by reforming of hydrocarbons or alcohols and may contain large amounts of impurities such as carbon dioxide, trace amounts of carbon monoxide and methanol etc. The studies on the effect of fuel impurities on PEM Fuel cell performance and methods of mitigation of poisoning are very important for the commercialization of fuel cells and are described in a limited number of papers only. In this paper, we present the studies carried out on the effects of carbon monoxide, carbon dioxide and methanol as fuel impurities on PEM fuel cell. The effect of various parameters such as hydrogen gas composition, cell voltage, current density, exposure time, reversibility, operating temperature, etc. on cell performances was investigated. Various methods of fuel poisoning mitigation were also suggested.

Keywords: PEM fuel cells, Electrocatalyst, Fuel poisoning,Polarization, Mitigation Studies

PP 97

Inhibition of Mild Steel Corrosion in 1m $H_2SO_4$by Symmetrical 1,3,4-Oxadiazoles

P.Sounthari[a], **S.Chitra**[b], **K.Parameswari**[b]
P.S.G.R.Krishnammal College for Women, Peelamedu, Coimbatore – 641004

Abstract: The inhibitive effect of symmetrical 1,3,4-oxadiazoles on the corrosion of mild steel in 1MH_2SO_4 was investigated by weight loss method, potentiodynamic polarization, electrochemical impedance spectroscopy (EIS) and scanning electron microscopy. The results showed that inhibition efficiency increases with increase in concentration of the inhibitors. The potentiodynamic polarization curves revealed that the oxadiazoles acted as mixed type inhibitors but slightly cathodic in nature. EIS measurements show an increase in charge transfer resistance with the inhibitor

concentrations. The temperature effect on the corrosion behaviour of the steel in 1M H_2SO_4 with and without the inhibitor was studied in the temperature range (303-333K) and the thermodynamic parameter ΔG and kinetic parameter Ea have also been calculated. The inhibition efficiency has been synergistically enhanced by the addition of halide ions. The surface morphology of the mild steel specimens was evaluated using SEM images.

PP 98

In-Situ Observation of Benzophenone Crystal Growth from Melt

V.Natarajan[a], M. Arivanandhan[b]*, Y. Hayakawa[b]
[a]*Department of Physics, Aditanar college of Arts and Science, Tiruchendur, TamilNadu, India*
[b]*Research Institute of Electronics, Shizuoka University, Naka-ku, Hamamatsu 432- 8011, Japan.*
Email: rmarivu@ipc.shizuoka.ac.jp, arivucz@gmail.com

Abstract: Understanding of crystal growth process is not only important for the fundamental science but also for the industrial technologies. It is obvious that only controlling the macroscopic aspect of crystal growth process such as size and orientation of a crystal is not sufficient. The factors associated with molecular structure of a crystal like, particle (growth unit) shape, morphological stability and purity are becoming increasingly important in crystal growth process control and optimization. This in turn demands a better understanding of the underlying molecular process taking place during crystallization from both solution and melt. In order to understand the growth process of benzophenone in detail, melt growth of benzophenone from undercooled melt was in-situ observed under various cooling rate and temperature gradient by Mach-Zehnder interferometer. Growth rate and the profile of temperature in the vicinity of solid-liquid interface were investigated. The movement of growth interface with time was measured for various growth faces such as (001), (101) and (011) and the growth rates of the respective faces were calculated from the data. It was found that the growth rate of all the faces increases with cooling rate of melt. Moreover, the steep temperature gradient leads to unstable growth of crystal. During the growth, the temperature gradient in the vicinity of solid-liquid interface was increased possibly due to release of latent heat accompanied with solidification of benzophenone. The observed growth rate variation was explained using the PBC and attachment energy model.

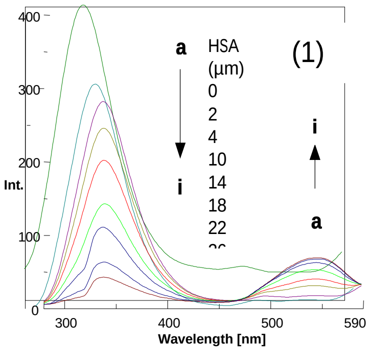
Keywords: Growth rate, solid-liquid interface, cooling rate, temperature gradient, attachment energy.

PP 99

Metal Ion Binding Properties of a Novel Terpolymer

N. Mujafar Kani, A. Burkanudeen*
PG and Research Department of Chemistry, Jamal Mohamed College (Autonomous),
Tiruchirappalli – 620 020, Tamil Nadu, India.

Abstract: Terpolymers find very useful applications as adhesives, high temperature flame resistant fibres, coating materials, semiconductors, catalysts and ion-exchange resins. Ion exchange may be defined as the reversible exchange of ions between the substrate and surrounding medium. Ion exchange technique can remove traces of ion impurities from water/process liquors and given out a product of ultra pure quality in a single efficient and techno-economically viable manner. Ion-exchange resins have attracted much interest in the recent years due to their application in waste water treatment, metal recovery and for the identification of specific metal ions. A terpolymer resin was synthesized through the condensation polymerization of *p*-phenylenediamine and thiosemicarbazide with formaldehyde in the presence of dimethylformamide as a reaction medium in 1:1:2 mole ratio at 150°C for 6 h. The resulting terpolymer resin was characterized by elemental analysis, FTIR, UV-Vis, ^{1}H &^{13}C-NMR spectroscopic studies. The molecular weight of the terpolymer was measured by gel permeation chromatography. The morphology of the terpolymer was established by scanning electron microscopy (SEM). The chelation ion-exchange property of the terpolymer showed a powerful adsorption towards specific metal ions like Cu^{2+}, Pb^{2+}, Zn^{2+} and Ni^{2+}. The results of the ion-exchange studies reveal that the synthesized terpolymer was found to be an excellent cation-exchanger for selective metal ions.



Keywords: Novel Terpolymer; Scanning Electron Microscopy; Batch Equilibrium; Ion-Exchanger;

PP 100

Interaction of Rhenium(I) Tridentate Surfactant Complexes with Human Serum Albumin: A Spectroscopic Approach.

G. Balakrishnan[a], K. Senthil Murugan[a], S.Malayappa Samy[b], M.Ganesan[a], V.K.Sivasubramanian[a], A.Ilangovan[b], S.Rajagopal[c],T. Rajendran[a, d*]
[a]Department of Chemistry, Vivekananda College, Thiruvedagam West, Madurai 625 214, India
[b]School of Chemistry, Bharathidasan University, Thiruchirappalli-620 023, India
[c]School of Chemistry, Madurai Kamaraj University, Madurai-625 021, India
[d]Department of Chemistry, PSNA College of Engineering & Technology, Dindigul-624 622, India.
E-mail: trajan542004@yahoo.co.in,mathi1bala1@gmail.com

Abstract: The interaction of four rhenium tridentate surfactant complexes, $[Re(CO)_3(\alpha\text{-diimine})\{4\text{-}C_{11}py\}]CF_3SO_3$ **1-5** (α-diimine = 2,2'-bipyridine (L_1), 4,4'-dinonyl-2,2'-bipyridine (L_2), 4,4'-di-tert-butyl-2,2'-bipyridine (L_3) 2,2'-biquinonline (L_4) and 4-

$C_{11}py$ = (py-4-$(CH_2)_{10}CH_3$) or 4-undecylpyridine long chain surfactant, with Humane serum albumin (HSA) in pH 7.4 buffer has been studied by optical spectroscopic technique. The quenching constant (k_q), binding constant (K) and number of binding sites (I) were determined by fluorescence quenching methods. Protein intrinsic fluorescence quenching by Re **1-4** occurs through ground-state static quenching of about ($k_q \approx 10^{13}$ M^{-1} S^{-1}), as well as binding strongly to HSA with a binding constant of about ≈ 10^5 to 10^6 M^{-1} at 298K. The fluorescence lifetime (Time -Correlated single Photon Counting Technique) spectral measurements indicate the strong binding and the formation of the protein-quencher complex in the ground state itself. Moreover, synchronous fluorescence spectral studies revealed some changes in the local polarity around the tryptophan residues.

References:

1. Lo, K. K-W.; Louie, M-W.; Zhang, Y. K. Coord. Chem. Rev. 2010, 254, 2603-2622.
2. Bhuvaneswari, J.; Fathima, K. A.; Rajagopal, S. Inorg. Chim. Acta. 2012, 227, 38-44.
3. Lo, K.K.-W.; Sze, K.-S.; Tsang, K.H.-K.; Zhu, N. Organometallics. 2007, 26, 3440-3447.
4. Thorp-Greenwood, F.L.; Coogan, M. P.; Mishra, L. Kumari, N.; Rai, G.; Saripella. S. New J. Chem., 2012, 36, 64-72.
5. Bhuvaneswari, J.; Muthu Mareeswaran, P.; Shanmugasundaram, S.; Rajagopal, S. J. Photochem. Photobiol. A: Chem. 2011, 375, 205-212.

PP 101

Investigation of Poly (N-Vinylimidazole) with Phenoxyethylmethacrylate as Corrosion Protective Coating against Mild Steel

D. Thirumoolan[a], K. Vetrivel[a], T. Siva[b], S. Sathiyanarayanan[b], K. Anver Basha[a*]

[a]PG& Research Department of Chemistry, C. Abdul Hakeem College, Melvisharam, Vellore-632 509
[b]Corrosion Division, CSIR-Central Electrochemical Research Institute, Karaikudi- 630006.
E-mail:kanverbasha@rediffmail.com

Abstract: The synthesis of copolymer from different monomer feed ratios of N-vinylimidazole (VIM) and phenoxyethyl methacrylate (POEMA) was achieved by using free radical solution polymerization technique and characterized using FT-IR, ^1H and ^{13}C NMR spectroscopy. The thermal stability of the synthesized copolymers was studied by using Thermogravimetric analysis (TGA) and Differential scanning calorimetry (DSC). The molecular weight of the copolymer is also determined by Gel permeation chromatography (GPC). The copolymer coatings on mild steel specimens were investigated for their corrosion protection properties in 1% NaCl using electrochemical techniques such as potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). The optimization of electrochemical results confirmed that the mole ratio of VIM and POEMA in the copolymer coatings sternly influences their corrosion protection performance on mild steel and also the corrosion protection properties are owing to the barrier effect of the copolymer coating against invasion of corrosive ions.

Keywords: Copolymer, Coatings, Impedance, Tafel

PP 102

Isolation, Characterization of Phytoconstituents and Antioxidant Activity of Lantana Camara Leaves

G.Chandramohan[a], J.Mariajancyrani[a*], Fathima Beevi[b], P. Savaranan[c], D. Deepa[d]

[a]Department of chemistry, A.V.V.M. Sri Pushpam College, Poondi, Thanjavur-613 503.
[b]Department of chemistry, S.T.E.T. Women's College, Mannargudi.
[c]Department of chemistry, Kings College of Engineering, Thanjavur.
[d]Department of chemistry, Anjalai Ammal Mahalingam Engineering College.
Email: mariajancyrani@yahoo.in

Abstract: Two steroids, namely, 3,15-Dihydroxy-chol-21-ene-oic-acid and 3,15,18-Trihydroxy-chol-20-ene-oic-acid were isolated from the chloroform extract of lantana camara leaves. The structure of these compounds was identified by usual spectroscopic methods. (IR, 'HNMR, ^{13}CNMR, EI/MS). The antioxidant activity of chloroform extract of lantana camara leaves were investigated by different methods viz. DPPH radical scavenging assay, Hydrogen Peroxide scavenging assay and reducing power assay. By comparing these three results, the DPPH method is more effective than other two methods. This is the first time, to report the above compounds present in the chloroform extract of lantana camara leaves.

Keywords: DPPH radical scavenging assay, Lantana camara, Spectroscopic methods, steroid.

PP 103

Kinetics of Oxidation of Unsaturated Alcohols by Isonicotinium Dichromate

RM.Sockalingam[a], V.Sathiyendiran[b], C.Surulivel[a], C.R.Yuvarajan[b], K.Vasuki[b]

[a] Department of Chemistry, Annamalai University, Annamalai Nagar - 608 002, Tamil Nadu, India
[b] Department of Chemistry, Sourashtra College, Pasumalai , Madurai-625 004.Tamil Nadu, India

Abstract: The oxidation kinetics of unsaturated alcohols by Isonicotinium Dichromate has been studied in 50% acetic acid – water medium. The reaction exhibits first-order dependence each in INDC, substrate and perchloric acid. Increase in acetic acid content of the solvent medium increase the rate of reaction. The rate of reaction is not influenced by the addition of sodium perchlorate. The added Mn^{2+} ions retard the reaction rate confirming the two electron transfer in the reaction. Thermodynamic parameters have been calculated. Suitable mechanism consistent with the observed kinetic datais proposed. The order of reactivity is Cinnamyl alcohol > Crotyl alcohol > Allyl alcohol.

PP104

$LiFeSnO_4$: A Perspective Anode for Rechargeable Lithium Battery

V. Mani, K. Balakumar, N. Kalaiselvi
ECPS Division, CSIR- Central Electrochemical Research Institute, Karaikudi-630006

Abstract: $LiFeSnO_4$, a polymorph known to exist in ramsdellite structure at high temperature & in a hexagonal close packed structure at low temperature has been prepared using oxalic di hydrazide assisted combustion (ODHAC) method. Based on trial and error attempts, type of precursor's combination and the temperature required to form Orthorhombic $LiFeSnO_4$ have been optimised. ODH assisted combustion method requires a temperature of 1200 °C to prepare electrochemically better performing $LiFeSnO_4$ anode compared to the one prepared at 900 °C. Despite the reports in the literature on the feasibility of intercalation and de-intercalation process, a possible alloy formation involving $Li_{4.4}Sn$ also could not be ignored. $LiFeSnO_4$ anode of the present study exhibits a capacity as high as 400mAh/g at C/20 rate upon extended cycling. The observed CV and impedance behaviour have been correlated with the charge and discharge characteristics of $LiFeSnO_4$ anode. Attempts to understand the mechanism involved in the charge/discharge process are in progress.

PP 105

Liquid-Liquid Extraction of Malachite Green by D2EHPA as an Extractant

M.Sathya, G.Muthuraman
University of Madras, Department of Chemistry, Presidency College, India, Chennai-05
E-mail:raman@gmail.com

Abstract: Liquid-liquid extraction of Malachite green (MG) from aqueous solution by Di (2-ethyl hexyl) phosphoric acid in hexane was studied. The extraction efficiency of MG dye increased with increasing pH of the feed phase and increasing D2EHPA concentration in organic phase. The loaded organic phase stripped into glacial acetic acid and oxalic acid solution.Stripping of MG dye was achieved with 7.0 M/L of glacial acetic acid and 0.63 M/L of oxalic acid solution. The extraction and stripping of dye not decreased in presence of various inorganic salts. The other parameters examined include effect of extractant concentration, effect of diluents, effect of pH, effect of temperature, equilibrium time, effect of salt concentration, and various stripping agents. Under the optimized condition, this system has been to real textile effluent.

Keywords: Malachite green, D2EHPA, Extraction, Stripping

PP 106

Low Temperature Synthesis of $Y_2Ti_2O_7$ by Molten Salt Technique

J.Arockia Vency[a], S.Lokambika[a], R.Vijay[b], L.John Berchmans[c*]
[a] Department of Electronics &Comm. Engg., Mount Zion College ofEng.g & Tech.,Pudukottai
[b]Division of Nanoscience and Technology, Anna University- BIT Campus,Tiruchirappalli
[c]Electro Pyrometallurgy Division, CSIR-Central Electrochemical Research Institute.KaraikudiEmail: ljberchmans@gmail.com

Abstract:$A_2B_2O_7$ type Pyrochlore compounds are regarded as potential multifunctional materials on account of its use in varied technological applications like oxygen-ion conductor, alternative materials to immobilize nuclear solid waste, photocatalyst for water-splitting to produce hydrogen, host materials for efficient Er^{3+} luminescence, ceramic pigment and hydrogen storage material. Usually, pyrochlore compounds are prepared using high temperature solid-state techniques, which require synthesis temperaturesof 1500°C-1650ºC. In our present investigation, we have successfully synthesized polycrystalline powders of $Y_2Ti_2O_7$ using Molten Salt Technique at temperatures *as low as 900°C. Yttrium Oxide* (Y_2O_3) and *Potasium hexa Fluorotitanate* (K_2TiF_6) were used as the reactants with the eutectic mixture of NaCl and KCl which acts as flux. The reactants and the flux were placed in a high density alumina crucible and fired at 900°C for 5 hours. At this temperature, the salt medium forms a molten flux, and the precursor oxides disperse, dissociate, rearrange, and diffuse rapidly throughout the melt. Finally, the resultant product was washed with dilute hydrochloric acid (5%) followed by hot distilled water for several times. Then the residue was dried at 50°C for 1 h to remove the surface moisture, yielding the free flowing fine crystalline powders. The formation of single phase $Y_2Ti_2O_7$ compound was confirmed from powder XRD studies. SEM data reveals the particles with cubic structure. The morphological features of the synthesized powders have shown uniform un-agglomerated particles of $Y_2Ti_2O_7$. The EDAX analysis exemplifies the concentration of Y, O and Ti in appropriate weight proportions. From the above studies it has been concluded that $Y_2Ti_2O_7$ pyrochlore compound can be synthesized at lower temperatures of 900°C using Molten Salt Technique.

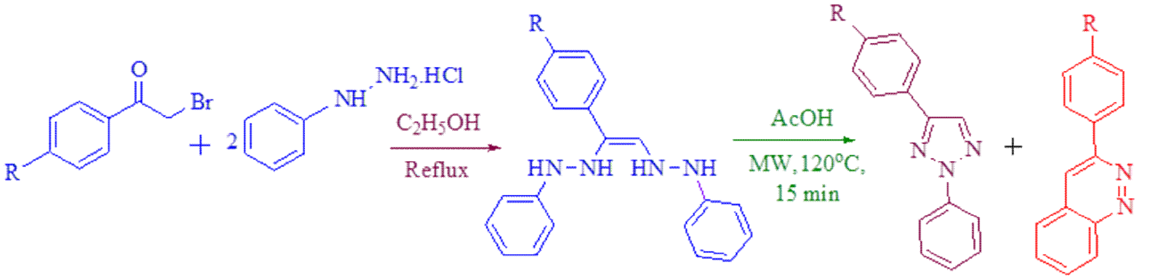
PP 107

Microwave Mediated Synthesis 2-Phenyl-4-Aryl-2*H*-1,2,3-Triazoles and 3-Arylcinnolines

S.Kaladevi, S. Muthusubramanian*, S. Sivakolunthu
Department of Organic Chemistry, Madurai Kamaraj University, Madurai 625 021.
E-mail:muthumanian2001@yahoo.com

Abstract: Nitrogen-containing heterocyclic compounds are one of the most abundant components in numerous natural products, potent pharmaceutical drugs and various kinds of functional materials. 1,2,3-Triazoles constitute a class of compounds which have attracted considerable attention in industry, agricultural and medicinal chemistry.[1] Cinnolines and their derivatives exhibit a broad range of biological activity and demonstrate a series of interesting physical characteristics, such as luminescent and nonlinear optical properties.[2] This presentation describes the synthesis of

differently substituted triazoles and cinnolines via pseudo three-component one pot reaction involving phenacyl bromide and phenylhydrazine hydrochloride employing microwave radiation.



References:

1 . K. Kacprzak, Synlett2005, 943-946.

2. (a) Barraja, P.; Diana, P.; Lauria, A.; Passananti, A.; Almerico, A. M.; Minnei, C.; Longu, S.; Congiu, D.; Musiu, C.; LaColla, P. Bioorg. Med. Chem.1999, 7, 1591-1596; (b) Chapoulaud, V. G.; Pl_e, N.; Turck, A.; Queguiner, G. Tetrahedron2000, 56, 5499-5507; (c) Mitsumori, T.; Bendikov, M.; Sedo, J.; Wudl, F. Chem. Mater.2003, 15, 3759-3768.

PP 108

Modification of Cotton Fabric with Acrylonitrile for Enhancement of Dyeing

P. Sridevi, K. Pandiselvi, S. Thambidurai*

Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, Tamil Nadu, India.

Email: sthambi01@yahoo.co.in

Abstract : Modification of cellulose fibers is to increase the dye exhaustion and fixation and also improve the physicochemical properties. Modified cotton was dyed with reactive dyes and a higher exhaustion and fixation degree of reactive dyes was achieved as a result of reaction with new groups. In this investigation, the pretreated cotton fabric was modified with acrylonitrile solutions to improve mildew resistance to that of cyano-ethylated cotton. Then it was tested for weight gain, shrinkage and the functional group was identified by FTIR spectroscopy. Moreover the modified cotton fabric was dyed with reactive dye bath to improve reactive dye utilization. As a result of the modification, the solubility of the cellulose in its usual solvents is decreased and other properties are modified, especially rot resistance, which is improved.

Keywords: Cotton, Acrylonitrile, modification, Reactive dye.

PP 109

Nano Sized Bio Active Schiff Base Metal Complexes Derived From O-Phenylene Diamine

V.Niranjani[a], K.M.Sini[a], Simmy Varghese[a], C.Murugan[a], S.Jone Kirubavathy[b]*
[a]*PG Student,Department of Chemistry,Kongunadu Arts and Science College,Coimbatore.*
[b]*Assistant Professor, Department of Chemistry, Kongunadu Arts and Science College,Coimbatore.*
Email:jonekirubavathi@gmail.com

Abstract: Schiff base and its complexes have a variety of applications in biological, clinical,analytical and pharmacological areas.Studies of a new kind of chemotherapeutic Schiff bases are now attracting the attention of biochemists.Earlier work reported that some drugs showed increased activity,when administered as metal complexes rather than as organic compounds. The present work was aimed at the synthesis of Schiff base compound from o-phenylene diamine and their transition metal complexes of biological significance. The Schiff bases were synthesized by the reactions of o-phenylene diamine with aldehydes.The chemical structures of the Schiff base and their metal complexes were determined by analytical and spectral studies like elemental analysis, molar conductance,metal estimation, IR and electronic spectral data.The synthesized Schiff bases and their transition metal complexes were screened for their in vitro antibacterial activity against Gram-negative (Escherichia coli)and Gram-positive (Staphylococcus aureus) bacterial strains by the agar-well diffusion method and the anti fungal activity against aspergillus niger and candida. The synthesized Schiff bases were found exhibit no or low to moderate activity against one or more bacterial and fungal species.The powder XRD and the SEM image of Cu(II) Schiff base complex was taken to know its surface morphology.

Keywords: Antimicrobial, Schiff base, transition metal complexes, SEM

PP 110

Nano Structured SnO_2 Thin Film Electrodes by Sol-Gel Method for Dye Sensitized Solar Cells

B.Subramanian[a], V.S.Vidhya[b], M.Jayachandran[a]
[b]*Department of Chemistry, Chendhuran College of Engg. & Technology, Pudukottai-622 507*
[a]*Electrochemical Materials Science Division, CSIR-Central Electrochemical Research Institute, Karaikudi-630 006*
Email: mjayam54@yahoo.com

Abstract: Transparent semiconductor oxide films with good conductivity are required for the development of energy conversion devices. Preparation of such films using simple techniques and lowcost precursor materials is important for developing efficient devices. SnO_2 thin films are prepared by various methods and the properties mainly depend on the method of preparation and the growth mechanism. In this aspect, chemical solution routes are considered promising for depositing metal oxide films due to the simplicity of preparing nano crystalline films. In the present paper, the process of spin coating method is optimized to prepare SnO_2 films possessing nanocrystalline structure with good adherence, uniformity and conductivity. Number of layers and heat treatment steps were optimized to prepare highly transparent and conducting SnO_2 films. At the optimum heat treatment temperature of 400-450 ^{o}C with 6-8 layers, the optical transmittance is about 85% in the visible spectral region. The band gap value calculated is 3.64 eV and the resistivity is found to be a minimum of 4.6 x 10^{-3} Ωcm. Such a lower resistivity value observed for the sol-gel spin coated SnO_2 films are is very good agreement with the values reported for the SnO_2 films prepare by other chemical as well as vacuum evaporation methods. SEM studies showed smooth and uniform surface morphology containing nano grains of size 45-60 nm. The present results clearly show that device quality and SnO_2 films with uniform surface morphology with a resistivity of about 10^{-3} Ωcm and nano grains can be prepared by the sol-gel spin coating technique. Usefulness of these fims in dye sensitized solar cells as transparent and conducting electrodes is presented.

PP 111

Nano Zn/Mg/Al Hydrotalcite as a Solid Catalyst for Transesterification of Neem oil

C.Karthikeyan [a], **R.Manivannan** [b]
[a] Department of Chemistry, Karaikudi Institute of Technology, Karaikudi -630 007
[b]Department of Chemistry Government Arts College (Autonomous), Kumbakonam- 612 001
E-mail:karthik83c@gmail.com, manickam_mani@yahoo.co.in

Abstract: In this work, an environmentally benign process for the methanolysis of neem oil to methyl esters using Zn/Mg/Al nano hydrotalcites as solid base catalysts in a heterogeneous manner was developed. The effect of the reaction temperature, reaction time, catalyst amount, methanol /oil molar ratio and molar ratio of Zn/Mg/Al on the Zn/Mg/Al nano hydrotalcite was analyzed. The nano catalysts were characterized by X-ray diffraction (XRD), scanning electron microscope (SEM), Transmission electron microscope (TEM), Fourier transform infrared (FT–IR) spectroscopy. Biodiesel produced from the neem oil by using Zn/Mg/Al nano hydrotalcite catalyst was analyzed by gas chromatography.

Keywords: Neem Biodiesel, nano Hydrotalcite, Transesterification

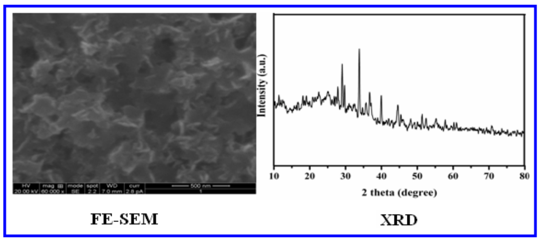
PP112

Nanoflakes of Mn_3O_4Synthesis by Novel Precipitation Method and their Characterization

V. Madhavi[a], **S. Sasikala** [a], **M. Ramalakshmi**[a], **K.Gurunathan**[a],
S.Karuppuchamy[b], **P. Shakkthivel** [a]*
Sustainable Energy and Smart Materials Research Lab, [a]Department of NanoScience and Technology, [b]Department of Energy Science, Alagappa University, Karaikudi – 630 003
Email address: apsakthivel@yahoo.com

Abstract: In the present work, the Mn_3O_4 (husmannite) nanoparticles was synthesized in alkali media through precipitation method. The as prepared samples were characterized with X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, Field Emission-Scanning Electron Microscopy (FE-SEM) and Thermogravimetric and Differential Thermal (TG/DTA) analysis. The XRD pattern exhibit the nanocrystals are in pure tetragonal phase. The average particle sizes of the Mn_3O_4 particles were calculated to be 25 nm. The presence of Mn-O bond was confirmed through FT-IR spectra. The FE-SEM images show that the formed particles

are nanoflakes like morphology. The results imply that the synthesized nanoflakes may have a fair chance to be used in electrochemical sensing applications.



FE-SEM XRD

PP113

New Combustion Route Synthesis of ZnO Nanocatalyst and its Characterization for Biodiesel Application

M. Rajesh, P. Shakkthivel Piraman*
Sustainable Energy and Smart Materials Research Lab, Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003, Tamilnadu, INDIA
E-mail: apsakthivel@yahoo.com

Abstract: Biodiesel production has increased greatly in recent years, because of the less-detrimental effects of this fuel on the environment, compared to a conventional diesel obtained from petroleum. Preparation and the application of solid nano catalyst is an emerging area because of the catalyst can easily be separated and reusable, moreover they have higher catalytic activity at reduced temperature. The combustion method is an alternative method for the synthesis of nano particles. Therefore, in the present work, we have synthesized solid ZnO catalyst by combustion method using glycerol as the chelating agent to prevent the particle growth to form nanoparticle. The synthesized nanocatalysts were characterized through X-ray diffraction (XRD), Fourier transform infrared microscopy (FT-IR) and Field Emission – Scanning Electron Microscopy (FE-SEM). The particles are hexagonal wurtzite crystallites with shape.Subsequently it was used as catalyst for biodiesel production and their catalytic activities under various experimental variables were also evaluated.

PP 114

Non-Ionic Surfactant Mediated of Cds Semiconductor Nanoparticles

K. Dhanabalan, K. Gurunathan*
Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003
E-mail: kgnathan27@rediffmail.com

Abstract: In the present investigation, we report a novel method which has been adopted to synthesize CdS nanoparticles through non- ionic surfactant mediated system. The synthesis was performed in room temperature with hydrophilic surfactant such as triton X- 100. The encapsulated micelles nanoparticles were studied its absorption and emission spectra at 450 nm and 435 nm respectively. The structural studies of nano-CdS reveal that cubic structure by X-ray diffraction and spherical shape by Transmission electron microscopy. Fluorescence spectra of nanoparticles were recorded at different excitation wavelengths that shows sharp and broad peaks resulted excitation and trap state emission spectrum.

Keywords: CdS Emission, reverse micelles, absorption, excitation, trap state

PP115

Novel Liposome-Gold Transducer for Electrochemical DNA Sensing

J. Shankara Narayanan, M. Bhuvana, V. Dharuman*
Molecular Electronics Lab, Department of Bioelectronics and Biosensors, Alagappa University,
Karaikudi -630 003, India
Email:dharumanudhay@yahoo.com

Abstract:A novel method is been introduced using liposome entrapped DNA, which shown to enhance the potency of DNA vaccines possibly by facilitating uptake of the plasmid by antigen-presenting cells (APC). In this paper, we developed liposome-AuNP composite on gold transducer for electrochemical DNA sensing. The sensor efficiently discriminates the complementary and non-complementary DNA. The liposome was attached onto the MPA monolayer by electrostatic interaction and the AuNPs were immobilized by simple dipping method on the liposome surface. Immobilization of the liposome totally blocks the electron transfer and decreases the current in CV and increase the charge transfer resistance in impedance. The attachment of the AuNP assists the charge transfer and thus increases the peak current. Single strand DNA immobilized on the liposome-AuNP by gold thiol chemistry resulting in the decreased peak currents. While the hybridization with complementary DNA shows the increased peak current, the non-complementary DNA (c-ncDNA) does have insignificant change in the sensor signal revealing the high sensitivity and selectivity.

Keywords: Electrochemistry, DNA sensor, Liposome, Gold Nanoparticle, Immobilization.

PP116

Palladium Nanoparticles Incorporated New Functional Hydrogels

Hyun Gyu Lee[a], Ok Heon Park[b], Se Hee Kim[b], F. Phillips[b], Kwang-Pill Lee[a,b], A.Gopalan[a,b,*]
[a]Department of Nanoscience and Nanotechnology, Kyungpook National University, Daegu South Korea
[b]Department of Chemistry Education, Kyunook National University, Daegu, South Korea
E. mail: agopalan@knu.ac.kr

Abstract: New functional hydrogels (FHG),composed of poly(acrylic acid), a polyaniline derivatice and palladium nanoparticles, were prepared with different compositions of the functional components. FHGs were characterized by field emission scanning electron microscope, thermogravimetric analysis, X-ray diffraction analysis and Forier transform infra red spectroscopy. The FHGs exhibited swelling-de-swelling transitions in water and catalytic properties.

PP 117

Performance and Characterization for the Formulation of a Multicomponent Organic based Electrolyte for Primary Lithium Battery

Sanjay Biswas*, **K.V.Ramana Rao, D.Ravindar, T.S. Balasubramanian**
Power Supply Systems, Directorate of Electromagnetic, Research Center Imarat,Defense Research & Development Organization (DRDO), Hyderabad 500 069, India.
E-mail address: anindita22b@yahoo.co.in

Abstract: Organic based electrolytes are being widely used in Primary Lithium Batteries due to its various advantages and compatibility over conventional aqueous based electrolyte typically low temperature properties. Formulation of a mixed multiple solvent- salt electrolytes for Primary Lithium battery has been carried out to encompass enhancing properties to the electrolyte like high ionic conductivity, high permittivity, low viscosity, large salt dissolution and high thermal stability. Extensive experimental works on non aqueous electrolyte are available, however optimization of electrolyte composition based on the individual component characterization is rare. Different Solvents namely Propylene Carbonate, Dimethoxyethane and Tetrahydrofuran along with Lithium perchlorate salt has been considered for the present study.The selection philosophy for the choice of solvent and salt components are based on the suitability of the electrolyte application in Primary Lithium Battery to power the dismounted soldiers in hostile enviromental conditions. Various influencing parameters of the mixed electrolyte system are being characterized to optimize the compostion, for maximizing the ionic conductivity. For the present system, an excellent electrical conductivity is acheived under feasibile operating conditions ranging from 11 to 18 x 10^{-3} Scm^{-1} (Simens per cm) which indicates a very high performance of the formulated composition. Experimental results were further correlated in terms of various variables affecting the electrolyte system and a simplified model has been proposed to predict the conductivity. The predicted values agreed well with the experimental data obtained and are within miminum percentage of error and standard deviations of errors, and a high regression coefficient 0.9848 has been acheived for the model for a *t*- value 1.648 at 0.05 probabilites and 95% confidence range. The most optimized composition for the electrolyte is identified and an excellent conductivity bheavior and stability noted during the temperature-performance study, which has exibited a typically non Arrhenius form of VTF bheavior. The present system will be a very promising organic based electrolyte for development of Primary Lithium battery.

PP 118

Performance Evaluation of GO-MWCNT/Co(OH)$_2$in Supercapacitor

Muniyandi Bagavathi,Bose Dinesh,Ramiah Saraswathi*
Department of Materials Science, Madurai Kamaraj University, Madurai – 625 021
Email: bagavathii@gmail.com and saraswathir@yahoo.com

Abstract: Electrochemical capacitors, also known as supercapacitors are suitable for applications in portable electronic devices, hybrid vehicles and renewable energy systems due to their high power densities and long cycle life. Nanocarbon, conducting polymers, metal oxides and layered double hydroxide based composites have been extensively investigated as electrode materials in supercapacitors.Herein we report for the first time the application of a novel hybrid nanomaterial *viz.* GO-MWCNT/Co(OH)$_2$ in supercapacitor. The material is prepared as follows : The GO-MWCNT film was electrophoretically deposited on a clean stainless steel substrate which was then transferred to an aqueous electrochemical bath containing 0.1 M Co(NO$_3$)$_2$. The material was characterized by FT-IR, XRD, SEM and cyclic voltammetry. The capacitive performance of GO-MWCNT/Co(OH)$_2$ film was evaluated with respect to that of GO-CNT and Co(OH)$_2$ by cyclic voltammetry and galvanostatic charge-discharge techniques. The specific capacitance value was found to be 981 F/g at a current density 0.5mA/cm^2 on the hybrid film, which is about 3 and 24 times higher than that of Co(OH)$_2$ and GO-CNT respectively. Cyclic stability tests indicate a 20 % decrease for about 100 cycles.

PP 119

Phytochemical Bioreduction of Silver by*Phyllanthus niruri*andits Studies of Anti-Microbial & Anti-Biofilm Activity

G.Siva Prakash, S.Muthukkumarasamy, K.Gurunathan*
Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003.
E-mail:kgnathan27@rediffmail.com

Abstract: In the present study, we report the phytochemical profiling of *phyllanthus niruri* bySpectroscopic (UV Visible, FTIR) & Spectrometric (GC-MS) studies. Silver nanoparticles were synthesized by using broth of *phyllanthus niruri* and characterised by UV Visible for characteristic SPR, TEM-SAED for morphology, structure, size & quality. Minimum inhibitory concentration (MIC) & Minimum bacterial concentration (MBC) were performed using Ag- NPs against human pathogenic bacteria.

Keywords: Phytochemical, Spectrometry, *Phyllanthus Niruri*, MIC & MBC.

PP 120

Phytochemical Profiling, Green Synthesis of Silver Nanoparticles Using *Cardiospermum helicacabum* L and its Anti-Biofilm Activity against *Escherichia coli* ATCC 25922

S. Muthukumarasamy, K. Gurunathan*
Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003
E-mail:kgnathan27@rediffmail.com

Abstract: In the present study, we report phytochemical profiling on *Cardiospermum helicacabum* L using chromatographic & spectroscopic studies (FT-IR & GC-MS), green synthesis of silver nanoparticles using aqueous broth of *Cardiospermum helicacabum* L and its anti-biofilm activity against *Escherichia coli* ATCC 25922. The AgNPs formed are spherical and are 1–10 nm in size, SPR spectra confirmed the formation of AgNPs as spherically shaped, Zeta potential, Zeta sizer, HR-TEM support this result and again confirmed the shape. SAED showed the qualitative assay of AgNPs. XRD confirms the crystal system such as cube found to be present. AgNPs showed 90 % reduction of colony of bacteria taken. Thus providing a versatile platform for wide range of applications in medicineas an ingredient in drug formulations.

Keywords: Phytochemical profiling, Ag nanoparticles, Anti-biofilm, Escherichia coli

PP 121

Poly(Vinilidineflouride) - Poly(Ethylene Oxide) Blended Conducting Polymer as Gel Polymer Electrolyte for Dye-Sensitized Solar Cells

K. Sakthivelu, C. Menaka, T. Stalin*.
Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, Tamilnadu, India.
E-mail: tstalinphd@rediffmail.com

Abstract: Gel polymer electrolyte (plasticized polymer electrolyte) was prepared by solvent casting method. Poly (vinilidineflouride)- PVDF, poly (ethylene oxide) - PEO as polymer and Ethylene carbonate (EC), Propylene carbonate as plasticizer sodium iodide (NaI) and iodine (I_2) as a tri-iodide redox mediator (PVDF-PEO/EC-PC/NaI-I_2). This electrolyte film shows 6.03×10^{-4} S/cm ionic conductivity was measured by AC impedance spectroscopy, X-ray diffraction pattern and FT-IR spectroscopy were used to determined amorphous state and complexation of electrolyte. Glass transition temperature, flexibility and thermal stability of the film were used differential scanning calorimetry analysis (DSC). Scanning electron microscopy (SEM) was used to surface porous nature of the film. An electrochemical property of the film was investigated by cyclic voltammetry studies.

Keywords: PVDF, PEO, Gel polymer electrolyte, AC impedance, Cyclic voltammetry

PP 122

Polyindole/Poly(Methyleneblue) Modified GCE for Electrochemical Sensing of Nitrophenols

K. Giribabu[a], **R. Suresh**[a], **R. Manigandan**[a], **S. Munusamy**[a], **S. Praveen kumar**[a], **S. Muthamizh**[a], **L. Vijayalakshmi**[b], **A. Stephen**[c], **V. Narayanan**[a*]
[a]*Department of Inorganic Chemistry, University of Madras, Guindy Campus, Chennai 600 025*
[b]*Vidhya Sagar Women's College, Chengalpattu, Kancheepuram 603211, India*
[c] *Department of Nuclear Physics, University of Madras, Guindy Campus, Chennai 600 025*
Email: vnnara@yahoo.co.in

Abstract: Polyindole/poly(methyleneblue) modified GCE was prepared by coating polyindole using drop casting method and polymerizing methylene blue on to the polyindole coated GCE. Methylene blue onto the polyindole was polymerized to improve the electrochemical property. The intimate interaction between the polyindole and poly(methylene blue) through hydrogen bonding which facilitate the electron transfer from the analyte to the electrode. The prepared electrode was studied in different background electrolytes in order to ascertain the electrochemical behaviour and the effect of pH was also studied. PNP (p-nitrophenol) and ONP (o-nitrophenol) was considered to be serious environmental pollutants. These pollutants were detected by using the prepared electrode. The detection limit was in the range of micromoles. The simultaneous detection of these two analytes was attempted.

PP 123

Synthesis of MWCNT/SDS/Polypyrrole Composite and its Application for Uric Acid Determination

A. Daniel Arulraj[a], **M. Vijayan** [b], **V. S. Vasantha** [c*]
[a] *Alagappa University, Karaikudi, Tamil Nadu, 630 003, India*
[b]*Central Electrochemical Research Institute, Karaikudi-630 003, India*
[c] *Madurai Kamaraj University, Madurai- 625 021, India*
E-mail: vasantham999@yahoo.co.in

Abstract : This part of work is focused on the synthesis of conducting polymer/MCNTs (Multi wall Carbon Nano Tubes) composites having polypyrrole as matrix. Before the preparation of the polymer/MCNTs composite, the MCNTs were carboxylated through acid treatment in order to disperse MCNTs in aqueous electrolyte. The chemically modified and unmodified MCNTs were characterized by FT-IR spectroscopy. The Polypyrrole (Ppy) and Polypyrrole (Ppy)/MCNTs composites were prepared by cyclic voltammetric method (CV) in the 0.1M pyrrole +0.01M SDS +0.05M $LiClO_4$ and different % of MCNTs, (0.1, 0.2 and 0.3 % (w/v)).The electrochemical properties of Ppy and Ppy-composites were tested in 0.05M $LiClO_4$ using CV. The capacitance value for Ppy/SDS/MCNTs is found to be higher than the capacitance of Ppy/SDS. Moreover, when the % of MCNTs was increased in the solution, the capacitance values of the composites increased. The surface morphology of Ppy/SDS and Ppy/SDS/CNTs composites were studied using Scanning Electron Microscope and Atomic Force Microscope. The codeposition of CNTs into the polymer matrix increases the size of globular features of the polymer. So the root mean square roughness and average profile height of the polymer film were increased with the increase of MCNTs % in the deposition solution. The images obtained from both techniques reveal the incorporation of MCNTs in the Ppy/SDS matrix. Finally incorporation of MCNTs was again tested by impedance analysis method. The impedance values of Ppy/SDS/MCNTs were found to be lower than pure Ppy/SDS film. The above composite films were used for sensing uric acid. The Ppy/SDS/MCNTs film exhibits high catalytic activity for uric acid among the other films.

PP 124

Preparation and Performance of Pulse Electrodeposited Ni-Sio_2 Composite Coatings

S. Kasturibai[a, b], K. Arunsunaikumar[b], G. Paruthimal Kalaignan[b]*
[a]Department of Chemistry, Alagappa Government Arts College, Karaikudi-630 003
[b]Department of Industrial Chemistry, Alagappa University, Karaikudi-630 003
E mail: pkalaignan@yahoo.com

Abstract: Ni-SiO_2 nanocomposite coatings were prepared under pulse current method using acetate bath. Surface morphology, microstructure and crystal orientation of the Ni and Ni – SiO_2 nanocomposites were investigated by Scanning electron microscope and X-ray diffraction analysis respectively. The effect of incorporation of SiO_2 particles in the Ni nanocomposite coatings on the microhardness and corrosion behaviour has been evaluated. Smooth composite deposits containing uniformly distributed silicon oxide particles were obtained. The preferred growth direction was also influenced by silicon oxide nano-particles. Therefore, the preferred growth process of the nickel matrix in crystallographic directions <111>, <200> and <220> is strongly influenced at a concentration of 12 g/l. The structure of electro deposited nickel and nickel nanocomposite coatings were face centered cubic. The effect of incorporation is maximum at a current density of 8 A/dm^2. The microhardness values of the nickel nanocomposite coatings (715HV) were higher than that of pure nickel (310HV) due to dispersion-strengthening ; matrix grain refining and increased with the increase of incorporated SiO_2 particles content. The corrosion potential (E_{corr}) in the case of Ni- SiO_2 nanocomposite had shown a negative shift, confirming the cathodic protective nature of the coating. The corrosion rates of Ni- SiO2 nanocomposite coatings (0.98milliinch/yr) were lower than that of electrodeposited nickel coating (9.69milliinch/yr) in 3.5% NaCl solution.

Keywords: Pulse Electrodeposition, Nanocomposite coating, Acetate bath, SiO_2, SEM, XRD.

PP 125

Preparation of Nanocomposite Gels Based on Iron Oxide Nanoparticles using Gamma Irradiation

Min Kyung Kim, Se Hee Lee, Anantha Iyengar Gopalan, Kwang-Pill Lee[a]*
Department of Chemistry Graduate School, Kyungpook National University, Daegu, South Korea
E-Mail: kplee@knu.ac.kr

Abstract: The combination of polymers with nano- or microsized solid materials displays novel and often enhanced properties compared to the traditional materials. They can open up possibilities for new technological applications. In this work, magnetic nanocomposite gels were prepared by dispersing gold nanoparticles distributed iron oxide nanoparticlesin into a polymer gel and designated as as IO@Au/polymer-CG. The CGs were prepared by the two independent stages involving gamma radiation. The first one was the distribution of gold nanoparticls onto the pre-formed IO nanoparticles to obtain IO@Au hybrid. In the second stage, IO@Au/polymer-CGs were prepared by gamma radiation. The microstructure and properties of IO@Au/polymer-CGs were characterized. The new results provide novel possibilities for preparation of more complex magnetic field-responsive materials like membranes for diversified applications.

PP 126

Preparation, Characterization and Performance of Cellulose Acetate/ Pvdf-Hfp Blend Ultrafiltration Membranes

S. Neelakandan, K. Malarvizhi, A. Nagendran*
Polymeric Materials Research Lab, Alagappa Govt. Arts College, Karaikudi – 630 003
E-mail: shivaninagendran@gmail.com

Abstract: Membranes are increasingly being used in the chemical and bioprocess industries replacing more conventional separation techniques. Blending of various polymers has stimulated great interest in membrane science to improve the performance of membranes such as hydrophilicity, flux and to reduce the fouling behavior. In this paper polyvinylidene fluoride-co-hexafluoropropylene (PVDF-HFP) was blended with cellulose acetate (CA) and the effect of blend composition on the characterization and performance are evaluated. CA/PVDF-HFP blend membranes were prepared at different compositions from 100/0 to 75/25wt% in a total of 17.5wt% polymer and 82.5wt% solvent. The prepared membranes were characterized for their UF performances such as compaction factor, pure water flux (PWF), water content, membrane hydraulic resistance and morphology. The prepared membranes were also characterized for their separation performance with macromolecular proteins such as bovine serum albumin (BSA). In general, it was found that 75/25wt% CA/PVDF-HFP blend membranes displayed higher permeate flux and lower rejection compared to pure CA membranes for protein rejection. This is due to the increased pore size of the membrane in comparison to the pure membrane.

PP 127

Removal of Brilliant Green from Aqueous Solution by *Adhatoda Vasika* Leaf Powder

K. Ananthakumar, P. Selvapandian*,S. Sudha
Department of Chemistry, Raja Doraisingam Govt. Arts College, Sivaganga – 630 561.
Email : sm9225@gmail.com

Abstract: In the present work, the leaves of Adhatoda (Adhatoda vasika) powderwere used as an adsorbent for the removal of Brilliant Green from aqueous solution. The adsorption characteristics of Brilliant Green on Adhatoda leaf powder was evaluated as a function of pH, adsorbent dose, initial concentration of adsorbate, temperature. The effect of pH indicates that the removal of dye was found to be effective in acidic medium. The effect of dose on the removal of dye shows that the percentage of removal of dye increases with increase of dose. The effect of initial concentration on the removal of dye shows that the percentage of removal of dye decreases with increases of dye concentration. From theeffect of temperature on the removal of dye the thermodynamic parameters such as change in enthalpy, change in free energy and change in entropy are evaluated from van't Hoff plot. The adsorption data fitted well into Freundlich and Langmuir adsorption models. The data obtained from effect of contact time on the removal of BG reveals that the adsorption process second order kinetics. The results show that Adhatoda leaf powder holds a great potential in removal of acid dye (Brilliant Green) from industrial waste water.

PP 128

Ru(III) and Pd(II) Complexes of N-Benzylisatin with Hydrazide Derivatives has DNA Binding and Cleavage Properties

R. Gomathi, A. Ramu*
Dept. of Inorganic Chemistry, School of Chemistry, Madurai Kamaraj University, Madurai-625 021.
Email : ramumku@yahoo.co.in

Abstract: The Schiff bases; N'-(1-benzyl-2-oxoindolin-3-ylidene) isonicotinohydrazide (L^1) and 2-(1-benzyl-2-oxoindolin-3-ylidene)-N-phenylhydrazinecarboxamide (L^2) have been synthesized from condensation of N-benzyl isatin with isonicotinohydrazide / 4-phenylsemicarbazide respectively. The prepared ligands were used in synthesis of titled complexes with stoichiometry ratio (2:1) (ligand:complexes). Both the synthesized ligands and complexes were characterized by UV, IR, NMR, ESI-Mass, CV, EPR and microanalytical techniques. ^{1}H and ^{13}C NMR data showed the presence of azomethane nitrogen which confirms the formation of Schiff bases. The IR and UV data revealed the presence of the bidentate ligand in these complexes. Electrolytic conductivity data indicate that the prepared complexes were found to be non-electrolyte in DMSO. ESI Mass spectral studies and micro analytical techniques confirm structural composition of ligands and complexes. The biological studies such as DNA binding and cleavage activities have also performed for the complexes. These studies confirm the complexes are good bio-models to mimic biological activities and they can be used as promising therapeutic compounds.

Keywords: N-benzyl isatin, isoniazid / phenylsemicarbazide, Ru(III) and Pd(II) metal complexes, CT-DNA binding, cleavage studies.

PP 129

Salicylaldimine Based Compounds for Antioxidant Property with Coumarin Moieties

K. Ponnuvel[a], V. Padmini[a]*, M. Kumar[a], A. Arun[a], A. Jayachitra[b]
[a]*Department of Organic Chemistry, Madurai Kamaraj University, Madurai-625021, India.*
[b]*Department of Plant Biotechnology, Madurai Kamaraj University, Madurai-625021, India.*
E-mail : vpresearchgroup@gmail.com

Abstract: An effective synthesis of salicylaldimine based compounds with coumarin moieties by condensation of 4-formyl-3-hydroxy phenyl 4-(alkyloxy) benzoate with 7-amino-4-methyl coumarin. Synthesized compounds were confirmed by NMR spectroscopy. All the final products were characterized and screened for their *in vitro* activities as antioxidants and anti-microbial agents. The antioxidant activity was studied by DPPH free radical scavenging method and the IC$_{50}$ values were calculated for comparison with a standard (ascorbic acid) atthe same dose. The antioxidant activities screening revealed that 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activities of the compounds were better results. The other antioxidant activity methods like hydroxyl radical (OH$^{•}$), nitric oxideradical (NO•), superoxide anionradical (O$_2^{-•}$), hydrogen peroxide (H$_2$O$_2$) were carried out with the synthesized compounds. This series of compounds having strong fluorescent property, it shows strong emission range 410-430 nm.

PP 130

Selective Solid Phase Extraction of Pendimethalin from Red Fruit Samples Using Molecularly Imprinted Polymer Grafted to Porous Metal Frits

V.C. Fernandes[a*], S, Viswanathan[a, b], V.F. Domingues[a], C. Delerue-Matos[a]
[a] *REQUIMTE, Instituto Superior de Engenharia do Instituto Politécnico do PortoRua Dr António Bernardino de Almeida, 431, 4200-072 Porto Portugal*
[b]*Department of Industrial Chemistry, Alagappa University, Karaikudi 630 003, Tamilnadu, India*
Email:vircru@gmail.com

Abstract: A novel format for selective solid-phase extraction based on a molecularly imprinted polymer (MIP) was developed for pendimethalin extraction. A small amount of MIP has been synthesized within the porous of commercial metal frits and attached to its surface using pyrrole and lithium perchlorate to start the polymerisation. The use of different solvents, solvent volumes, extraction time in the imprinted frits was investigated. Imprinted frits showed good selectivity when loads were performed using acetonitrile. The calibrations (solvent standard and matrix-matched standard) showed good linearity in the concentration range of 0.2-10 µg/g. The extraction efficiency was studied and 77% was the mean recovery obtained. Relative standard deviations at different spiking levels ranged below 15% in all the cases and imprinted frits were reusable without loss in their performance.Pendimethalin is a fungicide common used in red fruit crops (strawberries, raspberries and blueberries). The developed imprinted material was applied as a selective solid phase extraction method for red fruit extracts (strawberries, raspberries and blueberries) with pendimethalin, showing good results.

PP 131

Poly(3, 4-Ethylenedioxythiophene) Based Sensor Development for the Determination of Disperse Orange 3 in Textile Effluents

M. Abdul Kadir[a], A. Gomathi[b], P. Manisankar[c*]
[a]*Department of Chemistry,M..S.S.Wakf Board College, Madurai – 625020, India.*
[b]*Department of Chemistry, Sri K.G.S Arts College, Srivaikuntam - 628619, India.*
[c]*Department of Industrial Chemistry, Alagappa university, Karaikudi 630003, India.*
E-mail: pms11@rediffmail.com

Abstract: The electrochemical behaviour of an azo dye, Disperse orange 3 (DO 3) was investigated voltammetrically using plain glassy carbon electrode (GCE) and poly (3,4-ethylene dioxythiophene) modified GCE (PEDOT/GCE). Influence of pH, scan rate and concentration on cyclic voltammetric responses were studied and the optimum pH for the electrochemical study was found to be 7.0. The irreversible reduction process observed on plain and modified GCEs was adsorption controlled and the number of electrons involved in the reduction was found to be 4, calculated from the charge consumed for the exhaustive electrolysis of DO 3. The peak potentials suffer anodic shift with increased peak current on the modified GCE. The diffused and accumulated substrate on the PEDOT surface facilitates the reduction. A systematic study of the experimental parameters that affects square wave stripping voltammetry (SWSV) was carried out and the optimized experimental conditions were arrived. Under optimized conditions, stripping voltammetry procedure was developed for the determination of the azo dye. PEDOT/GCE seems to present better responses than plain GCE and the limit of detection (LOD) was 0.6 μg mL^{-1} for DO 3 on this modified system. Suitability of the square wave stripping voltammetric method using the developed PEDOT based sensor, for the trace determination of this textile dye in real sample was also realized.

Keywords: Azo dye,Square wave stripping voltammetry, Poly (3,4-ethylenedioxythiophene) (PEDOT), Cyclic Voltammetry, Glassy carbon electrode (GCE).

PP 132

Sorption Isotherm and Kinetic Modeling of Arsenic on Clerodendrum inerme

T.Sumathi, G.Alagumuthu
PG& Research Centre, Department of Chemistry, Sri Paramakalyani College, Alwarkurichi-627 412,
Tirunelveli district, Tamilnadu, India.
Email : sumathijr@gmail.com

Abstract: The study was carried out to evaluate the feasibility of *Clerodendrum inerme* for As(III) removal from aqueoussolution. Batch experiments were performed to investigate effects of various experimental parameterssuch as contact time (20 min–160 min), initial As(III) concentration (10–25 mg/L), temperature (30,40and 50 ◦C)and pH (3–12) on As(III) adsorption on the *Clerodendrum inerme* . The adsorption kinetics were examined using pseudo first- and second-order models, intra particle diffusion and Bangham's models. The equilibrium data were simulated using Langmuir, Freundlich, Dubinin and Radushkevich (D–R), Flory–Huggins(F-H) and Temkin isotherms. The results reveal that the pseudo second-order model and Langmuir isotherm fit the kinetics and equilibrium data, respectively. The intra particle diffusion model described that the intra particle diffusion was not the only rate-limiting step. Thermodynamic study indicates an endothermic nature of adsorption and a spontaneous and favorable process. The optimum pH for As(III) removal was neutral. The adsorption process appeared to be controlled by the chemical process. EDX analysis indicated the presence of Arsenic on the *C.inerme* surface. These results suggest that *C. inerme* could be employed as an efficient adsorbent for the removal of Arsenic from contaminated water sources.

Keywords: Adsorption, As(III), chemisorption, Kinetic, Thermodynamic, *C. inerme*.

PP 133

Studies on Electrochemical Trifluoromethylation of Isonicotinicacid Hydrazide(INAH) and Methylisonicotinate(MIN)

J. Raja Beryl Alagu[a], S. Vigneswaran[a], V. Suryanarayanan[b],
H. Gurumallesh prabu[a], P. Manisankar[a],D. Velayutham[b]*
[a]*Department of chemistry, Alagappa University, Karaikudi -630003, India.*
[b]*Electro organic division, CSIR-CECRI, Karaikudi -630006, India*
Email: dvelayutham@rediffmail.com, dvelayutham@cecri.res.in

Abstract: Organo fluorine compounds have been used in various fields due to its unique properties. Trifluoromethylated (-CF_3) compounds show high lipophilicity, bio combatability and metabolic stability which have an impact over its usage in pharmaceutical and agrochemicals etc. Chemical route does involve toxic or expensive reagents, while electrochemical method is considered as green and viable method for trifluoromethylation. In this work, trifluoromethylation of isonicotinicacid hydrazide (INAH) and methylisonicotinate (MIN) had been investigated in acetonitrile containing trifluoroacetic acid, pyridine, and triethylamine and sodium trifluoroacetate on platinum and glassy carbon electrodes using cyclic voltammetry. Preparative electrolysis of INAH and MIN was carried out on platinum in the same media and the products were characterized by GC-MS. LSVs for MIN in 0.1 M TFA/ Py/TEA/NaTFA in acetonitrile on platinum electrode show that there is no distinct oxidation peak for the oxidation of isonicotinicacid hydrazide within the voltammetric region of 0.0 to 1.6 V vs Ag and it gets oxidized anodically in the gas evolution region, however Isonicotinic acid hydrazide shows a broad peak at around 1.4 V on GC only. Product distribution patterns on both the electrodes during the galvanostatic electrolysis of MIN and INAH in TFA/Py/ACN andTFA/TEA/ACN media at different current densities were discussed. Selectivity of the trifluoromethylated product is about 20% with the conversion of 35 – 94 % under different current densities. High current density of 5 mA / cm^2 favours selectivity upto 20 – 30%. Based on GC – MS results, a plausible reaction pathway was postulated.

PP 134

Studies on Inclusion Complexation between 3, 3’-Dihydroxybiphenyl andΒ-Cyclodextrin by Experimental andtheoretical Approach

K. Paramasivaganesh[b], T. Stalin*[a],
[a]*Department of Industrial Chemistry, Alagappa University, Karaikudi- 630 003,Tamilnadu, India.*
[b]*Department of Chemistry, Arumugam Pillai Seethai Ammal College, Thirupputtur,*
Sivagangai- 630 211, Tamilnadu, India.
E-mail: tstalinphd@rediffmail.com

Abstract: The inclusion complex formation between 3, 3’-dihydroxybiphenyl (DHBP) and β-cyclodextrin (β-CD) in aqueous state were studied by UV spectroscopy, Fluorescence spectroscopy and electrochemical study (cyclic voltammetry, CV). The solid state complex between β-CD and DHBP was characterized by FT-IR, XRD techniques and SEM morphological studies. The β-CD: DHBP inclusion complex obtained by molecular docking studies is in good correlation with the results obtained through experimental methods. The binding constant of 'β-CD: DHBP' inclusion complex was calculated using Benesi–Hildebrand plot at 303 K. Thermodynamic parameter (ΔG) was calculated for the complex formation, it indicates that the reaction is spontaneous and exergonic process. The point energy, stabilization energy upon complexation, frontier molecular orbitals, and hydrogen bonds were obtained. The calculation results correlates well with the docking and experimental observations.

Keywords:3, 3'-Dihydroxybiphenyl; β-Cyclodextrin; Inclusion Complex; PM3; molecular modeling

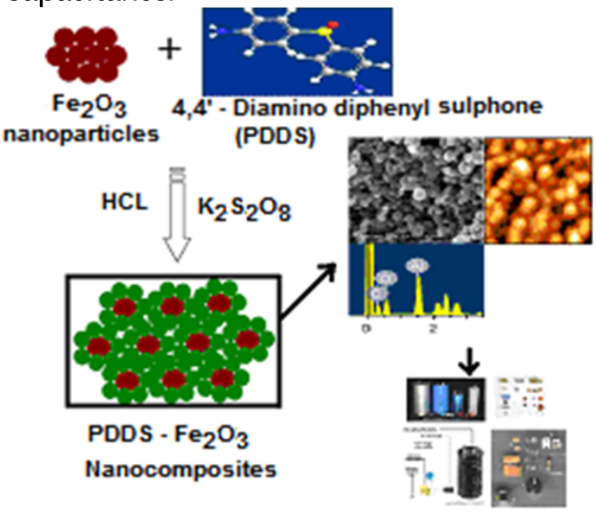
PP 135

Studies on Poly 4, 4'-Diaminodiphenyl Sulphone-Iron Oxide Nanocomposite for a Potential Capacitive Material

J. Anandha Raj, P.Manisankar*
Department of Industrial Chemistry, Alagappa University, Karaikudi -3, Tamilnadu, India.
E-mail: pms11@rediffmail.com, janandharaj@gmail.com

Abstract: 4,4'-Diaminodiphenyl sulphone was polymerized by chemical oxidation method using potassium perdisulphate in presence of nano size iron oxide nanoparticle to poly 4, 4'-diaminodiphenyl sulphone - iron oxide nanocomposite (PDDS- Fe_2O_3).The solubility of the nanocomposite was ascertained and it showed good solubility in DMF and DMSO. The conductivity of the nanocomposite was determined to be 3.23 x 10^{-3} Scm^{-1}. The nanocomposite was characterized by FTIR spectral studies. A single absorption peak due to the N-H stretching vibration of the imino groups was observed around 3356 cm^{-1}. This fact suggests the participation of NH group in the polymerization. The stretching vibrations of sulphone S=O groups showed a strong broad peak at 1425 cm^{-1}[1]. The X-ray diffraction studies revealed the formation of nano sized 30 nm crystalline composite. FE-SEM and AFM analysis showed mixed granular nature of the PDDS-Fe_2O_3 nanocomposite. EDAX analysis confirms the presence of iron oxide in the composite. The capacitance (256.29µF) of the nanocomposite was determined by EIS and this suggests that this nanomaterial can very well be used as an energy storage material.

Key words: 4, 4'-Diaminodiphenyl sulphone. Iron oxide nanoparticles, Polymer-metal oxide nanocomposite, Capacitance.



Scheme.1.PDDS-Fe_2O_3 nanocomposites

Acknowledgement

One of the authors, J.Anandha Raj wishes to thank DST for providing the financial support in the form of fellowship (DST-PURSE Scheme) to carry out this work.

Reference

1. C.Vedhi, J.AnandhaRaj, N.Gopal, RM.Somasundaram and P.Manisankar, Synthetic Metals 160 (11-12) (2010) 1307.

PP 136

Studies on the Removal of Metal Ions using Cationic Macro Reticular Resins

K.Kavitha[a], R.Sayeekannan[b]

[a]PG Research and Department of Chemistry, N.M.S.S.V.N College Madurai-19
[b]PG Research and Department of Chemistry, Thiagarajar College, Madurai-9

Abstract: Sulponated carbon derived from plant viz., Multani Mitti has been prepared and blended with phenol-formaldehyde cation exchanger(PFCE) by varying the percentage of blending(%w/w) and physico - chemical parameters like,density, gravimetric swelling(%)attritional breaking(%) and cation exchange capacity (CEC) of various metal ions have been determined.For a given metal ion,CEC decreases with the increase in percentage of blending Multani Mitti with PFCE.The blending of PFCE upto 30%(w/w)of Multani Mitti retains almost all the essential physico - chemical characteristics including CEC, as compared to that of the PFCE.It is concluded that the sulphonated Multani Mitti carbon could be used as blending material in the PFCE to lower the cost of the ion-exchange resin for water and wastewater treatment,especially for the removal of metal ions.

PP 137

Studies on the Removal of Textile Dyes using *Actinomycetes* Species, Isolates of Coringa Mangrove Forest

Bezawada Mani Kumar[a],Ch.Esther Rani[a], K.S.S. Swamy[a],
D. Chandana Lakshmi[a]

[a]Department of Biotechnology, Godavari Institute of Engineering &Technology,
Rajahmundry-533296, A.P., India,
[b]Centre for Environment, IST, Jawaharlal Nehru Technological University,
Hyderabad-500085, A.P., India
E-mail: bmkumar01@rediffmail.com

Abstract: At present the purity of water is of great concern to scientists as water is a prime necessity of life. Most of the dye substances discharged from textile industries is leading to pollution in water bodies i.e. marine, river, lake and ground waters. Since conventional treatment technologies are not economical and effective, we have chosen ecologically friendly process "*Biodegradation*". It has been proved to be more successful in removal of dye compounds by using various micro organisms .The immobilization of the cells on a suitable support simplify the treatment of liquid waste as the entrapment of living cells increases the retention time of cells in contaminated water. In the present study, the free and immobilized cells of*Actinomycetes species,* isolates of Coringa Mangrove forest were used as biological agents for the removal of a few selected dye substances from the aqueous solution. The major influencing factors such as pH, incubation time, initial concentration of biomass and temperature were verified to optimize the process.

Keywords: Water pollution, Textile dyes, Actinomycetes species, Biodegradation

PP 138

Study of Double Layer Capacitor Based on Polymer Gel-Fabric Electrolyte

R. Murali, N. Muthuchamy, G. Gopu*
Department of Industrial Chemistry, Alagappa University, Karaikudi –630 003
E-mail: nggopi79@gmail.com

Abstract: The electrochemical double layer capacitor (EDLC) is an emerging technology, which really plays a key part in fulfilling the demands of electronic devices and systems, for present and future. Polymer thinfilm electrolyte are widely adopted for compact, light weight with higher surface area , multiple purpose system and wide range operating condition where as gel electrolytes are placed for higher conductivity but mechanical , conventional and compact are questionable. Hence, a balanced version of electrolytes is necessary for the combinational actions, so we need some good supporting materials for gel type electrolytes. We have concerned the textile fabric as a supporting media for gel electrolyte because polymer electrolytes based system suffers mechanical deformation, volume expansion, shrinking, capacity loss and short life by temperature as well as to prevent gel leakage during the handiness. We prepared gel polymer electrolytes (GPE) using poly vinyl alcohol (PVA) and poly ethylene glycol (PEG). EDLCs were fabricated using the above GPE and gel coated textile fabrics. The EDLC behaviour was characterized by Cyclic Voltammetry, AC Impedance analysis and Galvanostatic Charge Discharge studies.

Keywords: Electrochemical double-layer capacitor, Textile supercapacitor, Gel Polymer Electrolyte

PP 139

Comparison of Double Layer Capacitors Based on Thin Film, Gel, Gel - Textile Fabric Electrolytes

B.Sathiya Bama, N. Muthuchamy, G. Gopu*
Department of Industrial Chemistry, Alagappa University, Karaikudi –630 003
E-mail: nggopi79@gmail.com

Abstract: Electrochemical double-layer capacitors (EDLC) have attracted increasing interest and attention with their potential in high power output and high-energy density application. Separator is also a critical component within the electrochemical cell. Typical separator film is a thin, porous, insulating membrane which should be a good ion conductor and mechanical stability. The idea developed in this work was to use textile fabric as a supporting media for gel electrolyte because polymer electrolytes based system suffers mechanical deformation, volume expansion and capacity loss during the operation. Secondly, for commercialization of EV we need eco-friendly materials mainly non corrosive, leakage, safely disposable in the view of global warming.We prepared Thin Film (TF), Gel Polymer Electrolytes (GPE) and gel coated textile fabric as electrolyte based on polymer and inorganic salt. Super capacitors were fabricated using the above three polymer electrolytes. The EDLC behaviour of the prepared material was characterized by Cyclic Voltammetry, AC Impedance analysis and Galvanostatic Charge Discharge studies. The results of TF-EDLC, GPE-EDLC and Fabric EDLC were compared and presented.

Keywords: Electrochemical double-layer capacitor, Textile supercapacitor, Thin Film Electrolyte, Gel Polymer Electrolyte

PP140

Study on Host-Guest Inclusion Complexation between N-Phenyl-1-Naphthylamine and Β-Cyclodextrin by Spectroscopic Methods

M. Maniyazagan, T. Stalin*
Department of Industrial Chemistry, Alagappa University,Karaikudi-630003, Tamilnadu, India.
E-mail:tstalinphd@rediffmail.com

Abstract: The molecular encapsulation of host-guest inclusion complexation between N-phenyl-1-naphthylamine (NPN) and β-Cyclodextrin (β-CD) was studied in solution phase by using UV-visible and Fluorescence (emission) spectral measurements. The solid-state inclusion complex was prepared and characterized by FT-IR, XRD and SEM techniques. The 1:1 stoichiometric ratio and the schematic representation of the inclusion complex between NPN and β-CD was proposed and their binding constant value (K = 34.4 m^{-1}) was calculated by the Benesi-Hildebrand method.

Keywords: UV-Visible spectra, Fluorescence spectra, β-cyclodextrin, N-phenyl-1-naphthylamine, solid complex.

PP 141

Study on Solubility Enhancement of 1-Aminoanthraquinone andβ-Cyclodextrin Complexation

S. Mohandoss, S. Karpakavalli, T. Stalin*
Department of Industrial Chemistry, School of Chemical Sciences, Alagappa University,
Karaikudi-630003, Tamilnadu, India.
E-mail:tstalinphd@rediffmail.com

Abstract: 1-Aminoanthraquinone (1-AAQ) solubility was enhanced using a β-cyclodextrin (β-CD) by thermodynamic approach and spectrophotometric technique. The overall equilibrium constants of 1-AAQ with β-CD complexation have been investigated influence of binary solvents. Their variance of solvents, the partly explain by a competitive inclusion complex of 1-AAQ with β-CD in binary solvents. The absorption spectral shift of 1-AAQ upon inclusion in β-CD is evidently caused by the change of the environment. Both pH and buffer used to adjust the medium pH had a very significant effect on 1-AAQ solubilities and the apparent binding constants of the 1-AAQ:β-CD complexes. The binding constant of inclusion complex at 303 K was calculated using Benesi- Hidebrand plot.

Keywords: β-cyclodextrin, 1-Aminoanthraquinone, Inclusion complex, pH and buffer, Binary solvents, Solubility.

PP 142

Study on the Influence of Tricholoro Ethylene Pre-Treatment on the Dyeing and other Physico-Chemical Behaviour of 100% Polyethylene Terephalate Fabric

S. Laya[*a], **K.Balakrishnan**[b], **R.Venkatachalam**[b], **G.Gopu**[c],**B. Muralidharan**[a]
[a]*Birla Institute of Technology and Science-Pilani, Dubai Campus, International Academic City, Dubai, U.A.E.,*
[b]*A.V.V.M. Sri Pushapam College, Poondi, Thanjavur Dt.613 502,*
[c]*Department of Industrial Chemistry, Alagappa University, Karaikudi, 630003.Tamilnadu, India.*
Email: bmdharan@gmail.com; muralidharan@bits-dubai.ac.ae.

Abstract: Of all the synthetic fibres, polyester is widely for textile applications. Dyeing of polyester with disperse dyes is a highly complex phenomenon. The present paper deals with pre-treatment of 100% polyethylene terephthalate fabric with tricholoro ethylene at room temperature and studied the changes in dyeing behaviour and other physico-chemical properties of treated polyester fabric. The effect of pre-treatment on the physico-chemical properties of the treated fibre material has been studied using Scanning Electron Microscope (SEM), Fourier Transform Infra Red Spectrophotometer (FTIR), Differential Scanning Calorimeter (DSC) and X-ray Diffractometer (XRD) The effect of solvent pre-treatments on light, wash and rubbing fastness of the dyed fabric has also been studied. Energy saving in dyeing has been achieved by bringing down the dyeing temperature without compromising on dye uptake. The results are presented and discussed.

Keywords: pretreater, irreversible swelling, dye diffusion, surface modification, fastness properties

PP 143

Solubility Enhancement of Neyveli Lignite by Phosphomolybdic Acid

M. Madasamy,N. Krishnamurthy
Department of Chemistry, Mepco Schlenk Engineering College, Sivakasi 626 005, India.

Abstract: This work presents a novel method towards the solubility enhancement of Neyveli Lignite by Phosphomolybdic acid. All the lignite samples are investigated with respect to change in time as well as the amount of catalyst. Herein, the solubility of lignite has been enhanced by hetero poly acid in the presence of phenol medium at reflux temperature and the depolymerized product is extracted with variety of polar and non-polar solvents. Depolymerization reaction is carried out and confirmed by depends on the pyridine extractability and IR spectral data. The mechanism of the reaction involves cleavage of methylene aromatic bonds in the lignite moiety followed by attachment of the methylene fragments to phenol molecules.

PP 144

Surface Modification and Antibacterial Behaviour of Biosynthesized ZnO Nanoparticles Coated Cotton Fabric

J.Suresh, R. Rajiv Gandhi, M. Sundrarajan
Advanced Green Chemistry Lab, Department of Industrial Chemistry,School of Chemical Sciences,
Alagappa University, Karaikudi -3, Tamil Nadu, India
E-mail: drmsgreenchemistrylab@gmail.com

Abstract: Biosynthesis of Zinc Oxide nanoparticles (ZnO) was achieved by a novel, simple green chemistry procedure using rambutan peel extract as a hydrolysing agent. Biosynthesis of ZnO nanoparticles was carried out via hydroxide precipitation at room temperature followed by calcination at 450°C. The successful formation of magnesium oxide nanoparticles has been confirmed by XRD, SEM and AFM analysis. The prepared ZnO nanoparticles were coated on the cotton fabric. Coated cotton fabric with the ZnO nanoparticles were analyzed by SEM and EDX analysis and their antibacterial effect was evaluated by Agar Diffusion test method. ZnO nanoparticles coated cotton show good antibacterial activity towards *E. coli* (Gram negative bacteria) and *S. aureus* (Gram positive bacteria).

Keywords: Zinc oxide nanoparticles, Rambutan, Cotton, Antibacterial activity

PP 145

Syntesis and Structural Elucidation of O-Cresol-Thio Semicarbazide-Formaldehyde Terpolymer Resin

L.Balasubramanian, M.Ravishankar
Department of chemistry, Rajah Serfoji govt. College, Thanjavur
Email:balahno3102@gmail.com

Abstract: To synthesis a terpolymer involving *o*-cresol, thiosemicarbazide, and formaldehyde by condensation polymer. To synthesized terpolymer characterised by FTIR, protonNMR and C^{13}-NMR spectral studies.Mixture of *o*-cresol-thio semicarbazide-formaldehyde taken in RB-flask refluxed in an oilbath at 160 ± 2^0C for 6hours presence of 2M Hcl. The content was shaken well and reaction is carried after completing reaction the resin is dissolving in 10% NaOH and reprecipitating by dropwise adding 1:1 Hcl/water with stirring the resin was filtered washed with hot water and dried. The resin was classified for spectral analysis the structure was elucidated by using FTIR, protonNMR and C^{13}NMR studies.

PP 146

Syntesis and Structural Elucidation of O-Cresol-Urea-Formaldehyde Terpolymer Resin

G.Thirunavukkarasu, M. Ravishankar
Rajah Serfoji Govt. College, Thanjavur
E-mail:rajanarasan20@gmail.com

Abstract: To synthesis a terpolymer involving *o*-cresol, urea, and formaldehyde by condensation polymer. To synthesized terpolymer characterised by FTIR, protonNMR and C^{13}-NMR spectral studies.

Mixture of *o*-cresol-urea- formaldehyde taken in RB-flask refluxed in an oilbath at 160±2^{0}C for 6hours presence of 2M Hcl. The content was shaken well and reaction is carried after completing reaction the resin is dissolving in 10% NaOH and reprecipitating by dropwise adding 1:1 Hcl/water with stirring the resin was filtered washed with hot water and dried. The resin was classified for spectral analysis the structure was elucidated by using FTIR, protonNMR and C^{13}NMR studies.

PP 147

Synthesis and Biological Screening of 3-Phenylcoumarin under Greener and Milder Reaction Condition

M.Subramanian[a*], M.Shanmugavadivel[a], C.Muthukumar[b], R.Mangaiyarkarasi[a]
[a]PG& Research Department of Chemistry, H.H.The Rajah's College, Pudukkottai-622001
[b]PG&Research Department of Chemistry, J.J.College of Arts and Science, Pudukkottai-622422

Abstract: Coumarin constitutes one of the major classes of naturally occurring compounds, and interest in its chemistry continues unabated because of its usefulness as biologically active agents. It also represents the core structure of several molecules of pharmaceutical importance. Coumarin has been reported to serve as antibacterial, anti-oxidant, antiinflammatory, anticoagulant and antitumour agents. In addition, these compounds are used as additives in food and cosmetics, dispersed fluorescent brightening agents and as dyes for tuning lasers. Having in mind the wide variety of their usage, we thought it worthwhile to synthesize new coumarin derivatives.3-phenylcoumarin was synthesized by cyclisization of benzylbenzoate with salicylaldehyde. The benzylbenzoate was synthesized by the esterification reaction of benzoic acid with benzyl chloride under greener reaction condition. The structures of the synthesized compounds have been established on the basis of physical and spectral data and are screened for antimicrobial activities; some of them exhibited significant activity.

PP 148

Synthesis and Characterisation of Graphene Nanosheets

S. Rayarruban, J. Suganya, P. Shakkthivel*
Sustainable Energy & Smart Materials Research Lab, Department of Nanoscience and Technology
Alagappa University, Karaikudi-630 003, Tamilnadu, India.
Email:apsakthivel@yahoo.com

Abstract: Graphene is a one atom layer thick carbon sheet. Graphene exhibits many interesting electronic, optical and mechanical properties due to its two-dimensional (2D) crystal structure. The charge carriers of graphene (i.e.: electron) move ballistic in the 2D crystal lattice of graphene; hence it possesses high conductivity despite it being an organic compound. Graphene is a building block because it can be wrapped up to form fullerene, rolled-up to form carbon nanotube or stacked up to form graphite. All of the variation from graphene exhibit interesting electrical properties. In this study, graphene oxide (GO) was synthesized from graphite flakes using modified Hummer's method. The synthesised graphene oxides were converted to graphene nanosheets (GNS) by simple chemical method. The synthesised GO and GNS were characterised through X-ray diffraction (XRD) Fourier transform infrared spectroscopy (FT-IR) and Raman Spectroscopy and Field Emission Scanning Electron Microscopy (FE-SEM) techniques and show the product was pure with sheet like morphology of Graphene formed.

PP 149

Synthesis and Characterization of ZnO-Aloevera Nanocomposites Useful for Antibacterial Activities

V.S. Vidhya[a], R. Perumal Samy[b], A. Ayeshamariam [c]*, M. Jayachandran[d]
[a]*Department of Chemistry, Chendhuran College of Engineering and Technology,*
Pudukottai[b]*Department of Physics, Sir Theagaraya College, Chennai-600 021, India*
[c]**Department of Physics, Khadir Mohideen College, Adirampattinam-614 701, India*
[4]*Electrochemical Material Science Division, CSIR-Central Electrochemical Research Institute,*
Karaikudi-630 003, India
E-mail: aismma786@gmail.com

Abstract: In recent years, the development of efficient green chemistry methods for the synthesis of semiconductor oxide nanocomposites (NCs) has become a major focus of researchers, in order to find an eco-friendly technique for the production of well-cystallized NCs. In this aspect, derivatives from plants are the best precursors or additives because of their availability and suitability for large-scale synthesis of NCs. Interest in wide band gap semiconductors has been significantly focused on zinc oxide (ZnO) due to its excellent optoelectronic and unique bio-compatible properties, including wide and direct band gap (3.37 eV), large exciton binding energy and easiness of growing it in various nanostructure forms. Aloe barbadensis Miller (*Aloe vera*) is a perennial plant of the lily (*Liliaceae*) or *Aloeaceae* family. Since *Aloe* has naturalised throughout the warm regions around the world, the genus *Aloe* contains different species with *Aloe vera* (AlVe) being the most popular and biologically active medicinal plant. In the present study, Zinc oxide+Alovera NC was prepared, characterized and its

antibacterial activity with gram-positive and gram-negative isolates are presented here.ZnO nano powder was prepared by the combustion synthesis route.

The precursor solution containing zinc nitrate, ammonia solution and urea as fuel was maintained at pH 6.0. When the solution was heated to 300 ºC, the process gelation, foaming and self combustion took place producing ZnO nano powder. AlVe gel was prepared by digesting the aloevera leaf extract in phosphate buffered saline solution and was well shaken for 8 h at room temperature and freeze-dried to obtain AlVe powder. Equal quantity of ZnO and AlVe powders were dissolved in triple distilled water and dried at 40 ºC to get ZnO-AlVe nano composite powder. XRD results showed low intensity peaks confirming the presence of ZnO nano particles in the aloevera matrix. Broad peaks corresponding to the (100), (002) and (101) planes are assigned to the hexagonal wurtzite structure with the crystallite size of about 12 nm. TEM results showed the formation of nano rod bundles in NC. Antibacterial activity studies were conducted using agar-well diffusion and agar-disc diffusion method using the stabilized Muller Hindon media. The activity on *Escherichia Coli (*gram-positive) *and Pseudomonas Aeruginosa* (gram-negative) isolates was determined by noting the zones of inhibition (mm) around the wells or discs using different quantity of ZnO-AlVe nano composites. Enhanced antibacterial activity was observed for these NCs compared to ZnO and AlVe alone.

PP 150

Synthesis and Characterization of Cds and Cdzns Nanoparticles by Co-Precipitation Method and their Larvicidal Activity

T. Banu Priya, A.Rajesh, K. Gopinath, A. Arumugam, K. Gurunathan*
Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003
E-mail:kgnathan27@rediffmail.com

Abstract: In the present study, we report the synthesis and characterization of CdS and CdZnS nanoparticles by co- precipitation method. CdS and CdZnS nanoparticles were characterised by various techniques/analysis. The XRD patterns conform the formation of CdS and CdZnS nanoparticles & particle size ranging from 10-15 nm. The absorbtion maxima in UV-visible spectra clearly indicate the size quantization effect. CdS & CdZnS may be a more rapid and environmentally friendly approach for vector control than current approaches. Biological control, used as an alternative to current larvicides for minimizing the mosquito population, can provide an effective and environmentally friendly approach to mosquito control.

Keywords: Nano-CdS & CdZnS, Co-pecipitation, Biological control, Mosquito control

PP 151

Synthesis and Characterization of Photocatalytic Properties of Cu Doped ZnO and Co Doped ZnO Thin Film

E. Santhosh[a], **S. Krishnamoorthi**[a], **N. Subramanian** [b]
[a]Department of Nanoscience and Technology,
[b]Department of pharmaceutical Engineering, Anna University, BIT Campus, Thiruchirappalli–24.
E mail:natesansubbu@gmail.com,elaiyasanthosh3@gmail.com

Abstract: ZnO thinfilms prepared on the glass substrate by using simple dip-coating method. Zinc acetate de-hydrate, Di-ethanol amine(DEA) and ethoxy ethanol were used as the starting material, stabilizer and solvent respectively in the preparation of ZnO thin films. Cu doped ZnO and Co doped ZnO thin films have been prepared with the different doped concentration. The thicknessof film was controlled by controlling the dipping cycles. The effect of Cu and Co doping on the structural, morphological and optical properties of the ZnO thinfilms was investigated by XRD (X-Ray Diffraction Microscopy), SEM (Scanning Electron Microscope), AFM (Atomic Force Microscopy) and UV-Vis spectroscopy. The photocatalytic activity of undoped ZnO, Cu doped ZnO and Co doped ZnO thin films were studied by using the degradation of Methelyne Blue waste water textile dye under UV irradiation.

PP 152

Synthesis and Characterization of Poly (Diphenylamine-*Co*-Phenyl Hydrazine)

D. Ilangeswaran[a], **P. Maheswari**[a], **P. Manisankar**[b]
[a] Department of Chemistry, Rajah Serfoji Govt. College (Autonomous), Thanjavur.
[b]Department of Industrial Chemistry, Alagappa University, Karaikudi.
Email: dhailangeswaran@gmail.com

Abstract:A new copolymer between diphenylamine (DPA) and phenyl hydrazine (PH) was synthesized by chemical method using potassium perdisulphate as an oxidizing agent. The copolymer formation between these two monomers was confirmed by FTIR and ^{1}H NMR studies. The secondary NH stretching frequency for poly (diphenylamine-*co*-phenyl hydrazine) was observed at 3204 cm^{-1} in its FTIR spectrum. The NH_2 stretching frequency for primary amino group usually observed above 3400 cm^{-1} was absent in this copolymer. This showed the involvement of NH_2-NH- unit of PH in copolymer formation with benzene ring of DPA. The presence of -NH-NH- unit in the polymer backbone was confirmed by the N-N stretching and bending vibrational frequencies of 1103 and 597 cm^{-1} respectively in the FTIR spectrum of poly(DPA-*co*-PH). The presence of 1, 4-disubstituted benzene units in the polymer chain was supported by IR peak at 804 cm^{-1} due to the C-H out of plane bending vibrations corresponding to the 1, 4-disubstituted benzene. The presence of different types of benzene and NH units of both monomers in the polymer chain was supported by proton NMR spectra. The amorphous nature of poly (DPA-*co*-PH) was ascertained by XRD studies. The grain size of copolymer was found to be 91 nm using Scherrer's formula. The SEM studies showed the difference in surface morphology of poly (DPA-*co*-PH) as compared to the homopolymers of DPA and PH. The copolymer, poly (DPA-*co*-PH) exhibited good solubility in $CHCl_3$, DMSO, DMF and THF. The conductivity of poly (diphenylamine-*co*-phenyl hydrazine) was found to be 2.94×10^{-2} S cm^{-1} using four probe conductivity meter.

Keywords: Phenyl hydrazine, diphenylamine, copolymer, NMR

PP 153

Synthesis and Characterization of Polyaniline Encapsulated Semiconducting Metal Oxide Nanocomposite

A. Manikumar, K. Pandiselvi, S. Thambidurai*

Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, Tamil Nadu, India.

Email: sthambi01@yahoo.co.in

Abstract: In recent years, developments of inorganic–organic hybrid materials on nanometer scale have been receiving significant attention due to a wide range of potential applications and high absorption in the visible part of the spectrum and high mobility of the charge carriers. Amongst conductive polymers, polyaniline (PANI) is the most attractive one because of the presence of reactive amine and imine functional groups in polymer chain, and used in broad range of applications such as batteries, sensors, electronic devices, super capacitors. Among the metal oxide nanoparticles, MgO provided the highest catalytic activity, selectivity, stability and super conducting products. In this work, we presented a simple approach to synthesize MgO/PANI hybrid composite with porous structure by *in situ* polymerization. The structure, morphology and electrical properties of the as-prepared composites were studied by Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), UV–vis absorption spectroscopy, scanning electron microscopy (SEM) and electrochemical cyclic voltammetric techniques.

Keywords: Polyaniline, Metal oxide, hybrid composite, FT-IR, UV-vis spectra.

PP 154

Synthesis and Electrochemical Characterization of Azamacrocyclic Complexes withthe Schiff – Base Ligand

R. Chitra, R.Mangaiyarkarasi and S. Valarselvan*

Department of Chemistry, H.H. The Rajah's College, Pudukkottai, Tamilnadu, India

Abstract: The supramolecular chemistry has been considerable interest in last decades due to availability of macrocyclic receptors. Much work has been devoted on synthesis and characterization of macrocycles with unique shape and distinct architecture by using widely available natural or synthetic sources. The present work deals with the synthesis and characterization of a macrocyclic ligand and its complex compounds using some transition metals. Macrocyclic ligand obtained from the condensation reaction of glyoxal and ethylene diamine. The ligand and its coordination compounds are characterized by electronic, infrared spectral analysis, cyclic voltammetry and conductivity measurements.

Keywords: Supra molecular chemistry, macrocycles, spectral analysis, cyclic volatammetry

PP 155

Synthesis and Magneto-Luminescence Studies ofBiocompatible Maghemite-Hydroxyapatite (HAP) Core-Shell Nanoparticles

D. Packiya nathan*, A. Rajesh and K. Gurunathan
Department of Nanoscience and Technology, Alagappa University,Karaikudi-630 003.
*E-mail:*kgnathan27@rediffmail.com

Abstract: *Lanthanide* doped magnetic *Maghemite-hydroxyapatite core-shell nanoparticles (NPs) below 100nm were synthesized by co-precipitation method. The phase purity* and size of the calcined sample was confirmed by XRD and TEM. The PL and VSM results revealed the prepared samples having good magneto-luminescence property. Our results suggest that the combination of both magnetic and luminescent biocompatible HAP- NPs is the potential use in the Targeted drug delivery, hyperthermia treatment and bio-imaging application.

Key words: *Hydroxyapatite*, co-precipitation, biocompatible, magnetoluminescence

PP 156

Synthesis and Structural Elucidation of Few Metal (II) N, N'-Bis (4-Chlorobenzylidene) Benzene-1, 2-Diamine Complexes: Evaluation of Electrochemical and DNA Binding

N. Pravin, N. Raman*
Research Department of Chemistry, VHNSN College, Virudhunagar-626 001, India
E-mail:ramchem1964@gmail.com

Abstract: Complexes of stoichiometry [ML(ox)]Cl_2 [where ox is oxalic acid, M = Cu(II), Co(II), Ni(II) and Zn(II); L = N,N'-Bis(4-chloro-benzylidene)benzene-1,2-diamine] were prepared to explore their binding propensity for mono-nuclear metallo-intercalators. The chemical structures were elucidated by IR, ^{1}H, ^{13}C NMR, EPR and UV-Vis. spectral analyses. The interaction of all the complexes containing Schiff base with calf thymus (CT) DNA was investigated by spectroscopic methods. UV–vis, cyclic voltammetry and viscosity measurements were carried out to assess their binding ability with CT DNA. The binding constants have been estimated (3.1 to 1.9 $\times 10^4$ M^{-1}). The percentage of hypochromism is found to be over 41% (from spectral titrations). The results showed that the complexes could bind to DNA with an intercalative mode. Electrochemical investigations are consistent with formation of stable quasi-reversible redox couples in the solution of all the metal complexes. The positive shifts in the CV peak potentials of the complexes are indicative of an intercalative binding mode of the complexes with DNA. In all the binding experiments, the complex with copper ion as the metal center showed enhanced binding behaviour than the other three.

PP 157

Synthesis, Characterization and Biological Studies of Gold Nanoparticles and Ecofriendly Reduction of 4-Nitrophenol

N. Muniyappan, A. Lakshmanan and N.S. Nagarajan*
Department of Chemistry, Gandhigram Rural Institute - Deemed University,Gandhigram - 624 302, Tamilnadu, India.
Email: nmuniyappan@gmail.com

Abstract: Gold nanoparticles are utilized in drugs because of their pharmacological and biomedical applications and also due to their eco-friendly properties. In the present study stable gold nanoparticles have been synthesized by using aqueous extract of Dalbergia sympathetica leaves used both as a reducing as well as a stabilizing agent. The gold nanoparticles synthesized by ultrasonication at 25^0C for 15 min were found to be stable in aqueous solution at room temperature over a period of five months. The quantitatively stable gold nanoparticles (AuNPs) formed by treating aqueous solution of $HAuCl_4$ with the aqueous extract of the plant by reduction of Au^{3+} ions when monitored by UV – Visible spectroscopic study revealed the Surface Plasmon Resonance (SPR) at 545 nm. The shape and size of the nanoparticles were analysed by Transmission Electron Micrography (TEM). When evaluated for their anti-inflammatory and antioxidant activity by in-vitro methods, AuNPs showed considerably enhanced activity, when compared to the aqueous extract of the plant at the test doses. The study involves green chemistry approach using a plant extract material for the generation of stable gold nanoparticles with high catalytic activity in the reduction of 4-Nitrophenol.

Keywords: Gold nanoparticles, Dalbergia sympathetica, anti-inflammatory, antioxidant, catalytic activity.

PP 158

Synthesis, Characterization and Electrochemical Property of Polypyrrole Nanospheres

S. Munusamy[a], R.Suresh, K. Giribabu[a], R. Manigandan[a], S.Praveenkumar, S. Muthamizh[a], L. Vijayalakshmi[b], and V. Narayanan[b]*
[a]*Department of Inorganic Chemistry, University of Madras, Guindy Campus, Chennai 600 025*
[b]*VidhyaSagar Women's College, Chengalpattu, Kancheepuram 603211*
E-mail: vnnara@yahoo.co.in

Abstract: Polypyrrole nanoparticles were synthesized by chemical polymerization method using ammonium persulphate as an oxidant. The synthesized polypyrrole nanoparticles were characterized by FT-IR, UV-Visible, FE-SEM and CV. The structure of polypyrrole nanoparticles were confirmed by FT-IR spectroscopy. The UV-Vis spectra of polypyrrole nanoparticlesshow π-π^* and n-π^* transitions. The morphological properties were characterized by FE-SEM and it shows that the synthesized polymer has agglomerated morphology. The electrochemical properties of the polypyrrole nanoparticleswere studied by cyclic voltammetric method. It is reasonable to expect that the synthesized polypyrrole nanoparticles will exhibit promising applications in the field of sensors.

PP 159

Synthesis of Aunps and Coating on Cotton Fabric for Antibacterial Activity

RM.Ganesan[a], **H.Gurumallesh Prabu**[b]*

[a]Department of Chemistry, Arumugam Pillai Seethai Ammal College, Tiruppattur-630211, India
[b]Department of Industrial Chemistry, Alagappa University, Karaikudi-630003, India
E-mail: hgprabu2010@gmail.com

Abstract: A gold nanoparticle (AuNPs) has been synthesized from aqueous chlroauric acid solution using aqueous leaves extract of *Coleus aromatics* as an ecofriendly reducing agent. Parameters such as Au^{3+}conc., reaction time and pH of reaction mixture were varied. The formation of gold particles was confirmed by its characteristic Surface Plasmon Resonance (SPR) signal observed in UV-Vis spectra. The XRD analysis of Au particles showed characteristic patterns at (111), (200), (220) and (311). This again confirms the formation of zero valent gold. FT-IR analysis showed the presence of characteristic reducing functional groups in the *Coleus aromatics* leaves extract. SEM micrographs support the spherical morphology of AuNPs. EDAX spectrums authenticate the presence of Au^0. The extract containing Au was coated on cotton. Antibacterial activity of coated cotton fabric was assessed and found to be satisfactory.

Keywords: AuNPs, *Coleus aromatics, r*eduction, cotton, antibacterial

---

PP 160

Synthesis of Cao-La_2o_3 Metal Oxide Nanocatalyst for Bio-Diesel Application

R. Prabhu, **M. Rajesh, P. Shakkthivel***

Sustainable Energy and Smart Materials Research Lab, Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003, Tamilnadu, INDIA.
Email:apsakthivel@yahoo.com

Abstract: Heterogeneous ($CaO-La_2O_3$) nanocatalysts were prepared through combustion method using binder and urea assisted method. The prepared $CaO-La_2O_3$powder was characterized by various techniques such as XRD, FT-IR, TGA/DTA, and FE-SEM. The cubic crystal systems of particles are identified by the XRD patterns and the particles are varied from 28 - 73 nm with respect to the constituent metal ratio. The TG/DTA analysis shows the metal oxide formation was occurred at 400ºC.The FE-SEM micrographs represents the morphology of the synthesized nanoparticles shows agglomerated cubic shape and the mean particles are lies in the range of 160 nm. The FT-IR spectra confirmed the formation of metal oxides of the synthesized nanocatalyst. The synthesized metal oxides may be more useful for bio-diesel synthesis.

PP 161

Synthesis of La Doped ZnOThin FilmsbySol-Gel Dip Coating Method and their Characterization

M.Benazir,K.S.Venkatesh, S.R.Krishnamoorthi, R.Ilangovan*
Nanoelectronics laboratory, Department of Nanoscience and Technology, Alagappa University,
Karaikudi 630 004,Tamil Nadu, India.
**Email: rajangamilangovan@gmail.com*

Abstract: Zinc oxide has attracted intensive research effort due to its unique properties and versatile applications. Pure and La doped (1, 3, 5 &10 wt %) Zinc oxide thin films and have been prepared by sol-gel dip coating method on glass slides. ZnO and La doped ZnO nanoparticles were also synthesized using sol-gel technique. The as-synthesised pure powder was dried and subjected to TGA/DTA analysis. The structural property of the coated thin films and synthesis nanopowder were studied by means of XRD and it revealed the presence of polycrystalline nature. The grain size was measured using Debye –Scherrer's formula and it was about 18 and15 nm for pure and to wt%. La doping respectively. The optical property of the thin films and nanopowder were studied through UV-Vis NIR Spectra. The FTIR Spectra was recorded for the films and nanopowder to analyze the characteristic peaks of ZnO.

Keywords: Thin films, La doped ZnO, XRD, TGA/DTA, UV, and FT-IR

PP 162

Synthesis of Nanocrystalline Nickel Ferrite and Ce Substituted Compounds by Solution Combustion Method

M.Tamilarasi[a*], G.Senguttuvan[b], L.John Berchmans[c]
[a]*Division of Nanoscience and Technology, Anna university- BIT campus, Tiruchirappalli India.*
[b]*Department of Physics, Anna University -BIT campus, Tiruchirappalli*
[c]*Electropyro Metallurgy Division, CSIR - Central Electrochemical Research Institute, Karaikudi*
**Email: tamilarasivcet@gmail.com*

Abstract: Magnetic spinel ferrite nanocrystals are regarded as one of the most important inorganic materials because of their electronic, optical, electrical, magnetic and catalytic properties. Among various ferrites, nickel ferrite ($NiFe_2O_4$) is a typical inverse spinel, where Fe^{3+} ions are located in the tetrahedral (A) and octahedral (B) sites and Ni^{2+} ions are located in octahedral sites only. More attention has been devoted to the nano-sized magnetic materials for their unique properties like high electromagnetic performance, excellent chemical stability, high coercivity, and moderate saturation magnetization compared to their bulk counter parts. These unique properties of nickel ferrite find application as soft magnets and low loss materials at high frequencies as well as ferro-fluids and biomedical diagnosis.We report the synthesis of nano-structured nickel ferrite particles by combustion method using urea as the fuel. The structural and magnetic properties of the as prepared nickel ferrite as well as the effect of fuel and cerium concentrations were also investigated. Samples with nominal compositions $NiCe_xFe_{2-x}O_4$(x= 0.02, 0.04, 0.06, 0.08 and 1.0) were prepared by this method. The prepared compounds were sintered at 800°C using an electrical resistance furnace. The ferrite powders were characterized by XRD, FT-IR, EPR, EDAX

and SEM analyses. XRD data confirms the single phase spinel nickel ferrite compound. FT-IR spectrum shows the stretching and bending vibrations of Ni-O and Fe-O bond in the ferrite structure. The paramagnetic behaviour of the synthesized powders has been revealed from the EPR studies. The elemental composition of the synthesized powders is assessed by EDAX analysis. SEM images show the unagglomerated uniform fine particles. From the above studies, it has been concluded that nano-structured Nickel ferrite compounds can be synthesized by simple combustion method.

PP 163

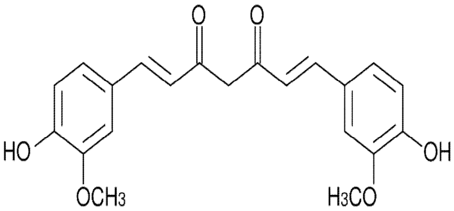
Synthesis of NanocurcuminEncapsulated Metal Oxide for Biological Application

R.Dhivya[a],M. Vigneshwar[a], M. Rajasekaran[a]*, J. Annaraj
[a]*Department of Materials Science, Madurai Kamaraj University, Madurai-625 021,India.*
[b]*Department of Chemistry, Yadava College, Madurai- India.*
Email: jjannaraju@gmail.com

Abstract. Curcumin is a highly potent, non toxic, bioactive agent derived from turmeric and has been known for centuries as a household remedy to many aliments [1]. The disadvantage is that it suffers from low aqueous solubility and consequently poor bioavailability. The present study was to develop a facile method for the preparation of nanostructured curcumin (particle size = 23-83 nm) to improve its solubility. The minimum inhibitory concentration of nanocurcumin was determined for variety of bacterial and fungal strain and it was compared to that of bulk curcumin. The results demonstrated that its enhanced solubility and better biological activity of curcumin by reduction of its particle size and increased surface area. Metaloxide nanoparticles has a unique properties in biological applications based on shape, size and crystalline structure. Among them, ZnO and TiO_2 nanoparticles are most effective in antibacterial properties [2]. To enhance the biological activities of ZnO and TiO_2, we try to made an attempt to encapsulate them with nanocurcumin for the first time. The curcumin encapsulated metal oxide nanoparticles were characterized by FT-IR, UV- Visible spectroscopy, XRD diffraction, AFM and also try to investigate their enhanced biological applications such as anticancer, antimicrobial, antibacterial and Alzheimer disease etc.

Keywords: Nanocurcumin, Metaloxides, Encapsulation, Biological application

Rhizomes of Curcuma longa Linn plant



chemical structure of polyphenolic curcumin compound

Reference:
1. Bhavana, Rupesh kumar,et.al.,Journal .Agriculture and Food Chem.2011,59,2056-2061
2. Aashis S.Roy,Ameena Parveen,et.al., Journal of Biomaterials and Nanotechnology, 2010,1,37-41

PP 164

Synthesis of New Fulleropyrrolidine Derivatives of C_{60}

A. R. Parveen, V.Sughanya, S. Nagarajan*
Department of Chemistry, Annamalai University,Annamalainagar - 608002
**Department of Chemistry, Central University of Tamil Nadu, Thiruvarur-610 004.*
E-mail:snagarajan@cutn.ac.in

Abstract: Discovery, isolation and chemical modification of fullerenes have been extensively explored because their supramolecular structure extends significant potential applications in many fields. Functionalization of fullerene is considered to be the best approach to solve several problems, especially because it offers better solubility to improve the development of new devices. Fullerene derivatives show a remarkable electron acceptor character that has been effectively used for the preparation of a wide variety of different electron active systems by the covalent attachment to electron donor molecules. In the present investigation, fulleropyrrolidine substituted with mono and di-(n-alkyloxy) aryl derivatives has been synthesized. The compounds were synthesized by the reaction of $C_{60}$with N-methylglycine and aldehydes, involving1,3-dipolar cycloaddition reaction to generate azomethineylides of C_{60}. All the synthesized compounds were characterized by FT-IR, NMR and mass spectroscopic techniques. The photophysical and electrochemical properties of the compounds were investigated by uv-vis, fluorescence spectroscopic and cyclic voltammetric methods.

PP 165

Synthesis of Newer Thiophene Derivatives and Computational Evaluation of their Biological Activities

P.Muthuraja, S. Chitra, V.Sethuraman, M.Sethupathy, P.Manisankar*
Department of Industrial Chemistry, Alagappa University, Karaikudi – 630 003 Tamilnadu, India.
E-mail: pms11@rediffmail.com, pmuthuraja.chem@gmail.com

Abstract: Thiophene derivatives are well known heterocyclic compounds and most of these exhibit different biological activity such as antitumor, Src- family selective Lck inhibitor,T-cell receptor signaling, VEGFR- 2 kinase inhibitor etc. In present study, new scaffolds of 5-bromo-4-[5-(morpholin-4-ylmethyl)thiophen-2-yl]-5h-cyclopenta[c]pyridin-1-amine functionalized with different aromatic boronic acids were synthesized and computationally evaluated their biological activities using cheminformatics tools. Six newer thiophene derivatives obeyed Lipinski's rule of five with good biological activity. One target among six showed lesser drug likeness and drug score values which were evaluated using OSIRIS property explorer. Except this derivative, all other five targets synthesized act as drugs.

Keywords: Thiophene derivatives, Libinskis rule, OSIRIS Property Explorer, Molinspiration software.

PP 166

Synthesis, Characterization and Antimicrobial Activity of Some Transition Metal Complexes with A Novel Mannich Base 7-Dimethylaminocinnamyl-8-Hydroxyquinoloine

C.Muthukumar*, S.Sundaram, K.Solaiyan, G.Anandaraj, M.Priyadharshini, A.Subramanian

PG & Research department of Chemistry, J.J.College of Arts and Science, Pudukkottai- 622422

Abstract: A new Mannich base 7-dimethylaminocinnamyl-8-hydroxyquinoline was prepared by the condensation of 8-hydroxyquinoline, cinnamaldehyde and dimethylamine in 1:1:1 molar ratio in room temperature. From this ligand, a series of metal complexes with different transition metal chlorides such as Mn(II), Co(II), Ni(II) and Cu(II) were synthesized. The nature of bonding and the geometry of the complexes have been investigated by elemental analysis, UV-Visible, IR, ^{1}H NMR and ^{13}C NMR spectral analyses. The elemental analysis and spectral studies indicate the octahedral geometry for all the complexes. Invitro antimicrobial screening of the new ligand and its metal complexes were carried out by employing Agarwell diffusion technique. *E.coli* and *S.aureus* were the bacterial strains used and *A.niger* and *P.chrysogenum* were the fungi used. Streptomycin and Amphotericin were the standard antibiotics used to study the efficiency of the ligand and complexes. The results showed that the metal complexes and ligand possessed good activities against the microbes used.

PP 167

Synthesis, Characterization and Electrochemical Sensing Behaviour of Mno$_2$Nanoparticles

R. Manigandan[a], K. Giribabu[a], R. Suresh[a], S. Munusamy[a], S. Praveen kumar[a], S. Muthamizh[a], L. Vijayalakshmi[b], A. Stephen[c], V. Narayanan[a]*

[a]*Department of Inorganic Chemistry, University of Madras, Guindy Campus, Chennai 600 025*
[b]*VidhyaSagar Women's College, Chengalpattu, Kancheepuram 603211, India*
[c]*Department of Nuclear Physics, University of Madras, Guindy Campus, Chennai 600 025*
E-mail:vnnara@yahoo.co.in

Abstract: We have synthesized MnO$_2$ nanoparticles by simple hydrothermal method. X-ray diffraction analysis (XRD), Fourier transform infrared spectroscopy (FT-IR), DRS UV-Visible spectroscopy and scanning electron microscopy (SEM) were used to characterize the synthesized MnO$_2$ nanoparticles. The FT-IR spectrum shows a band in the region of 400-550 cm^{-1} that confirms the formation of Mn-O bond in MnO$_2$. XRD confirms the structure, crystallinity and phase of the MnO$_2$ nanoparticles. The morphological property of the MnO$_2$ was investigated by SEM analysis. The band gap of the synthesized MnO$_2$ nanoparticles was determined by DRS UV-Visible spectroscopy. The conductivity of the MnO$_2$ nanoparticles was evaluated by impedance measurements. Further, the synthesized MnO$_2$ nanoparticles were used to modify the glassy carbon electrode (GCE) and the modified GCE electrode was found to exhibit electrochemical sensing behaviour towards peroxide. It shows that the MnO$_2$ nanoparticles exhibit promising applications in the development of bio-sensors.

PP 168

Synthesis, Characterization and Electrochemical Studies of Nickel Iminodiacetic Acid Dithiocarbamate Complex

T.Raju[a]*, K. Giribabu, V.Narayanan[b]
[a]*Department of Analytical Chemistry,* [b]*Department of Inorganic Chemistry, University of Madras,*
Guindy Maraimalai Campus, Chennai -600 025.
E-mail: proftraju2004@yahoo.co.in

Abstract: Iminodiacetic acid dithiocarbamate was prepared by reacting iminodiacetic acid and carbon disulphide in the presence of a strong base. Nickel iminodiacetic acid dithiocarbamate was prepared by reacting iminodiacetic acid dithiocarbamate and nickel ions in the molar ratio of 1:2. The synthesized nickel iminodiacetic acid dithiocarbamate was further characterized by using UV-Visible, FT-IR spectroscopy. The absorption bands at 620 nm corresponds to the d-d transition of the central metal ion in the complex and 465 nm was due to charge transfer/d-d transition between the metal and the ligand and the bands at 390, 320, and 245 nm were indicative of n-π* transition localized in the S-C=S group and the presence of π- π* bands. The IR important bands at 1725, 1500, 1415, 990 cm^{-1} which are due to C-N, C-S, C-O and C=O functional groups present in the complex and the band at 380 cm^{-1} corresponds to the M-L bond formation. The cyclic voltammetry of nickel iminodiacetic acid dithiocarbamate was studied to understand the electrochemical properties of the complex. The electrochemical reaction is as follows:

$$Ni\ (dtc)_2 \rightarrow Ni(dtc)_2^-$$
$$Ni\ (dtc)_2^- \rightarrow Ni(I)(dtc) + dtc^-$$

PP 169

Synthesis,Spectral Characterisationand Biological Activity of Few First Row Transition Metal Complexes with the Schiff Base Ligand Derived from 4–Oxo-4h–1–Benzopyran–3–Carboxaldehydeand 4–Aminoacetophenone

P.Krishnaveni, M.Sutha Devi, C.D.Sheela.*
Department of Chemistry, The American College, Madurai-2.
E-mail: cdsheela@yahoo.com

Abstract:A series of metal (II) complexes of types ML_1 and ML_2 where [M=Cu(II) , Ni(II), Co(II), Mn(II), Zn(II) and VO(IV)] have been prepared from 3-formyl chromone and 4-amino acetophenone. The structure of the complexes have been investigated by molar conductance, magnetic moment, IR, UV-VIS, NMR, mass spectral and ESR studies. The conductance measurements indicate the non-eletrolytic nature of the complexes .The spectral and other data show a square planar structure for Cu(II), square pyramidal structure for VO(II) and tetrahedral for other complexes. The redox behavior of Cu (II) complex was studied using cyclic voltametry. Antimicrobial activity of compounds against several micro organisms indicates that some complexes have higher activity than the ligand. The Schiff base exhibits properties originating from intra ligand transition and metal-mediated enhancement is observed on complexation. This suggest

that the synthesized complexes can serve as potential photo active materials as indicated from their characteristic fluorescence property.

PP 170

Synthesis, Spectraland Single Crystal X- Ray Structural Studies On $[Bi(Medtc)_2(NO_3)]$ and $[Bi(Medtc)_2(1,10\text{-}Phen)_2]NO_3$; Single Crystal X-Ray Structural Studies of $[Bi(Medtc)_2(1,10\text{-}Phen)_2]NO_3$

E. Sarojpurani[a], **R. Baskaran**[a*]
[a]Department of chemistry, Annamalai University, Annamalai Nagar- 608002
E-mail:puranichem@gmail.com,rbhaskaran99@yahoo.co.in

Abstract: The novelbismuth(III) complexes with dithiocarbamate, $[Bi(medtc)_2(NO_3)]$(**1**) and $[Bi(medtc)_2(1,10\text{-}phen)_2]NO_3$ (**2**) have been synthesized. Both the complexes (**1**) and (**2**) have been characterized by IR, UV and NMR spectra. In the IR spectra,the important stretching mode characteristic of the thioureide band $\nu_{(C\text{-}N)}$ occurs at 1507 cm^{-1} and 1499 cm^{-1} for complexes (**1**) and (**2**) respectively. The reduction in$\nu_{(C\text{-}N)}$(thioureide) of adduct (**2**) compared to their parent compound (**1**) is due to the change in coordination number 6 to 8. In NMR spectra, the most important $N^{13}CS_2$ chemical shift appears at 198.82ppm (**1**) and199.71ppm (**2**). The crystal structures of the complex (**2**) belong triclinic with space group P-1. The unit cell constants are a=8.8720(10) Å, b=13.338(2) Å, c=16.044(2) Å, α=97.749(2)°, β=105.261(2)°, γ=101.103(2)°. In the complex, bismuth atom is eight coordinated in a capped distorted pentagonal bipyramidal geomentry. The dithiocarbamate group of the complex (**2**) has short thioureide C-N distances (1.311A and 1.318A) which indicate that the electron density is delocalized over S_2CN moiety and this bond has partial double bond character. Crystal structure is stabilized by number of supramolecular interaction. The structural properties of the complex will be discussed at length.

PP 171

Synthesis, Structural and Optical and Cell Toxicity Studies on Hela and Hep2 Cells by GrapheneOxide Nanoparticles

M. Sudha, A. Rajesh, K. Gopinath, A. Arumugam, K. Gurunathan*
Department of Nanoscience and Technology, Alagappa University, Karaikudi-630 003
E-mail:kgnathan27@rediffmail.com

Abstract: Recently, there has fabulous excitement in the nano- biotechnological area for the study of nanoparticles synthesis using some natural biological system which has led the growth advanced nanomaterials synthesis .In the present investigation, we have synthesised the graphene oxide (GO) using co-precipitation method. The synthesized GO are characterized by various characterization techniques such as XRD, FTIR, Raman Spectrocopy and TEM. Graphene oxide delivered in HeLa and Hep 2 cells line in different concentrations and analysis of cell toxicological effect. Graphene oxide (GO) clearly indicates the presence of HeLa and Hep 2 cell line with varying from low and high concentrations and were viewed using laser confocal microscopy.

Key words: Graphene Oxide nanoparticles, HeLa and Hep 2 cell line, Toxicity

PP 172

Electrochemical Formation of the Cu-Curcumin Complex and its Application to theNanomolar Detection of *P*-Nitrophenol

Bose Dinesh[a], Balamurugan Devadas[b], R. Saraswathi[a]*, Shen-Ming Chen[b]
[a]Department of Materials Science, School of Chemistry, Madurai Kamaraj University,
Madurai – 625 021, Tamilnadu, India
[b]Department of Chemical Engineering and Biotechnology, National Taipei University of
Technology, No.1, Section 3, Chung-Hsiao East Road, Taipei 106, Taiwan, ROC.

Abstract: Curcumin (1,7-bis[4-hydroxy-3-methoxyphenyl]-1,6-heptadiene-3,5-dione) is the main pigment of the turmeric (*curcuma longa)*. It possesses biological activities including antiinflammatory, antiangiogenic, antioxidant and anticancer effects. It fights free radical formation in blood and body tissues and helps to prevent various cardiovascular, viral and other chronic diseases. The 1, 3-diketone moiety of curcumin can transform automatically to a keto–enol tautomeric form, the later is more stable and can readily chelate the metal ions to form the complexes.

For the first time the Cu (II)-curcumin (Cu-CM) complex was prepared by electrochemical route on a glassy carbon electrode surface (GCE). The as-prepared complex was systematically characterized by UV-visible spectroscopy, scanning electron microscopy (SEM), electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV) techniques. The SEM results showed that curcumin (CM) was formed as tubular structures and the Cu nanoparticles were uniformly distributed on the CM. The complex formation was confirmed by UV-visible spectroscopy. The electrocatalytic reduction of *p*-nitrophenol (*p*-NP) on Cu-CM complex modified GCE was evaluated with respect to that of CM/GCE and Cu/GCE by cyclic voltammetry in phosphate buffer (pH=6). The catalytic peak current at the Cu-CM complex electrode was found to be 1.5 and 7 times higher than that of the Cu/GCE and CM/GCE respectively and the overpotential at the Cu-CM complex modified GCE was reduced by 310 mV compared to bare GCE. The sensor performance of the Cu-CM complex modified GCE was evaluated by both electrochemical impedance spectroscopy (EIS) and differential pulse voltammetry (DPV) techniques under optimized conditions. The DPV sensor exhibited a very low detection of 13 nM and excellent current sensitivity of 87 $\mu A\ \mu M^{-1}\ cm^{-2}$.

PP 173

Studies on The Interaction Of Cadmium And Lead Determination Using Bismuth Film Modified Electrode During Anodic Stripping Voltammetry

G.Sathya[1], S.Anandhakumar[2], J.Mathiyarasu[2], G. Gopu[1]*

Department of Industrial Chemistry, Alagappa University, Karaikudi –630 003
Electrodics & Electrocatalysis Division, Central Electrochemical Research Institute Karaikudi -6.
E-mail: nggopi79@gmail.com

Abstract: The present work reports the interaction of cadmium (Cd) and lead (Pb) at the low concentration level (micro-gram level) during the square wave anodic stripping voltammetry estimation using a bismuth film modified glassy carbon electrode by in-situ and ex-situ methods. In these methods, the deposition potential is optimized as -1.2 V for 120 s, frequency 120 Hz in a supporting electrolyte of 0.1M acetate buffer. It is observed that the presence of Cd and Pb in the analyte solutions influence the analytical value of the estimation of the individual metal species. For instance, with the in-situ bismuth modified electrodes, the stripping peak current of bismuth is decreased to 16.89 % in the presence 50 ppb Cd and this is increased as 39.83 % with the further additions of Cd. The bismuth stripping peak current of bismuth is decreased to 7.19 % in the presence of 50 ppb Pb and it is increased to 29.52 % for the further additions of Pb. In the case of simultaneous detection the stripping peak current of bismuth is decreased to 20.52 % in the presence of 50 ppb Cd and Pb and this is increased to 51.99 % for further additions of Cd & Pb. In the case of ex-situ bismuth film modified electrodes, the stripping peak current of bismuth is decreased to 4.38 %, 20.84 %, and 9.95 % in the presence of 50 ppb Cd & Pb alone and its mixture respectively.The Cd stripping peak current is increased to 87.45 % compared to the Cd alone determination in the presence of 50 ppb Pb. In the presence of 50 ppb Cd, the stripping peak current of Pb is decreased to 18.99 % than the Pb detection alone. These results suggest that, Cd and Pb showed some quantitative interaction with bismuth film modified glassy carbon electrode.

Key Words: Glassy carbon, Bismuth film electrode, Anodic stripping voltammetry, In-situ, Ex-situ, Interaction of Cd –Pb

Index