Prof. S. Sudalaimuthu
Vice-Chancellor
Alagappa University
(Accredited with 'A' Grade by NAAC)

MESSAGE

I am very happy to note that the Department of Industrial Chemistry, School of Chemical Sciences is organizing a National Conference on "**Recent Advances in Textile and Electrochemical Sciences-2012** (RATES-2012)" and celebrating World Day for Water during March 22-23, 2012.

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 have made impressive growth 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 most appropriate that the School of Chemical Sciences has taken efforts to arrange this National Conference with invited lectures from eminent personalities 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 come out with many innovative ideas for the young researchers in the frontier areas.

I wish the Conference a grand success

20/3/12

Date: 20.3.2012 **(S. SUDALAIMUTHU)**

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SCHOOL OF CHEMICAL SCIENCES
Department of Industrial Chemistry
(DST FIST, DST PURSE and UGC SAP Assisted Department)

16.03.2012

Dr. P. MANISANKAR
Professor and Head

Message

I am very happy that our Department of Industrial Chemistry of Alagappa University is organizing a National conference on **RECENT ADVANCES IN TEXTILE AND ELECTROCHEMICAL SCIENCES (RATES-2012)** during March 22&23, 2012. Advancements in research activities on Textile and Electrochemical sciences attain greater momentum and reached hallmark in the era of scientific developments. 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. During the conference, the Department of Industrial Chemistry is also planning to celebrate **World Water Day 2012** with an important theme **Water and Food Security**. In this regard, it is most appropriate that the Department of Industrial Chemistry has taken efforts to arrange this National Conference and Celebration with invited talks from eminent personalities and paper presentations 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 to be in these frontier areas.

I wish the National Conference on RATES-2012 commendable success.

P. MANISANKAR

National Conference on
RECENT ADVANCES IN TEXTILE AND ELECTROCHEMICAL SCIENCES
(RATES-2012)
March 22-23, 2012
Department of Industrial Chemistry
ALAGAPPA UNIVERSITY
KARAIKUDI-630 003, TAMILNADU

Dr. T. Stalin
Convener

WELCOME TO THE DELEGATES

On behalf of the Staff and students of the Department of Industrial Chemistry, Alagappa University, Karaikudi, I am pleased to extend a hearty welcome to all the delegates of the National Seminar on Recent Advances in Textile and Electrochemical Sciences 2012(RATES 2012).

Though the conference announcement was at short notice, there was an overwhelming response. About 81 technical papers and 6 invited lectures were received during this short notice of time. These cover a wide range of topics and are programmed to be deliberated in 6 sessions Special care was taken to cover the various fields of Electrochemical and Textile Sciences.

I am delegated to the response received from academicians, scientists from R&D Institutions and Chemists from industries. The seminar would also provide a common platform to share their ideas/achievements of research into industrial applications to research into industrial applications to reach the common man and also help to establish a strong academic–research–industrial relationship. I hope that the conference will provide the unique opportunity for participants to interact and share the knowledge and experience.

I take this opportunity to acknowledge to the various organizations that have come forward to co-sponsor this event. I also thank the advertisers for their generous gesture.

I wish the delegates enjoyable and memorable stay at Karaikudi.

Dr. T. Stalin

ABOUT THE CONFERENCE

Advancements in research activities on Textile and Electrochemical sciences attain greater momentum and reached hallmark in the area of scientific developments. Textile industries are doing well and their export is in second position next to the IT field. Electrochemistry is a challenging as well as fascinating branch of Chemistry which is finding applications in almost all areas of Science and Technology. It is important for the researchers, educators and developers from academic institution and industries to know the research and recent developments that have been made on various aspects of Textile and Electrochemical Sciences.

The Department of Industrial Chemistry, Alagappa University, Karaikudi is organizing a National conference on to bring together. National experts from various academics, research institutions and industries on a common platform. The technical sessions of the conference consists of invited lectures by eminent speakers and oral presentation by researchers

ABOUT THE UNIVERSITY

Alagappa University has emerged from the galaxy of institutions initially founded by the great philanthropist and educationist. This university is reaccredited by. The 440 acre green and lush campus with all academic activities is having international collaborations. The post-graduate Departments and Centers in Science and Humanities in the University and other collaborative agencies offer quality education through regular and distance modes catering to the needs of around one lakh students. The University's motto is and the University keeps before it the vision of excellence in all spheres of its action.

ABOUT THE DEPARTMENT

The Department of Industrial Chemistry was established in 1985. It is offering M.Sc Chemistry (specialization in Textile Chemistry and Electrochemistry), M.Sc Chemistry, M.Phil and Ph.D in Chemistry. Research activities are in the fields of Electrochemistry, Materials Chemistry, Polymer Chemistry, Textile Chemistry, Supramolecular Chemistry, Green Chemistry and Solar cell applications. This Department has received funds to a tune of Rs. 7.31 crores for research projects from UGC, ICAR, AICTE, DST, CSIR, DRDO, DRDL, TNSCST & DCI, etc. This Department has also been recognized by UGC for Special Assistance Program (SAP) and by DST for FIST program. More than 1360 research papers have been published in International/National journals and presented in various conferences. The Department has more than 16 patents to its credit. The Department has conducted many refresher courses, two UGC innovative courses and National level conferences/workshops etc. The Department has undertaken many consultancy services to various industries.

SPECIAL THEME OF WORLD WATER DAY-2012

The World is exposed to a progressive and critical increase in water scarcity including climate change impacts. The seminar provided key messages and promising solutions to form the basis of the campaign for the World Water Day 2012, intended to draw the international attention on the relationships between water & food security.

RUST AREAS OF THE CONFERENCE

Electrochemistry
Materials Chemistry
Solar Cell Applications
Nano Chemistry
Computational Chemistry
Supramolecular Chemistry
Water Chemistry
Catalysis
Photo Chemistry
Textile Chemistry
Green Chemistry
Polymer Chemistry
Environmental Chemistry

ORGANIZING COMMITTEE

Patron : Prof. S. SUDALAIMUTHU
Vice-Chancellor, Alagappa University, Karaikudi.

Co-Patron : Dr. K. MANIMEKALAI
Registrar i/c, Alagappa University, Karaikudi

Co-Ordinator : Dr. P. MANISANKAR
Professor & Head, Department of Industrial Chemistry

Convener : Dr. T. STALIN
Assistant Professor, Department of Industrial Chemistry

Co-Convener : Dr. G. GOPU
Assistant Professor, Department of Industrial Chemistry

Members : Dr. G. PARUTHIMAL KALAIGNAN
Professor, Department of Industrial Chemistry

:Dr. H. GURUMALLESH PRABU
Professor, Department of Industrial Chemistry

: Dr. S. THAMBIDURAI
Assistant Professor, Department of Industrial Chemistry

:Dr. M. SUNDRARAJAN
Assistant Professor, Department of Industrial Chemistry

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Dr. N.S. Nagarajan, Gandhigram University, Dindigul

Dr. K. Krishnamoorthy, NCL, Pune

Dr. A. Subramania, Pondicherry University, Puducherry

PROGRAMME

March 22, 2012 Thursday 9.30 am

Time

9.30 am : Invocation

Tamil Thai Valthu followed by Vallal Valthu

Lighting Kuthuvilakku

9.40 am : Welcome Address : **Dr. P. MANISANKAR**
Professor & Head
Department of Industrial Chemistry
Alagappa University, Karaikudi.

9.50 am : Inaugural Address : **Prof. Dr. RUDOLF HOLZE**
Head of Electrochemistry Research group
Technische Universitat Chemnitz
Institute of Chemistry
D-09107 Chemnitz, Germany.

10.05 am : Thematic Introduction : **Dr. G. PARUTHIMAL KALAIGNAN**
Professor
Department of Industrial Chemistry
Alagappa University, Karaikudi.

10.10 am : Presidential Address : **Prof. Dr. S. SUDALAIMUTHU**
Vice-Chancellor
Alagappa University, Karaikudi.

10.25 am : Keynote Address : **Dr. MICHAEL NOEL**
Director
Water Institute
Karunya University, Coimbatore.

10.40 am : Vote of Thanks : **Dr. T. STALIN**
Convener, RATES-2012
Assistant Professor
Department of Industrial Chemistry
Alagappa University, Karaikudi.

10.45 am : High Tea

Technical Programme

Technical Session – I   Time: 11.00 to 13.00 hrs

Chair Person: : Dr. G. PARUTHIMAL KALAIGNAN
Professor, Department of Industrial Chemistry

IT 01: Electrocatalysis – relevance to electrochemical sensors
Dr. V. Yegnaraman , Department of Bioelectronics & Biosensors, Alagappa University, Karaikudi-630003. (Formerly) CSIR-Central Electrochemical Research Institute, Karaikudi-630006

IT 02 : High temperature polymer electrolyte membrane (ht-pem) fuel cells
Dr. G. Sasikumar , Dean (Research), SriVenkateshwara College of Engineering, Sriperumpudhur, Chennai-602 105.

OPE 1 Preparation and characterization of cu-polydiphenylamine nanocomposite coatings
S. Ramalingam[1], V.S. Muralidharan[2], A. Subramania[3 *]

OPE 2 Studies of carbon monoxide as fuel impurity on pem fuel cell performance
N. Nachiappan[1,] , G. Paruthimal Kalaignan [2] G. Sasikumar[3]

OPE 3 Electro-fenton decolorization of congo red optimization: a response surface modeling approach
Priyanka pandey, P. Manisankar*

OPE 4 Synthesis and characterization of nanosize polyaniline with benzalkoniumchloride
B. Mahalakshmi[1], G. Gopu[2], C.Vedhi[1]

OPE 5 A study on dna interaction of bis-amide copper (ii) complex using UV-Vis and cyclic voltammetry techniques
N. Raman*, R. Rajakumar

Lunch   Time: 13.00 to 14.00 hrs

Technical Session – II Time: 14.00 to 15.30 hrs

Chair Person: Dr. H. GURUMALLESH PRABU
Professor, Department of Industrial Chemistry

IT 03 : Water security and industrial development a case study of thirupur dye industry
Dr. Michael Noel, Water Institute, Karunya University, Coimbatore 641114

IT 04: Electrochemistry of psychosis drug action
Dr. V.S. Muralidharan, CSIR Emeritus scientist, Alagappa university, Karaikudi-630003.

OPE 6 Electrochemical noise (ECN) study of passive films formed on mild steel in simulated concrete pore solution medium
A. Sivasankar, SP. Manoharan, VS, Muralidharan*

OPE 7 Effect of sealing treatment on the corrosion resistance of phosphated steel
R.Mangaiyarkarasi**, C.Marikkannu*.

OPE 8 Effect of micro and nano particles in cement mortar
R. Nirmala[1], N. Saktheeswaren[1]* V. Sarasvathi[2]

OPE 9 Preparation of poly (methyl methacrylate) nanofiber membrane for dye-sensitized solar cells.
M. Sethupathy, K. Devi, V. Sethuraman, J. Aanandha Raj, P. Manisankar*

OPE 10 Electrodeposition of zinc-nickel alloy from alkaline non cyanide bath
K. Shanmugasigamani, PR. Thangavelu, KN. Srinivasan, M. Selvam

OPE 11 Corrosion behaviour of copper brazing in sulphide medium
C. Sudha, K. Muthuraman, G.T. Parthiban, N. Palaniswamy

OPE 12 Studies on surface for treatment for stainless steel 304l
S. Sadiq Batcha, J. Karthikeyan, S. Karpagamoorthy, K. Muthuraman,

G.T. Parthiban, N. Palaniswamy

OPE 13 Effect of solanum trilobatum-l extracts as safe corrosion inhibitor for mild steel in acid and neutral medium
A. Daniel Arulraj[1], M. Vijayan[2], V.S. Vasantha[3,*]

Tea : Time: 15.30 to 15.45 hrs

OPE 14 Electrochemicalanalysis -a potential quantitative technique for corrosion monitoring
R. Sudha, T.Gowrani

OPE 15 Nano level inhibitor film formation on the surface of mild steel dtpmp-spt-Zn^{2+} system in aqueous environment.
P. Manjla[1], K.N. Manonmani[2]*, S. Manimegalai[3]

OPE 16 Electrochemical studies of gold alloys in artificial sweat in presence of D-glucose
J. Lydia Christy[1], S. Rajendran[2*]

OPE 17 Performence of zinc anodes in simulated concrete environment.
J. Karthikeyan, S. Sadiq Batcha, S. Karpagamoorthy, K. Muthuraman,
G.T. Parthiban, N. Palaniswamy

OPE 18 Studies on corrosion behaviour of reinforcement steel in alkaline media.
S. Karpagamoorthy, S. Sadiq Batcha, J. Karthikeyan, K. Muthuraman,
G.T. Parthiban, N. Palaniswamy

OPE 19 Cathodic electrodeposition of epoxy/acrylic resin.
R. Nirai mathi[2],* S. Muthukrishanan[1]

OPE 20 Grass derived carbon as a low cost catalyst support for hydrogen gas generation (hydrogen energy from waste)
A. Anitha[1], P. Kalyani[2]

OPE 21 Three phase electrochemical cell for the oxidation of synthetic phenol solution at high dissolved solids condition
R. Boopathy, G. Sekaran

OPE 22 Gold nanoparticles decorated poly (3,4-ethylenedioxythiophene) thin film for high sensitive label-free electrochemical dna sensor
S. Radhakrishnan, J. Wilson, V. Dharuman

OPE 23 Electrochemical behaviour of cadmium ion on 2,5bis (4-methyl pipera-1-zyl methyl)1,4 hydroquinone modified wax impregnated graphite electrode
N. Ramalakshmi* B. Marichamy

Technical Session – III Time: 15.45 to 18.00 hrs

POSTER PRESENTATION : PPE1 to PPE20

Date : 23.03.2012

Technical Session – IV Time: 9.30 to 11:30 hrs

Chair Person: Dr. D. Velayutham, Sr. Principal Scientist & Head, Electro Organic Division, CECRI, Karaikudi

IT 05: Metal-semiconductor nanoparticles for solar energy conversion applications
Dr. Sambandam Anandan, Nanomaterials & Solar Energy Conversion Lab, Department of Chemistry, National Institute of Technology, Tiruchirappalli - 620 015, India

IT-06: Zno modified moo_3 nanostructures for gas sensing applications.
Dr.V.P. Mahadevan Pillai,[1 *], Navas Illyaskutty[1], Heinz Kohler[2],
[1]Department of Optoelectronics, University of Kerala, Kariavattom, Trivandrum-695581, Kerala, India.
[2]Institute for Sensorics and Information Systems, Karlsruhe University of Applied Sciences, Moltkestr. 30, D-76133, Karlsruhe, Germany.

OPE 24 Corrosion of steel rebars in composite cements under simulated conditions
A. Abisa Lydia Michael[1], K. Aarthi[1], V. Saraswathy[2]

OPE 25 Solar light induced catalytic activity of non-metal doped tio_2 on photodegradation of organic pollutant.
K. Gowthami Balashri[1], T.Sivakumar[1]*

OPE 26 Green chemistry
K. Kaleeswari

OPE 27 Visible active (solar light) nanocatalyst for the degradation of azo and zanthene dyes.
R. Jeyapriya[1] , J.Amala Infant Joice[1], T.Sivakumar[2]*

OPE 28 Investigation on the kinetics and mechanisms of sorptive removal of fluoride from water using cerium dispersed starch carbon (cdsc)
S. Murugesh[1], V. Sivsankar[2,] S. Rajkumar[2]

OPE 29 Tamarind fruits shell carbon: challenging scavengers of fluoride from drinking water
Rajkumarsubramanium[1*], S.M urugesh[2], V. Sivasankar[1]

OPE 30 Heterocatalytic fenton oxidation process for enhancing the efficiency of biological treatment of wastewater containing refractory organic compound
M. Ezhil Priya[2], S. Karthikeyan[1], A. B. Mandal[1], M. Velan[2], G. Sekaran[1*]

OPE 31 Catalytic application of o, n, o type chiral ligands synthesized from l-proline in

asymmetric michael reaction
Nallamuthu Ananthi,

OPE 32 Heterocatalytic fenton oxidation for the treatment of leachate from chemical industry cluster
S. Karthikeyan, P. Maharaja, A. B. Mandal, G. Sekaran*

OPE 33 Heterogeneous fenton oxidation for the treatment of industrial wastewater
P. Maharaja, A.B. Mandal , G. Sekaran

OPE 34 Photoinduced electron-transfer from benzimidazole to nano crystals
C. Karunakaran, J. Jayabharathi*, K. Jayamoorthy, P. Vinayagamoorthy

Tea **Time: 11.30 to 11:45 hrs**

OPE 35 A noval method for synthesis functionalized tetrahydro iso quinolines asi catalyzed a^3 coupling folowed by intra moleculcar palladium catalysed carbocyclisation
K. Balakrishnan[1], R. Venkatachalam[1], A. Nandakumar[1]*, P.T. Perumal[2],

OPE 36 Centrifugal spinning – a future fiber forming technology
L. Amalorpava Mary, T. Senthilram, V.R. Giri Dev*

OPE 37 Biodegradation of reactive orange 94, a textile dye by newly isolated staphylococcus sp. K
V. Karthikeyan[1], S. Sivanesan *

OPE 38 The role of ph and molecular structure of the dye molecule on textile waste water treatment in nf membrane
Thamaraiselvan Chidambaram*, Michael Noel

OPE 39 Adsorption behavior of methylene blue dye onto surface modified strychnos potatorum seeds
C. Senthamarai*[1], P. Senthil Kumar[2], S. Sivanesan[1]

OPE 40 Finishing of textiles using green technology
B. Aparna

OPE 41 Sol-gel synthesis of bactericidal mntio$_3$@zno core-shell nanospheres for photocatalytic degradation of dyes
C. Karunakaran*, P. Vinayagamoorthy, A.Vijayabalan

OPE 42 Thermal and antimicrobial finishing on textiles using green technology
V. Krishnaveni

Lunch **Time: 13.15 to 14.00 hrs**

Technical Session – V Time: 14.00 to 15:30 hrs

Chair Person: **Dr. S. Madhu,** UGC-Visiting Professor, Department of Industrial Chemistry

IT 07: Electroactive polymers for smart textiles

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

OPE 43 One pot multi-component synthesis of novel 2-amino -4h –chromenes using cyclic nucleophiles
B. Rasidha banu[1], R. Venkatachalam[1], P.T. Perumal[2],

OPE 44 Synthesis and characterization of nanosize polyaniline with benzalkoniumchloride
B. Mahalakshmi[1], G. Gopu[2], C.Vedhi[1]

OPE 45 Greener approach in the synthesis of silver nanoparticles
M. Anandan, H. Gurumallesh Prabu*

OPE 46 Antibacterial effect of cotton fabric using α-Fe_2O_3 nanoparticles – chitosan Composite.
AL. Kavitha H. Gurumallesh Prabu*

OPE 47 Synthesis of rutile tio_2-pani composite for dye degradation
K. Bharathi Yazhini, H. Gurumallesh Prabu*

OPE 48 synthesis of au nanoparticles stabilized by poly (*n*-vinyl-2-pyrrolidone) and preparation of polyaniline/au nanocomposite
P. Boomi, H. Gurumallesh Prabu*

OPE 49 A study on the synthesis of Tio_2
S. Clara Anthoniamma, H. Gurumallesh Prabu*

OPE 50 Green synthesis of gold nanoparticles using coleus aromaticus extract
RM. Ganesan, H. Gurumallesh Prabu*, S. Ananda Babu

OPE 51 Electrochemical behaviour of cadmium ion on 2,5bis (4-methyl pipera-1-zyl methyl)1,4 hydroquinone modified wax impregnated graphite electrode
N. Ramalakshmi* B. Marichamy

OPE 52 Single-phase mn_3o_4 nanoparticle synthesis via ionic liquid – assisted route
M. Ramalakshmi, M. Sundrarajan*

OPE 53 Ionic liquid (1-*n*-butyl-3-methylimidazolium hexafluorophosphate) assistedsynthesis of mgo nanoparticles by sol-gel method
R. Rajiv gandhi, J. Suresh, M. Sundrarajan*

OPE 54 Treatment and recycle of automobile wastewater by ozonation
S. Selvam, M. Sundrarajan*

OPE 55 Green synthesis of tio_2 nanoparticles using natural plant extract
S. Gowri, R. Rajiv gandhi, J. Suresh, M. Sundrarajan*

OPE 56 Spectral and electrochemical study of host-gust inclusion complex between 2, 4-dinitroaniline and β-cyclodextrin
K. Srinivasan, T. Stalin*

OPE 57 Effect of various concentration of iodide/ tri iodide redox couple for poly (ethylene oxide) based plasticized polymer electrolytes
K. Sakthivelu, T. Stalin*

OPE 58 Comparison study of solid polymer electrolyte for dye sensitised solar cell
C. Menaka, T.Stalin

OPE 59 SYNTHESIS AND CHARECTERISATION OF INCLUSION COMPLEXES OF ASOLUBLE CYCLODEXTRIN POLYMER WITH DAPSONE DRUG AND ITS IN-VITRO DRUG RELEASE
A. Shanmugapriya, T. Stalin*

OPE 60 Preparation of ph sensitive chitosan-g-poly(acrylamide)/ sodiumalginate composite hydrogel bead for controlled release of rifampicin
K. Pandiselvi, S. Thambidurai

OPE 61 Effect of ph on chitosan-zno nanostructure and its properties

S. Anandhavelu, S. Thambidurai

OPE 62 An amperometric biosensor based on enzyme immobilization onto conducting polymer for polyphenol antioxidants
V. Sethuraman, M. Sethupathy, J. AnandhaRaj, Priyanka Pandey,
P. Manisankar*

OPE 63 An efficient synthesis of 8-benzylaminoquinolines under solvent-free conditions
M. Subramanian[a*], C.Balamurugan[b], P.Vairamuthu[a], A.Manikumar[a],

OPE 64 Influence of thermo-oxidation on mechanical, surface and thermal properties of low density polyethylene (ldpe) film
B. Suresh, S. Maruthamuthu, V.S. Muralidharan

OPE 65 Energy transfer in exercise
Manizhagu,

OPE 66 Synthesis, Crystal Structure and Biological Evaluation of Copper(II) Complexes of Tetradendate Amine and its Schiff's Base
A. Jayamani, V. Tamilarasan, N. Sengottuvelen.

OPE 67 Application of physicochemical data for water quality assessment of watercourses in the karur municipality (south india)
K.K. Sivakumar,* M.S. Dheenadayalan

OPE 68 Spectral and electrochemical characteristics of dihyroxybiphenyl: effects of solvents, acid–base concentrations, preparation and characterization of solidcomplex with β-cyclodextrin and its inclusion effects
K. Paramasivaganesh[1], [2], T. Stalin*[1]

OPE 69 Spectroscopic and electrochemical studies of inclusion complexes of 2-naphthol with β-cyclodextrin nanocavity in aqueous and solid phases
R. Kavitha, T. Stalin*

OPE 70 Study of double layer capacitor based on pva and peo gel-fabric electrolyte
PR.Vijayalaksmi, G. Gopu*

OPE71 Comparison of double layer capacitors based on thin film, gel, gel -textile fabric electrolytes
N.Saranya, G. Gopu*

OPE 72 Preperation and characterization of PMMA/MWCNT based counter electrode for DSSC
K. Sathya, K.Sakthivelu, T.Stalin*

High Tea **Time: 15.30 to 15.45 hrs**

VALEDICTORY FUNCTION
March 23, 2012 Friday 3.45 pm

Time

3.45 pm : Invocation
Tamil Thai Valthu followed by Vallal Valthu
Lighting Kuthuvilakku

3.55 pm : Welcome Address : **Dr. P. MANISANKAR**
Professor & Head
Department of Industrial Chemistry
Alagappa University, Karaikudi.

4.05 pm : Presidential Address : **Prof. Dr. S. SUDALAIMUTHU**
Vice-Chancellor
Alagappa University, Karaikudi.

4.20 pm : Response of Participants

4.30 pm : Valedictory Address : **Prof. Dr. K. MUTHUCHELIAN**
Vice-Chancellor
Periyar University, Salem.

4.45 pm : Distribution of Certificates

4.50 pm : Report : **Dr. H. GURUMALLESH PRABHU**
Professor
Department of Industrial Chemistry
Alagappa University, Karaikudi.

4.55 pm : Vote of Thanks : **Dr. G. GOPU**
Co-Convener, RATES-2012
Assistant Professor
Department of Industrial Chemistry
Alagappa University, Karaikudi.

5.00 pm : National Anthem

IT 01

ELECTROCATALYSIS – RELEVANCE TO ELECTROCHEMICAL SENSORS

Dr. V. Yegnaraman
Department of Bioelectronics & Biosensors, Alagappa University, Karaikudi-630003
(Formerly) CSIR-Central Electrochemical Research Institute, Karaikudi-630006
Email: vyegna@rediffmail.com

Abstract

In the present era of scientific and technological advances, depletion of existing functional materials is a serious concern and poses a major R&D challenge. Deriving 'the maximum out of the minimum' has become the topmost criterion. In this scenario, the area of electrocatalysis which deals with the kinetics and pathways of electrochemical reactions to enhance the reaction yields has direct relevance to and impact on industrial processes. Electrochemical reactions, a major class of chemical reactions, play a vital role in industries such as the chlor-alkali, batteries and fuel cells, synthesis of organic, inorganic and polymeric compounds, water electrolysis, surface engineering, winning of metals and sensors. The electrochemical reactions occur at the electrode/electrolyte interface, which possesses unique advantageous characteristics such as, 1) ability for donating/accepting 'clean' electrons needed to bring about the chemical transformations, 2) very high electric field over the interface and 3) efficient pathway for extracting/storing electrical energy from fuels. Similar to heterogeneous catalytic reactions, electrochemical reactions are essentially surface reactions, which call for the development of novel, cost effective electrodes to offer efficient catalytic surfaces that will bring about significant reduction in reaction overpotentials (analogous to the reduction of activation energy of a chemical reaction) resulting in enhanced reaction yields. Sometimes, one observes electrocatalytic effect with the electrodes which exhibit significant increase in reaction yields (faradaic current) but show insignificant reduction in overpotential. R&D attempts to promote electrocatalysis include i) reconstruction of electrode surfaces ii) design of novel electrode geometries such as ultramicroelectrodes, iii) preparation of new generation electrodes based on supramolecules and nanosized materials and iv) development of novel methodologies such as

self-assembly, electroploymerization and derivatization for chemical modification of electrode surfaces to impregnate catalytically active agents like alloys, nanomaterials, polymers and composites. The design and preparation of novel and high efficiency electrocatalysts have necessitated the understanding of the various surface processes occurring on the electrodes. Electrochemical sensors require their sensing materials to exhibit excellent electrocatalytic activity for achieving high sensitivity and selectivity. Some aspects of research in this direction carried out in CSIR-CECRI and elsewhere will be discussed.

IT 02

HIGH TEMPERATURE POLYMER ELECTROLYTE MEMBRANE (HT-PEM) FUEL CELLS

Dr. G. Sasikumar
Dean (Research)
SriVenkateshwara College of Engineering, Sriperumpudhur, Chennai-602 105.
Email: sashi.energy@gmail.com

Abstract

Conventional Polymer electrolyte membrane (PEM) fuel cells are operated at a temperature of about ambient to 70-80°C only, due to the limitations of the currently available membranes. Nafion membranes which are commonly used in these PEM Fuel cells lose conductivity and mechanical strength as the temperature is raised above 80°C and at lower relative humidity, leading to performance and damage of fuel cells. The operation of PEM fuel cells at high temperatures offers many advantages. Special membranes have been developed, which enable operation of PEM Fuel cells at high temperature of 120-180°C and are called High Temperature Polymer Electrolyte Membrane Fuel Cells or HT-PEM Fuel cells. Some of the advantages of HT-PEM Fuel cells include i) improved carbon monoxide tolerance of the catalyst ii) enhanced electrode kinetics leading to improved performance iii) easier thermal management iv) better utilization of heat generated during fuel cell operation, for combined heat & power (CHP) applications, leading to increased system efficiencies. However, the operation of PEM Fuel cells at high temperatures leads to higher carbon support corrosion, lesser durability etc., and hence needs lot of research on materials development to address the above issues. The features of HT-PEM Fuel cells, recent advances, material issues and research needs for HT-PEM Fuel cells will be discussed during the presentation.

IT 03

WATER SECURITY AND INDUSTRIAL DEVELOPMENT A CASE STUDY OF THIRUPUR DYE INDUSTRY

Dr. Michael Noel
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Abstract

It was said that future wars will be fought for water. At least in South India we know that disputes have already started between the states. The scientific communities working in the area of water treatment as well as water management have to work together quite seriously to find solutions to these issues. Water is already scarce. Urbanization, Industry and modern agriculture not only use plenty of water but also generate larger volumes of contaminated water. A typical competition between water security and industrial development is the Thirupur dye industry. This paper attempts to highlight the technical issues of this industry. Noyyal river dam was constructed for agricultural development of the region. The textile dye industry which developed around Thirupur discharged millions of litres of water containing organic materials as well as inorganic salts everyday. The conflict of interest between agricultural community and textile industry has intensified the need for proper water treatment strategy and zero liquid discharge waste water treatment process. This paper brings out the present technical issues in this area.

IT 04

ELECTROCHEMISTRY OF PSYCHOSIS DRUG ACTION

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Abstract

In 1906, Charles Scott Sherrington coined the term “synapse” to describe the specialized gap that existed between neurons. Neurons communication can be by “refluxes”. Synaptic potentials are either excitatory or inhibitory. Excitatory post synaptic potential (EPSP) is a graded potential while inhibitory post synaptic potential (IPSP) occurs when synaptic input selectively opens the gate for positively charged potassium ions to leave the cell and negatively charged chloride ions to enter the cells. Ionic concentration alters membrane potentials and periodic production of action potentials is known as “spontaneous firing.” In 1930, Otto Lowei suggested chemical and electrical synapses. Electrical transmission is by dendrite to dendrite while chemical is by axon to dendrite. The gap between the synapses for electrical transmission is 3-20 nm while for chemical it is 20-30 nm .Currently the research is focused on dopamine and its influence on human behavior. A drug like methamphetamine alters the DA transmission either by entering DA vesicles in axon terminal or blocks the transport by pumping back into the transmitting neuron.The talk analyses the electron transfer through the synapses and the action of psychosis drugs.

Keywords: Electrochemical, dopamine, drug action

IT 05

METAL-SEMICONDUCTOR NANOPARTICLES FOR SOLAR ENERGY CONVERSION APPLICATIONS

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Abstract

Nanotechnology can be defined as the science and engineering involved in the design, synthesis and application of materials and devices on the nanometer scale. It is not in itself a single emerging discipline, but rather a meeting of several traditional sciences such as chemistry, physics, materials science, biology and engineering to bring together the required expertise needed to develop these new technologies. The unique properties of nanoscale materials provide benefits in remediation, pollution prevention, and efficient use of resources; however, the greatest contribution to green chemistry is likely to be the new manufacturing strategies available through nanoscience. So, the present lecture mainly focuses on the nanometer sized metal-semiconductor nanoparticles in order to assess its photocatalytic degradation ability of target pollutant (wastewater generated by textile industry) upon visible light irradiation. This is because; the wastewater generated by textile industry is rated as the most polluting source among all industrial sectors. Therefore, the degradation or mineralization of pollutants (dyes) has become an important matter of concern and more recently advanced oxidation processes (AOPs) are widely applied for the treatment.

IT 06

ZnO MODIFIED MoO_3 NANOSTRUCTURES FOR GAS SENSING APPLICATIONS

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Abstract

Doping/introducing foreign materials is a fundamental and significant tool in micro and nanoelectronics by which the physical and optoelectronic properties of semiconductors can be tuned continuously for various applications. Doped and binary molybdenum oxide one-dimensional (1D) nanostructures are particularly attractive among the transition-metal oxides due to their unusual chemistry produced by the multiple valence states and photo-, electro-, thermo-, and gaso-chromic properties. The present work aims to study the influence of ZnO incorporation on the crystallization, morphological and gas sensing properties MoO_3 nanostructures. Pure and ZnO (1, 3, 5, 10, 25 at. wt. %) added MoO_3 gas sensitive layers on alumina substrates (with inter-digitated electrodes) are realized in nanostructured form by RF magnetron sputtering and controlled post deposition annealing. The structural, compositional and morphological analyses are carried out by using XRD, micro-Raman, EDX and ESEM studies. The orthorhombic α-MoO_3 structure of the nanostructures is not altered by higher concentrations of ZnO, but ZnO induces oxygen vacancies in MoO_3 lattice. On the basis of our systematic analyses by XRD and micro-Raman, we propose a growth mechanism that derives from partial screw dislocations due to the strain effect induced by ZnO inorder to explain the drastic variation in the surface morphology persuaded by ZnO. The

four sensors are tested their sensitivity towards carbon monoxide (CO) at different concentrations in synthetic air under non-humid and humid conditions. The sensor test measurements are carried out in isothermal (200 and 300 ^{0}C) and thermocyclic (ramping between 100 and 320 ^{0}C) operations. Unlike to other metal oxides, the gas detection by MoO_3 mainly directs by the lattice oxygen rather than chemisorbed oxygen. The lattice oxygen from MoO_3 layer catalytically oxidizes the incoming analyte gas and simultaneously reduces. Hence, the change in conductivity is determined by the reduction of MoO_3 to non-stoichiometric levels. The sensors show very poor sensitivity at 200 ^{0}C towards the analyte gase, whereas the signal stability is better at 300 ^{0}C at humid as well as non humid conditions. The ZnO admixture has profound influence on the sensitivity towards these gases. The CTP results show that the ZnO: MoO_3 can be used as a sensing material for CO detection.

IT 07

ELECTROACTIVE POLYMERS FOR SMART TEXTILES

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Abstract

Smart 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.

OPE 01

PREPARATION AND CHARACTERIZATION OF Cu-POLYDIPHENYLAMINE NANOCOMPOSITE COATINGS

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Abstract

Polydiphenylamine (PDPA) nanoparticles were synthesized by a surfactant assisted dilute polymerization method and characterized by UV-Visible, FT-IR and cyclic voltammetry studies. The prepared PDPA nanoparticles were suspended in an acidified copper sulphate bath to prepare Cu-PDPA nanocomposite coatings by electrodeposition technique. X-ray diffraction analysis revealed that the crystalline structure of electrodeposited copper and Cu-PDPA nanocomposite coatings were crystalline fcc. Surface morphology of the composite coating showed uniform distribution of PDPA nanoparticles on the copper matrix. The Vickers microhardness result indicated that the microhardness of the Cu-PDPA composite coatings was much higher than the electrodeposited copper coating. Electrochemical impedance and polarization studies confirmed that the Cu-PDPA nanocomposite coatings were found to be more corrosion resistance than electrodeposited copper coating in 3.5% NaCl solution.

Keywords: Nanocomposites Cu-PDPA nanocomposites· Compositecoatings · Polydiphenylamine · Electrodeposition · Corrosion resistance.

OPE 02

STUDIES OF CARBON MONOXIDE AS FUEL IMPURITY ON PEM FUEL CELL PERFORMANCE

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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 vehicles, portable power and backup power. PEM fuel cell mainly consists of anode & 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, and may contain large amounts of impurities such as carbon dioxide, trace amounts of carbon monoxide etc. The studies on the effect of carbon monoxide 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 effect of carbon monoxide as fuel impurity on PEM fuel cell. The effect of various parameters such as carbon monoxide concentration, cell voltage, operating temperature etc. on cell performance and methods of CO poisoning mitigation were investigated.

Keywords: PEM fuel cells, Electrocatalyst, Carbon monoxide, Polarization Studies

OPE 03

ELECTRO-FENTON DECOLORIZATION OF CONGO RED OPTIMIZATION: A RESPONSE SURFACE MODELING APPROACH

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Abstract

The direct electro-degradation of industrial effluents has become an attractive method in recent existence. The decolorization of Congo red by Eelectro-Fenton technique is a green approach and contributed considerable advantages on top of solving problems without requirement of special equipment, and high efficiency in organic pollutant removal. By using response modeling (RSM) approach, we can improve the ability of Electro-Fenton technique and minimizing more solvent pollution. Batch experiments were optimized by RSM method; it was employed to assess individual and interactive effects on the main independent parameters on the decolorization efficiency. A four-factor central composite design (CCD) combined with RSM and optimization was employed for maximizing the dye removal by Electro-Fenton process based on 30 different experimental data obtained in a batch study. Four independent variables, viz. initial dye concentration (3.0-7.0 mg/l), electrode surface (9.0-15.0 cm^2), voltage (2.0-4.0 V) and electrolysis time (15-45 min.) were transformed to coded values and quadratic model was built to predict the responses. Analysis of variance (ANOVA) and t-test statistics were used to test the significance of the independent variables and their interactions. Adequacy of the model was tested by the correlation between experimental and predicted response and enumeration of predicted errors. Optimum conditions suggested by the second order polynomial regression model for attaining maximum decolorization were dye concentration 5.23 mg/L, electrode surface area 7.5 cm^2, voltage 3.5 V, and treatment time of 35.0 min.

Keywords: ANOVA, Congo red, Dye degradation, Electro-Fenton, Response Surface Modeling.

OPE 04

SYNTHESIS AND CHARACTERIZATION OF NANOSIZE POLYANILINE WITH BENZALKONIUMCHLORIDE

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Abstract

Polyaniline/benzalkonium chloride was synthesized in the aqueous solution of aniline (ANI) and cationic surfactant of benzalkonium chloride (BAC) by chemical method using $K_2S_2O_8$ as an oxidant. Various molar ratio of BAC was changed with 0.1 M ANI and prepared different concentration polymer, during this process BAC play as surfactant and dopant. The synthesized polymer were characterized by UV, FTIR, CV, SEM, TEM and electrochemical impedance spectroscopy measurements and the results are analyzed. The FTIR absorption band at 2800-3200cm $^{-1}$ assigned to aliphatic C-H stretching of long alkyl chain of BAC. The peak showed in 3600-3900cm^{-1} is due to presence of benzene ring of BAC. From FTIR spectral behaviour of polymer confirmed incorporation of BAC in PANI. UV-VIS spectra showed the band at 600nm due to n-π^* transitions of quinine-imine groups in polyaniline. The SEM analysis of polymer exhibits mixed granular flower like structure of doped nanosize polyaniline. EDAX analysis further confirmed the presence of BAC. Cyclic voltammetric behaviour also showed the oxidation peaks at 0.3067, 0.6763V and reduction peaks at 0.1428V and 0.4656V. The TEM behaviour also shows the formation of nanosized (100nm) polymer.

Keywords: Polyaniline, Benzalkoniumchloride, Cyclic voltametry, Morphology and Impedance

OPE 05

A STUDY ON DNA INTERACTION OF BIS-AMIDE COPPER (II) COMPLEX USING UV-VIS AND CYCLIC VOLTAMMETRY TECHNIQUES

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Abstract

Interaction of transition metal complexes with DNA has gained considerable current interest due to their various applications in many areas like chemical, biological and medicinal significance as potential artificial gene regulators (or) cancer chemotherapeutic agents. DNA is an important cellular receptor, many chemicals exert their antitumor effects by binding to DNA thereby changing the replication of DNA and inhibiting the growth of the tumor cells, which is the basis of designing new and more efficient antitumor drugs and their effectiveness depends on the mode and affinity of the binding. The studies of copper (II) complexes have been widely explored for the versatility of their coordination geometries, exquisite colors, technical application dependent molecular structures, spectroscopic properties and biochemical significance. Hence, in this work, a quatridentate bis–amide ligand, N, N'–propylenebis (salicyl amide) and its copper complex has been synthesized. It was characterized by elemental analysis, conductivity and magnetic susceptibility measurements, UV–Vis, IR, Mass spectral data and thermal analysis. All the evidences confirmed that the copper ion adopts octahedral geometry. DNA interaction behavior of the Cu(II) complex was studied by UV-Vis spectroscopy and cyclic voltammetry. The nature of binding is intercalative mode and calculated binding constant is in the range 10^4. The relative binding ability of Cu(I) over Cu(II) is 3.48.

OPE 06

ELECTROCHEMICAL NOISE (ECN) STUDY OF PASSIVE FILMS FORMED ON MILD STEEL IN SIMULATED CONCRETE PORE SOLUTION MEDIUM

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Abstract

Passive oxide films are formed on the mild steel rebar in alkaline media (pH-13) which gives corrosion protection to it. However, the chloride ion penetration causes the pitting attack by depassivation. This work studies the growth and depassivation of oxide films by electrochemical noise, impedance and UV-visible spectroscopy techniques. Oxide films were electrochemically grown by applying DC potential (-790 mV vs. SCE) for 3 hours. Cyclic voltammeteric study were undertaken at low scan rate of 100mV/min over the entire electrolyte stability domain which provides potential for redox processes between Fe/Fe^{3+}. Chloride ion attack on the various oxide films formed on the mild steel was studied by the power spectral density (PSD) data constructed using fast Fourier transform with a “hanning window” on current as well as potential noise. Optical absorption and diffuse reflectance spectra of oxide films on mild steel in OCP state showed the spectral bands at 290nm, 310nm and 430nm confirmed the electronic spectra of α-Fe_2O_3 in rhombohedral structure. When potential changed to -790mV vs. SCE diffuse reflectance spectra showed the broad spectra around 490nm which confirmed Fe_3O_4 formation.

Keywords: Passive oxide film, Electrochemical Noise, Power Spectral Density, UV-Spectroscopy

OPE 07

EFFECT OF SEALING TREATMENT ON THE CORROSION RESISTANCE OF PHOSPHATED STEEL

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Abstract

Phosphating is one of the most important chemical conversion treatment to improve the corrosion resistance, paint adhesion, wear reduction and as an absorbing layer for waxes, soap, oils, lacquers etc. However phosphate coatings are crystalline and porous and need a post-treatment after phosphating.Chromate post sealing is the well known practice and due to strict environmental regulations connected with the use of chromates, necessitate the development of chromate-free alternatives. Hence, attempts have been made to develop post-sealing treatments based on PANI, molybdate and compared with that of chromate sealing. In this investigation, the cold rolled steel has been phosphated in tri-cationic phosphating solution at 70c for 5 minutes and sealed in 0.1% of sealing solution at 50c for 1 minute and the corrosion resistance of the phosphated steel with and without post- sealing has been evaluated in 3.5% sodium chloride by chemical methods, linear polarization, potentiodynamic polarization, and AC impedance spectroscopy (EIS). Results of the study indicate that the corrosion resistance of the phosphated steel has been improved by the sealing treatments and comparable to that of chromate.

Key words: Conversion coating; chromate free coating; sealing; Polarization; EIS.

OPE 08

EFFECT OF MICRO AND NANO PARTICLES IN CEMENT MORTAR

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Abstract

Recently, Nano particles have been gaining increasing attention in many fields to fabricate new materials with novel functions due to their unique physical and chemical properties. It has been found that physical properties of mortar, particularly strength and permeability significantly depend on its pore structure. Ultra fine particles of Nano composites provide more homogenous distribution of hydrated products of concrete. This effect of micro and Nano particles enhances the durability of cement composites as well as the strength. In the present investigation, micro level materials such as Rice husk Ash(RHA) and marble powder as a replacement of cement and manufactured sand (M-Sand) quarry dust as a replacement of fine aggregate have been studied. In addition, influence of Nano particles on different properties of cement mortar was investigated with rice husk ash as a well known active pozzolan. Nano particles such as SiO_2, Al_2O_3, Fe_2O_3 of different percentage (0.25%, 0.5%, 0.75% and 1%) by weight of cement was replaced and their influence on Mechanical properties, chloride permeability, porosity, and corrosion resistant properties of the specimens were determined. Further, the grain structures were examined through Scanning Electron and X-Ray diffraction Analysis and TGA/DTA and Optical Microscopy.

OPE 09

PREPARATION OF POLY (METHYL METHACRYLATE) NANOFIBER MEMBRANE FOR DYE-SENSITIZED SOLAR CELLS.

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Abstract

Electrospun membranes of poly (methyl methacrylate) (PMMA) were fabricated with different concentrations of polymer solution and the optimum concentration arrived at was 10 wt %. The morphology of the electrospun membranes was observed by scanning electron microscopy. It consist of thin fibers with an average diameter of about 200 nm. The images revealed that the nanofibers showed uniform diameter and no bead formation was observed. Further, the ionic conduction, electrolyte uptake, thermal behavior, and functional group identification of the electrospun membranes were characterized. PMMA membrane showed an ionic conductivity of 0.50×10^{-3} Scm^{-1} at room temperature. Thermogravimetric analysis (TGA) was used to obtain the thermal properties of the materials, indicating the thermal stability of the fibers. Fourier transform infrared spectroscopy (FTIR) was utilized to identify the functional groups in the nanofibre. The results suggested that electrolyte uptake, ionic conduction and thermal behavior were improved for the PMMA electrospun nanofiber. Hence these nanofibre can very well be employed for the construction of dye-sensitized solar cells.

Keywords: Electrospinning, polymer electrolyte, PMMA, surface morphology, ionic conductivity.

OPE 10

ELECTRODEPOSITION OF ZINC-NICKEL ALLOY FROM ALKALINE NON CYANIDE BATH

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Abstract

Electroplating of alloys occupies an important position in the metal finishing field, as it offers favorable properties for decorative, protective and functional applications. The alloy composition decides the property of the deposit. Zn is widely used in industries as a protective coating for ferrous metals. But its excessive dissolution has lead to its restricted usage. So it is alloyed with Ni, making the alloy efficient and economical when put to use. The alloy plating of Zn-Ni offers the possibility of improved corrosion resistant. New environmental regulations over the world encourage the use of alternatives to cadmium plating for corrosion-protection systems used on steels. Zn-Ni alloy is gaining importance to replace Cadmium for most of the industrial applications. Hence the aim of this study was to optimize the bath for getting zinc nickel alloy deposition with nickel content in the range of 10-12 %.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 11% of Ni & 89% of Zn. 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. Deposited alloy contain 10-12 % nickel in the deposits. Addition of gelatin improves the brightness of the deposits and increases the bright deposit range. XRD results confirm the presence γ -phase of the alloy. Impedance and polarization studies revealed that CR of the deposit is more superior to zinc .Hence it is good replacement of cadmium for many industrial applications

OPE 11

CORROSION BEHAVIOUR OF COPPER BRAZING IN SULPHIDE MEDIUM

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Abstract

Electrochemical studies were carried out to understand corrosion control for brazed joints. The studies include Potentiodynamic polarization and electrochemical impedance test of brazed joints. The studies were carried out at a concentration of 0.8% sulphide at different temperatures (Room Temperature, 60˚C & 80˚C). The electrochemical parameters such as open circuit potential (mV), corrosion potential (E_{corr}, mV), corrosion current density ($I_{corr,}$ mA/cm²), anodic tafel slope (mV), cathodic tafel slope (mV), LPR (ohm.cm²) were determined from the polarization graph, Similarly the electrochemical impedance studies were carried out at open circuit potential (mV) and charge transfer resistance (ohm.cm²), double layer capacitance (farads) were determined. Corrosion potential shifted towards more negative values from -133.07 mV to -514.43 mV while corrosion current density increased from 0.0016405 mA/cm² to 0.0063436 mA/cm², as temperature increased. The result of impedance studies were obtained in the form of inquest plots. The charge transfer resistance (R_{ct}) decreased from 2066.5 ohm.cm² to 960.14 ohm.cm² with increase in temperature. These results lead to the inference that the corrosion resistance of brazing in sulphide medium decreases, as temperature increases.

OPE 12

STUDIES ON SURFACE FOR TREATMENT FOR STAINLESS STEEL 304L

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Abstract

Stainless tubes are fabricated by welding.The welded region is cleaned by picking and the tube is passivated for improving its corrosion resistance.However when the tube has smaller wall thickness, the damage caused by the pickling is severe. Electro polishing is an available alternative.however for thin walled tubes with length of 10m and an internal diameter <0.1m,electropolishing is very difficult to control. To overcome this problem,surface treatments have to be identified which clean and passivative the surface.Welded, unpickled and passivated SS3041 specimens were utilized for this study.The weld zone was non-uniform and hence developed staning with in few weeks. Several combinations of cleaning solutions were prepared and the stained specimens,their surface appearance and profile,and their electrochemical behaviour were characterized.The treatment with solution based on chromic acid with pH~1 yielded a surface that exhibited much superior corrosion resistance,equivalent to that obtained by pickling.

OPE 13

EFFECT OF SOLANUM TRILOBATUM-L EXTRACTS AS SAFE CORROSION INHIBITOR FOR MILD STEEL IN ACID AND NEUTRAL MEDIUM

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Abstract

The secondary metabolites of Solanum trilobatum-L was extracted from its leaves and their components were separated by column chromatography as Fraction-A and Fraction-B. The functional groups of the extracts were identified by FT-IR. The inhibition Efficiencies of the extracts were tested for mild steel in 0.1M HCl and 3% NaCl by potentiodynamic polarization and electrochemical impedance techniques. Plant extracts act as mixed type of inhibitors in all experimental conditions and Fraction-A has more I.E than crude extract and Fraction-B. The surface coverage and time constant for adsorption of extracts molecules are calculated using Rct and capacitance values.

Keywords: Solanum trilobatum-L, Inhibition Efficiency, Column Chromatography, Potentiodynamic Polarization.

OPE 14

ELECTROCHEMICALANALYSIS -A POTENTIAL QUANTITATIVE TECHNIQUE FOR CORROSION MONITORING

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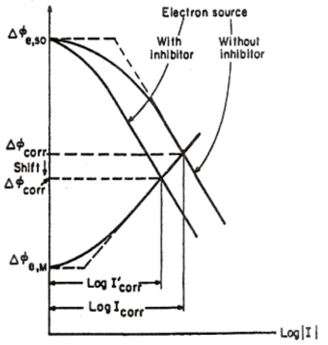
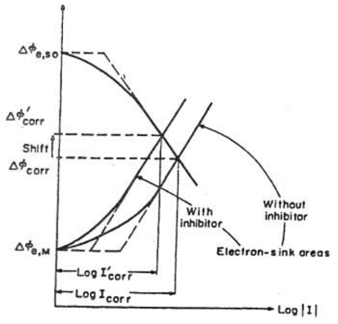
Abstract

Inhibition is diminution of the mean rate of chemical reactions and/or of physical process by material influence caused by one or more substances assembling in or near the phase boundary of two phases. Inhibitors are chemical substances which when added to the corrosive environment at an optimum concentration decreases the corrosion rate of metals or alloys. This paper deals with the electrochemical techniques how potentially help in quantifying corrosion inhibition process. The model diagrams are given for easy interpretation. The mechanistic aspects of corrosion inhibition will be investigated by electrochemical studies such as Polarization study and AC impedance study.



If an inhibitor adsorbs on electron source areas, the corrosion potential shifts in the negative direction.



If an inhibitor adsorbs on electron sink areas, the corrosion potential shifts in the positive direction.

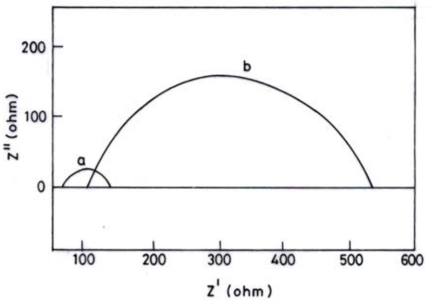


Fig.IV.15. A.C. Impedance curves of carbon steel immersed in various test solutions.
(a)Cl^- 60 ppm
(b)Cl^- 60 ppm+ 10 ppm Zn^{2+}+ 100 ppm DTPMP +100 ppm SM

OPE 15

NANO LEVEL INHIBITOR FILM FORMATION ON THE SURFACE OF MILD STEEL DTPMP-SPT-Zn^{2+} SYSTEM IN AQUEOUS ENVIRONMENT

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Abstract

Nanochemistry focusing on creating materials/systems/devices at the inanolevel in our experimental systems for getting excellent inferences. The inhibition efficiency of (IE) DTMMP-SPT -Zn^{2+}system in controlling corrosion of carbon steel in an aqueous solution containing 60 ppm of Cl- has been evaluated by weight loss method. Weight loss study reveals that the formulation consisting of 100 ppm 0f DTPMP (Diethylenetriaminepentamethylene Phosphonicacid) ,100 ppm of SPT(Sodium Potassium Tartrate) and 50 ppm of Zn^{2+} has 95% inhibition efficiency in controlling corrosion of carbon steel immersed in an aqueous solution containing 60 ppm of Cl-. Synergistic parameters suggested that a synergistic effect exists between inhibitor mixtures and $Zn^{2+.}$ Polarization study reveals that this system functions as mixed type of inhibitor controlling the cathodic reaction and anodic reaction to an equal extend. AC impedance spectra reveal that a protective film is formed on the metal surface. The FTIR spectra reveal that the protective film consists of Fe^{2+}-DTPMP-SPTcomplex.. Surface analysis by AFM (Atomic force microscope) reveal that a nano level surface coating is formed on the surface. In industrial cooling water systems phosphonic acid inhibitor mixtures are used to prevent scale formation by dissolved residues in water.

Keywords: Corrosion inhibition, carbon steel, green inhibitor, environmentally friendly inhibitor, phosphonic acid.

OPE 16

ELECTROCHEMICAL STUDIES OF GOLD ALLOYS IN ARTIFICIAL SWEAT IN PRESENCE OF D-GLUCOSE

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Abstract

Corrosion is a limiting factor preventing the development of economically or even technologically workable systems. Today the corrosion, billion dollar thief severely affects our environment in critical manner. Recent years have seen an increasing use of metal prosthetic devices in the body, such as pins, plates, hip joints, pacemakers, and other implants. New alloys and better techniques of implantation have been developed, but corrosion continues to create problems. Human sweat comes into contact with a number of consumer products. This results in a variety of undesirable effects such as corrosion and malfunction. In this study, corrosion behaviour of three metals, namely 22ct gold, 18ct gold and nickel-chromium alloy in artificial sweat (ISO 3160-2) in presence of D-glucose have been studied by electrochemical studies such as polarization study and AC impedance spectra. The study reveals that the decreasing order of corrosion resistance is Ni-Cr >>22ct gold>18ct gold.

Keywords: Corrosion of metals, electrochemical studies, polarization study, AC impedance spectra, artificial sweat, 22ct gold, 18ct gold and Ni-Cr alloy

OPE 17

PERFORMENCE OF ZINC ANODES IN SIMULATED CONCRETE ENVIRONMENT

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Abstract

The performance of zinc anode was assessed in simulated concrete Environment. This was done in order to study the feasibility of utilizing zinc anodes for sacrificial cathodic protection of steel reinforcement bars embedded in concrete.Zinc anodes were subjected potentio-dynamic polarization in simulated concrete environment containing different concentrations of chloride. The different electrochemical parameters were determined and their variation with chloride concentration was analyzed. To compare, samples of the steel reinforcement rods were subjected to identical test. The electrochemical data obtained, were compared with those exhibited by the zinc anode. The zinc anode maintained a driving voltage of 0.25V even at 3.5% chloride concentration. This indicates that the zinc anode can serve effectively to sacrificially protect the embedded steel from corrosion.

OPE 18

STUDIES ON CORROSION BEHAVIOUR OF REINFORCEMENT STEEL IN ALKALINE MEDIA

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Abstract

The corrosion behavior of steel reinforcement was assessed in simulated concrete environment. This was done in order to study the feasibility of sacrificial cathodic protection for steel reinforcement bars embedded in concrete.Steel reinforcements were subjected potentio-dynamic polarization in simulated concrete environment containing different concentrations of chloride. The different electrochemical parameters were determined and their variation with chloride concentration was analyzed. The electrochemical data obtained, were compared with those exhibited by the zinc anode. The steel remained cathodic to zinc anode at all concentration of chloride. The galvanic behaviour was confirmed by determining the limiting current density at different chloride concentrations.

OPE 19

CATHODIC ELECTRODEPOSITION OF EPOXY/ACRYLIC RESIN

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Abstract:

Cathodic electrophoretic coatings are well known for their corrosion protection. Epoxy/acrylic resin was prepared. Acrylic monomers namely methylmethacrylate, butyl acrylate and acrylic acid monomers were used. The solid epoxy resins and amines were reacted with acrylic resins and product was solubilised with organic acid. Cathodic electrodepositing was carried out on acid pickled mild steel panels. The P^H, concentration and deposition voltage of the bath were varied. The coatings properties were evaluated using accelerated and physical tests.

OPE 20

GRASS DERIVED CARBON AS A LOW COST CATALYST SUPPORT FOR HYDROGEN GAS GENERATION (HYDROGEN ENERGY FROM WASTE)

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Abstract

Energy is the basic necessity for human activity and socio-economic development. The amount of energy available to us determines not only our standard of living, but also how long we live. The world demand for energy is rapidly increasing due to population growth and to rising living standards. The criteria used to assess the various energy sources are their capacity, reliability, cost, safety, and effects on the environment. The world urgently needs a clean energy source that is able to meet world energy needs. Significant research is underway to test the feasibility of hydrogen to meet the world energy demand. Research efforts are being directed toward the transition to sustainable hydrogen based economy, which is a carbon-free energy system in which hydrogen is the only energy carrier. Hydrogen is thus recognized as the promising energy carrier for the future. Hydrogen is also ideal from an environmental standpoint—it burns without emitting air pollutants. Efficient, clean, abundant and renewable—hydrogen is clearly the energy source to power the world. Hydrogen is abundantly present in Nature; nearly 75% of the mass of the Universe & 1% of the earth's crust is made up of hydrogen. But being very reactive it is hardly present in the elemental form. Invariably it is stored in nature as water and hydrocarbons. One has to spend energy to generate hydrogen from either water or hydrocarbons. It is this extra cost that comes in the way of using hydrogen on larger scale. Water electrolysis is a fantastic technology for hydrogen generation in which noble metals; especially platinum based electrocatalysts (electrodes) are employed. Usage of Pt decreases the energy expended for the water electrolysis. Electrocatalysts rendered more number of active sites required for efficient electrolysis. But electrocatalysts are costly, hampering widespread commercialization of water electrolysers, So we have attempted to produce carbon support powders from cheap source namely biomass of GRASS.Thus, our work would represent an essential and innovative attempt to produce carbon powders from grass that may have electronic, scientific and industrial applications as conductive support for electrocatalysts for hydrogen gas generation through electrolysis of water. Our work establishes Green Energy –from-waste concept.

OPE 21

THREE PHASE ELECTROCHEMICAL CELL FOR THE OXIDATION OF SYNTHETIC PHENOL SOLUTION AT HIGH DISSOLVED SOLIDS CONDITION

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Abstract

Many studies have been carried out on the electro-oxidation of organic compounds and several anode materials have been tested. Electro-oxidation method has been successfully applied for the treatment of wastewater from textile industry, tannery, distillery, domestic sewage and also for landfill leachate. But, the treatment of organic content at high dissolved solids condition is very less. Hence, in this study, the synthetically prepared Phenol with high saline wastewater was oxidised using graphite as electrodes. In order to increase the electrical conductivity of the electrode the connecting port of the graphite has been copper coated by electro-coating method. And the electrolyte medium was packed with mesoporous activated carbon to render the complete organic oxidation. The various process parameters such as solution initial pH (5, 6 and 7); potential (2, 3 and 4 V); temperature (10, 20, 30, 40 and 50°C); and contact time (0-120 min) were examined for the reduction of COD. Further, the optimum conditions for the effective COD reduction were statistically optimised by Response Surface Methodology (RSM) using Design Expert software tool. Non-linear kinetic analysis and thermodynamic property was done for the soak liquor electrochemical oxidation of organic contents.

OPE 22

GOLD NANOPARTICLES DECORATED POLY (3, 4-ETHYLENEDIOXYTHIOPHENE) THIN FILM FOR HIGH SENSITIVE LABEL-FREE ELECTROCHEMICAL DNA SENSOR

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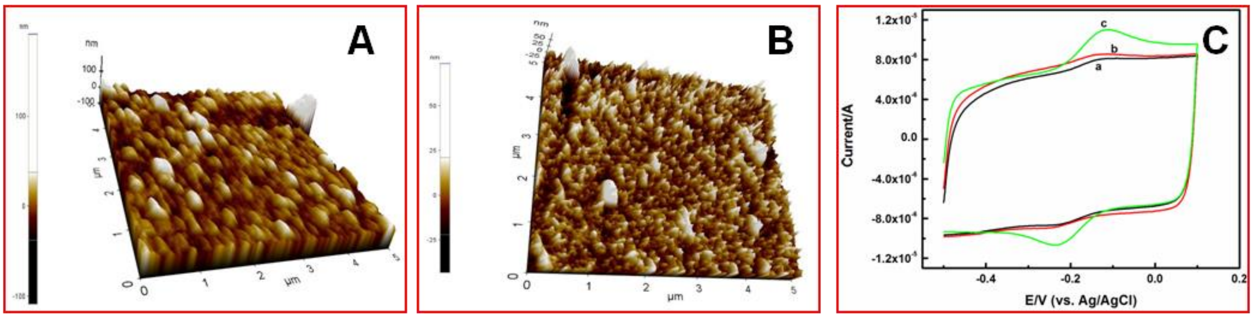
Abstract

Wide-scale genetic testing requires the development of easy to use, fast, inexpensive, miniaturized analytical devices, and there is an ever-increasing need for faster, cheaper, and simpler nucleic acid assays that would fully address the demands of modern medical diagnostics and biomedical research. In the present work we have prepared PEDOT thin film on Au electrode by electrochemical potential cycling method. Followed by gold nanoparticle was decorated over the PEDOT film by simple dipping method into the citrate stabilized gold nanoparticle solution, taking advantage of the interaction between Au metal and thiophene polymer backbone. This modified surface has been characterized by atomic force microscope (AFM), cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The gold nanoparticle modified conducting polymer substrate used for 5'-tholated capture probe DNA immobilization. Besides, the DNA modified substrate has been used for DNA hybridization discrimination study with different targets DNA (complementary, non-complementary and mismatched DNA). The proposed DNA sensor showed a good reproducibility and stability during repeated regeneration and hybridization cycles.



AFM images of (A) PEDOT, (B) PEDOT-Au and (C) Cyclic voltammogram of PEDOT (curve a), PEDOT-Au$_{nano}$ (curve b) and PEDOT-Au$_{nano}$-S-ssDNA modified electrode in PBS (pH 7.0) containing 50 µM Ruthenium hexamine.

OPE 23

ELECTROCHEMICAL BEHAVIOUR OF CADMIUM ION ON 2,5BIS (4-METHYL PIPERA-1-ZYL METHYL)1,4 HYDROQUINONE MODIFIED WAX IMPREGNATED GRAPHITE ELECTRODE

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Abstract

2,5bis (4-methyl pipera-1-zyl methyl) 1,4 hydroquinone was coated on wax impregnated graphite electrode(WIGE) by electrodeposition using cyclic voltammetry technique. The modified electrode was characterized by scanning electron microscopy (SEM), energy-dispersive X-ray analysis (EDX) and Cyclic Voltammetry. The pH study was performed for 1mM Cd^{2+} ion solution and the optimum pH 2 was found for analytical purpose. The electrochemical behaviour for Cd^{2+} ion on modified WIGE was studied by changing sweep rates and concentration of Cd^{2+} ion. The chronoamperometry and chronocoloumetry experiments for different concentrations of Cd^{2+} ion in 0.5M KCl medium shows that diffusion co-efficient values for Cd^{2+} ion are decreased with increasing concentration. The interference study on modified WIGE was performed by equimolar mixture of Cu^{2+}, Hg^{2+}, Pb^{2+} and Cd^{2+} ions. This shows that Hg^{2+} ion is highly interfered with Cd^{2+} ion. The detection limit of Cd^{2+} was found by cyclic voltammetry technique in the range of $1 \text{ X } 10^{-5}$M. s

OPE 24

CORROSION OF STEEL REBARS IN COMPOSITE CEMENTS UNDER SIMULATED CONDITIONS

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Abstract

Blended cements are being used worldwide to produce dense and impermeable concrete. These cements contain a blend of Portland cement clinker and a variety of natural pozzolans such as blast furnace slag, fly ash and silica fume. In the present investigation, three types of cements OPC, PPC and PSC were chosen. It is well known that blended cements proved to bind free chlorides present in concrete. Hence the present investigation aims at the use of composite cements (consists of both binary and ternary systems) on the corrosion performance of steel in concrete environments. Since the presence of pozzolan in PPC, slag in PSC and their combined influence with OPC expected to alter the corrosion resistant properties of steel in concrete. This paper investigates the influence of chlorides on the corrosion of steel in various composite cements. The corrosion performance of CTD and TMT rebars were evaluated in composite cements under different combinations using various electrochemical techniques such as Cyclic Polarization, Linear Polarization Resistance, Tafel Extrapolation and Electrochemical Impedence Spectroscopy. Surface analytical characteristics will be done by conducting XPS, SEM and Optical Microscopy.

OPE 25

SOLAR LIGHT INDUCED CATALYTIC ACTIVITY OF NON-METAL DOPED TIO_2 ON PHOTODEGRADATION OF ORGANIC POLLUTANT.

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Abstract

In the last few decades the development of the agrochemical industry has dramatically increased due to widespread intensive agricultural activities. The increased application of pesticides and its improper wastewater disposal methods are of particular concern for the freshwater (surface and groundwater), coastal and marine environments. It is estimated that less than 1% of all pesticides used in agriculture actually reach the crops. The remaining contaminates the land, the air and particularly the water .These contaminants are in many cases toxic and non-biodegradable and they tend to accumulate in the environment with unpredictable consequences. An ideal treatment method for pesticide wastes could achieve rapid and complete degradation to inorganic products and could be suitable for small scale treatment units. Our present study describes the photocatalytic decomposition and mineralization of thiamethaxam a systemic chloronicotinoid insecticide, using TiO_2 and non-metal doped TiO_2 nanoparticles. The photocatalytic degradation of thiamethaxam was carried out in the presence of F doped TiO_2, C doped TiO_2 and compared with the bare TiO_2. The photocatalysts were prepared by sol-gel method, calcined at various temperatures (200^{O}C to 600^{O}C) and were tested for their catalytic activity. It was found that the photocatalytic activity was dependent upon the calcination temperatures. The catalysts were characterized by XRD, FTIR, TEM, BET and UV-Vis DRS. The effects of various operating variables such as pH, concentration of the insecticide, amount of photocatalyst , and light sources of different wavelengths on the rate of degradation were studied and optimized and also the photocatalytic activity of the synthesized catalysts were studied under UV light irradiation and solar light irradiation. The progress of the reaction was observed and the degradation of thiamethaxam was found to be efficient with doped nano catalysts compared to the bare TiO_2. Further the TOC studies were also carried out.

Keywords: Insecticide, sol- gel synthesis, doped catalysts, photodegradation.

OPE 26

GREEN CHEMISTRY

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Abstract

The main problem we are experiencing day-to-day is the global warming and the green house effect. These problems are mainly due to the carbon-di-oxide and some of the other chemicals like sulphur-di-oxide, carbon monoxide, etc. The main aim of the green chemistry is to make the environment a safer place for the survival of all forms of organisms without getting affected by these hazardous things. The green chemistry involves twelve principles by which chemistry can be utilized for the betterment of our environment by going green. The treatment of the industrial effluent, which pollutes the aquatic life and kills them, and so to purify the available polluted water resources we can use the twelve principles in green chemistry to reduce the water scarcity.

Keywords: Principles of green chemistry, treatment of industrial effluents, methods to Minimize water scarcity, purification of water.

OPE 27

VISIBLE ACTIVE (SOLAR LIGHT) NANOCATALYST FOR THE DEGRADATION OF AZO AND ZANTHENE DYES.

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Abstract

Increasing environmental pollution from industrial wastewater in developing countries is of major concern. The degradation of organic pollutants has become the focus of the research efforts in today's scientific world. Textile dyes and other industrial dyestuffs constitute one of the largest groups of organic compounds that represent an increasing environmental danger. Heterogeneous photocatalysis has proven to be a useful treatment technique for the degradation of water pollutants over the last three decades. TiO_2 has been considered the most promising photocatalyst for the degradation of pollutants in air or water. In the present study, Nanocrystalline TiO_2 was prepared by sol-gel process. However, it shows poor absorption of visible light and requires ultraviolet (UV) light for activation. XRD analysis showed that TiO_2 contained mostly anatase peaks. In order to obtain titania as a visible light active photocatalyst with a decreased bandgap and to reduce the recombination of e^-/h^+ pairs, doping of metal(Ag) and non metal(N) has been done. The doped titania catalysts were characterized by XRD, SEM, UV-DRS and BET techniques. All the photocatalysts were tested for their photocatalytic activity towards the degradation of Azo (Amido black-10B) and Xanthene(Rhodamine-B) in multilamp photocatalytic reactor. The results shows that the doped titania calcined at 400ºC was found to be the best as it gives 100% degradation in a shorter reaction time. The effects of various operating variables such as pH, concentration of dyes, amount of photocatalyst, calcination temperature on the synthesis of catalyst on the rate of decolourization were studied and optimised. The degradation of organic substrate was evaluated by TOC analyser. To be effective the catalyst activity were studied under the solar light irradiation and the kinetics for the effective reaction was also studied.

Keywords: Dyes, photocatalysis, sol- gel synthesis, doping, degradation, TOC analyser.

OPE 28

INVESTIGATION ON THE KINETICS AND MECHANISMS OF SORPTIVE REMOVAL OF FLUORIDE FROM WATER USING CERIUM DISPERSED STARCH CARBON (CDSC)

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Abstract:

Fluoride is considered nutritious when it is present less than 0.5 mg/l in water but its excess presence causes dental and skeletal fluorosis. The removal of excess fluoride from water is carried out various methods. Among the various methods, adsorption is low cost and effective and a method of frequent choice by the researchers. The present work is contributed for fluoride removal from water using cerium dispersed starch carbon. In this study, cerium dispersed starch carbon (CDSC) was synthesized and attempted for the defluoridation studies. Fluoride removal efficiency of CDSC as a function of pH, Initial fluoride concentration, CDSC dose and co-ionic interference was investigated. The kinetic and thermodynamic models have been used to interpret the nature of the fluoride sorption onto CSDC. The characterization was done by SEM and XRD studies.

Keywords: Fluoride removal, CDSC, characterization studies.

OPE 29

TAMARIND FRUITS SHELL CARBON: CHALLENGING SCAVENGERS OF FLUORIDE FROM DRINKING WATER

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Abstract

Fluoride is an essential nutrient for the human body at low concentration. However the high concentrations of fluoride lead to dental, skeletal and non-skeletal Fluorosis. According to WHO, the maximum acceptable concentration of fluoride is 1.5 $mgL^{-1.}$ Drinking water is the main source of fluoride. Defluoridation of drinking water is the only workable way to overcome the problem of excessive fluoride in drinking water. The most commonly used methods for the defluoridation of water are adsorption, ion exchange, precipitation and electro dialysis. Among these methods adsorption is the most widely used. A large number of materials have been studied as adsorbents such as activated carbon prepared from tree bark, saw dust, rice husk, ground nut husk, clay char coal, carbon nano tubes etc., In this present study *Tamarindus Indica* fruit shells[TIFS] which contain calcium compound were carbonized at 400°C for 2 hours. The resulting material was characterized and used as adsorbent for the removal of fluoride from ground water. Batch studies on the fluoride scavenging efficiency of TIFSC with respect to contact time, pH, dose, initial fluoride concentration and co-ion interference were conducted. Different kinetic models (*viz,* pseudo-first order, pseudo-second order, intra particle diffusion and Elovich) and isotherm models were applied for their suitability. The practical applicability of TIFSC using field ground water samples was approved from the results obtained. The characterization of virgin and fluoride loaded TIFSC was done by SEM and XRD studies.

Keywords: Defluoridation, TIFSC, Characterization studies.

OPE 30

HETEROCATALYTIC FENTON OXIDATION PROCESS FOR ENHANCING THE EFFICIENCY OF BIOLOGICAL TREATMENT OF WASTEWATER CONTAINING REFRACTORY ORGANIC COMPOUND

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Abstract

The presence of toxic chemical pollutants in wastewater demands an integrated advanced oxidation process and biological treatment processes to achieve complete abatement of pollutants. The present study aims at the degradation of cresol, a refractory organic compound, by the heterogeneous Fenton oxidation followed by biological treatment. This research demonstrates the applicability of Mesoporous Activated Carbon (MAC) as a heterogeneous matrix in enhancing the Fenton oxidation process. The experiments were carried out under the batch as well as under the continuous operating conditions. The effect of pH, ratio of $FeSO_4$ to H_2O_2, time, concentration of cresol, mass of mesoporous activated carbon MAC (Mesoporous Activated Carbon) and temperature on the degradation of cresol were critically examined through batch processes. The quantitative removal of COD, BOD_5 and TOC by heterocatlytic oxidation of cresol was evaluated and observed to be more efficient than Homogeneous (conventional) Fenton oxidation. The kinetic and thermodynamic studies of the oxidation process were also carried out and the activation energy required for the oxidation of cresol was found to be reduced in the presence of MAC. The oxidation process was confirmed through Fourier Transform- Infra Red spectroscopy (FT-IR), NMR, UV-Visible spectrophotometry and cyclic voltammetry. The hetero-catalytically treated cresol was acclimatized to microbial consortium of domestic effluent origin. The acclimatized organisms were loaded to the aerobic biological reactor and performance evaluation of the reactor was carried out.

OPE 31

CATALYTIC APPLICATION OF O, N, O TYPE CHIRAL LIGANDS SYNTHESIZED FROM L-PROLINE IN ASYMMETRIC MICHAEL REACTION

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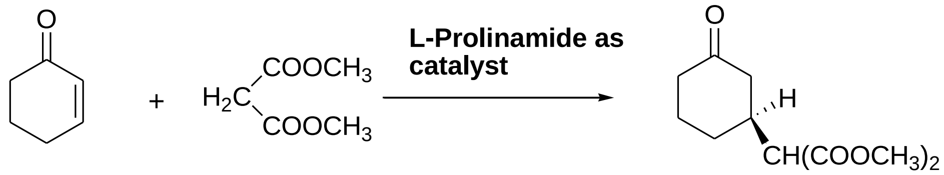
Abstract

Asymmetric Michael addition is an important carbon-carbon and carbon–hetero atom bond forming reaction. Michael addition reaction involves the attack of soft nucleophiles on α,β- unsaturated systems. It refers to the addition of carbanion to unsaturated systems in conjugation with an activating group. Various efficient chiral organocatalysts have been developed for the enantioselective Michael addition of aldehydes, ketones and 1,3-dicarbonyl compounds to generate chiral Michael adducts in high optical purity. Among the reported chiral catalysts in asymmetric Michael reaction, catalysts synthesized from amino acid L-Proline have occupied very less space in the literature. L-Proline and L-prolic amides, have been well identified as powerful catalysts to activate aldehydes or ketones via enamine or imine transition state. In this conference, I like to present the synthesis, characterization of chiral L-prolinamide synthesised from L-Proline and their application in catalytic asymmetric Michael reaction between malonic ester and cyclohexenone.



(*S*)-dimethyl 2-(3-oxocyclohexyl)malonate

The product (*S*)-dimethyl-2-(3-oxocyclohexyl) malonate was formed in high yield with 70% enantiomeric excess. The synthetic utility of the chiral ligand was explored by performing the asymmetric Michael reaction with various substituted benzaldehydes and heterocyclic aldehydes. The chiral products were formed in good yield with good enantiomeric excess. The reaction conditions were found to be mild. The mechanism favoring the formation of the particular enantiomer will also be discussed in detail.

OPE 32

HETEROCATALYTIC FENTON OXIDATION FOR THE TREATMENT OF LEACHATE FROM CHEMICAL INDUSTRY CLUSTER

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Abstract

An attempt was made in present investigation to study the degradation of organic pollutants in the leachate generated from secure landfill of chemical industry cluster by heterocatalytic Fenton oxidation process. Experiments were carried out under the batch as well as under the continuous operating conditions. The effect of time, pH, H_2O_2 concentration, $FeSO_4 .7H_2O$ concentration and the mass of mesoporous activated carbon on the degradation of organics in the wastewater were critically examined. The kinetic constants and the thermodynamic parameters for the oxidation of organics in wastewater were determined. The quantitative removal of COD, BOD and TOC from the wastewater were evaluated. The degradation of organics in leachate wastewater was confirmed through FT-IR, UV-Visible spectroscopy, and cyclic voltammetry.

Keywords: Heterogeneous Fenton Oxidation, leachate wastewater, Mesoporous activated carbon.

OPE 33

HETEROGENEOUS FENTON OXIDATION FOR THE TREATMENT OF INDUSTRIAL WASTEWATER

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Abstract

The present investigation to degradation of heterogeneous Fenton oxidation for the combination of high activity, low sludge production and the possibility of employing the system at low pH . The present work reports on the heterogeneous Fenton oxidation using Mesoporous Activated Carbon (MAC) on the oxidation of the organics of industrial waste water. The efficiency of the process was studied as a function of experimental conditions: Mass of MAC; H_2O_2 and FeSO4 concentration, all of which showed a strong effect on the reaction kinetics under the best experimental conditions: MAC = 7g/L; H_2O_2 dose = 7ml/L; and FeSO4 = 0.1 g/L, it was possible to remove about 80% of the initial COD, BOD, ammoniacal-N, Total Kjeldhal nitrogen. The analysis of the kinetic study suggests that the reaction is initiated by heterogeneous generation of free radicals on the MAC surface, but as soluble iron (III) and iron (II) species are released into the solution during the course of the reaction, a simultaneous homogeneous Fenton reaction step propagates and contributes to the overall reaction.

Keywords: Industrial wastewater, Heterogeneous Fenton reaction; MAC;

OPE 34

PHOTOINDUCED ELECTRON-TRANSFER FROM BENZIMIDAZOLE TO NANO CRYSTALS

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Abstract

The dynamics of photoinduced electron injection and energy transfer from benzimidazole to CuO, Fe_2O_3, WO_3 and Al_2O_3 nanoparticles respectively, has been studied by absorption, FT-IR, absorption and fluorescence spectroscopic methods. The association between nanoparticles and benzimidazole derivative was explained from both absorption and fluorescence quenching data [K_{app} = 2.11×10^6 M^{-1}(CuO); 4.11×10^6 M^{-1}(Fe_2O_3); 2.91×10^6 M^{-1}(WO_3) & 3.85×10^6 M^{-1}(Al_2O_3)]. There is good agreement between these values of K_{app} obtained from the data of fluorescence quenching with that determined from the absorption spectral changes which highlighted the validity of the association between benzimidazole and nanoparticles. The distance between the benzimidazole derivative and nanoparticles (r_0 ~3.12 nm) as well as the critical energy transfer distance (R_0 ~1.70 nm) has been calculated. By applying Rehm–Weller equation, the free energy change (ΔG_{et}) for electron injection has also been calculated.

OPE 35

A NOVAL METHOD FOR SYNTHESIS FUNCTIONALIZED TETRAHYDRO ISO QUINOLINES ASI CATALYZED A^3 COUPLING FOLOWED BY INTRA MOLECULCAR PALLADIUM CATALYSED CARBOCYCLISATION

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Abstract

An efficient stereo and regio selective silver iodide catalysed intra molecular hydroarylation of Tetrahydro Isoquinoline which provides a concise access to functionalized propargylamines in high yields has been developed a wide range of substrates possessing aromatic, aliphatic and hetero aromatic, alkene can be efficiently transformed into the targeted propargylamines irrespective of the nature of the substrate the cyclization follows highly stereo and regio chemistry.

Keywords: Palladium,AgI, Carbocyclization, regiochemistry, aldehyde, allkyne, amine.

OPE 36

CENTRIFUGAL SPINNING – A FUTURE FIBER FORMING TECHNOLOGY

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Abstract

Ultrafine fibres can play a pivotal role in various applications such as tissue engineering, drug delivery, gene targeting, fuel cells and filtration. Electrospinning is one of the most versatile and successive technique for the production of nanofibers by means of applying high voltage. Around the globe, research attempts are being made to produce nanofibres without applying high voltage. A novel spinning method has been developed in-house based on application of centrifugal force. In the present work, aligned and crimped Poly-caprolactone (PCL) fibers were successively produced using the developed centrifugal spinning set up and the morphology of fibres were studied by SEM, Optical microscopic images. The comparative study has been done with varying the parameters such as solution concentration, revolution per minute (rpm), fibre collecting modes and the effect of such variations with respect to fibre formations were examined.

Keywords- centrifugal force; nanofibre; poly-caprolactone; aligned fibres; crimped fibres

OPE 37

BIODEGRADATION OF REACTIVE ORANGE 94, A TEXTILE DYE BY NEWLY ISOLATED STAPHYLOCOCCUS SP. K2204

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Abstract

Soil samples collected from the vicinity of textile industry near Tiruppur, India were studied for screening and isolation of bacterial strains capable of degradation of textile dyes. A potential strain was selected on the basis of rapid dye degradation and later identified as *Staphlococcus* sp. K2204 using 16s rRNA sequence. An isolated bacterial strain is placed in the branch of *Staphlococcus* genus on the basis of 16s rRNA sequence and biochemical characteristics. From the experimental results, it is confirmed that *Staphlococcus* sp. K2204 showed 100% decolorization on Reactive Orange 94 (RO 94) dye at 40 ºC and pH 6.6 when compared to other Reactive Dyes like Reactive Blue 21, Reactive Yellow 160, Reactive Green 19A, Reactive Black HEBL, Reactive Brown 18, Reactive Red 152. The 100 mg/L of Reactive Orange 94 in nutrient broth was decolorized within 16 h. The biodegradation was monitored by Ultraviolet-visible spectroscopy (UV-vis), Fourier transforms infrared spectroscopy (FTIR) and High Pressure Liquid Chromatography (HPLC). The Gas chromatography–mass spectrometry (GC-MS) analysis indicated the specific degraded product of the dye. The *Staphlococcus* sp. K2204 strain is capable of degraded the textile dyes.

Keywords: Decolorization; Biodegradation; Reactive Orange 94; Staphylococcus sp.K2204

OPE 38

THE ROLE OF PH AND MOLECULAR STRUCTURE OF THE DYE MOLECULE ON TEXTILE WASTE WATER TREATMENT IN NF MEMBRANE

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Abstract:

Amidoblock 10B, Eosine Yellow and Azure-A containing SO_3^-, CO_3^- and S^+ ionic centers were subjected to membrane filtration using NF-270 membranes. Both stirred cell and flow cell filtration were evaluated in acidic (pH-3), actual (pH 4.7-6.4) and alkaline (pH-10) conditions. The synthetic dye wash solution employed was prepared by dissolving 0.050 gpl in 2000 ppm NaCl solution. The solution pH was found to influence the salt rejection, dye rejection and flux. These results are explained in terms of the dependence of solubility of dye molecules in water and the dependence of the charge of the membrane surface.Amidblock 10B contains a strong sulphonic acid group. This compound is highly soluble in acid, actual and alkaline pH conditions. Hence this molecule does not get adsorbed on membrane surface. Hence high flux rate high dye rejection and low salt rejection was noticed for this compound. Solubility of Eosine Yellow decreases in acidic pH due to the presence of weak carboxylic acid functional group. Hence, in acidic pH alone adsorption of this molecule on membrane and decrease in flux rate was noticed. Azure-A contain a positively charged S^+ functional group. In alkaline pH, the membrane is likely to carry (-ve) charge. Under this condition extensive dye adsorption and membrane fouling is noticed. These experimental results are presented and discussed in this paper.

OPE 39

ADSORPTION BEHAVIOR OF METHYLENE BLUE DYE ONTO SURFACE MODIFIED STRYCHNOS POTATORUM SEEDS

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Abstract

Kinetics, Equilibrium and Thermodynamics behaviour of adsorption of methylene blue (MB) dye onto surface modified *Strychnos potatorum* seeds (SMSP), in an aqueous solution were studied. Batch adsorption experiments were carried out to analyze the effect of initial solution pH, adsorbent dose, contact time, initial MB dye concentration and temperature on the removal of MB dye. The kinetics of MB dye adsorption onto SMSP follows a pseudo-second order kinetic model. The adsorption of MB dye onto SMSP was found to be controlled by both surface diffusion and pore diffusion. The effective diffusivity values were calculated from Boyd kinetic and Shrinking Core Model for varying initial MB dye concentration from 50 to 250 mg/L. The adsorption equilibrium data were fitted to different adsorption isotherm models such as Langmuir, Freundlich and Dubinin-Radushkevich. The equilibrium data fits best with the Freundlich adsorption isotherm model, which indicates multilayer adsorption of MB dye onto SMSP. Thermodynamic studies show that adsorption of MB dye onto SMSP follows an exothermic process.

Key words: Adsorption, Isotherms, Kinetics, Mechanism, Methylene blue, Thermodynamics

OPE 40

FINISHING OF TEXTILES USING GREEN TECHNOLOGY

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Abstract

The field of "green technology" encompasses a continuously evolving group of methods and materials, from techniques for generating energy to non-toxic cleaning products. Environmental technology or green technology is the application of one or more of environmental science, green chemistry and conserve the natural environment and resources, and to curb the negative impacts of human involvement. Sustainable development is the core of environmental technologies.In recent years, the population and environmental pollution cause various infections to human skin. Textile fabric and garments are also used to protect the patients from microorganisms. So, the Health care professionals have an increasing concern over exposure and transfer of various microorganisms that are commonly carried through bodily fluids. Microbial infestation poses danger to both living and non living matters. There is an undisputed need for effective barriers that will eliminate or reduce the risk of infection. The preventive methods and medicines to cure these diseases are mainly chemicals and sometimes their application leads to side effects and allergic reactions. These effects include the generation of unpleasant odor, stains and discoloration in the fabric, a reduction in fabric mechanical strength and an increased likelihood of contamination. The scientific reports reveal that textiles worn on the body cannot be kept hygienically fresh by washing alone. The solution to this problem lies in a durable hygienic protection finish. Now, there is a good deal of demand for the fabrics having functional/specialty finishes in general but antimicrobial finishes in particular to protect human being against microbes. Biquanides, phenols and their derivatives, isothiazolones, metals, ammonium compounds and alcohols serve as anti-bacterial agents producing side effects in many ways. So now the green technology is playing a vital role in replacing the chemicals with natural resources like medicinal plants and Chitin (extracted from shells of crabs and shrimps). In the present scenario of environmental consciousness, the research aims at developing an eco friendly natural antimicrobial finish from plant extracts for textile application, its extraction method, finish application, quantitative and qualitative tests and its end use in medical textiles.

OPE 41

SOL-GEL SYNTHESIS OF BACTERICIDAL $MnTiO_3$@ZnO CORE-SHELL NANOSPHERES FOR PHOTOCATALYTIC DEGRADATION OF DYES

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Abstract

Core-shell $MnTiO_3$@ZnO nanospheres have been synthesized by sol-gel method using polyethylene glycols (PEG 4000 & PEG 20000) as structure modifying agents. The synthesized nanomaterials have been characterized by powder X-ray diffraction (XRD) patterns, energy dispersive X-ray spectra (EDX), scanning electron micrographs (SEM) and photoluminescence (PL), UV-visible diffuse reflectance (DRS) and electrochemical impedance spectra (EIS). The XRDs reveal the ZnO shell and the PL, like that of ZnO, show near band gap and deep level emissions. The DRS, similar to that of bare ZnO, display band gap excitation under UV-A light. Both the synthesized core-shell nanospheres degrade dyes under UV-A illumination and inactivate bacteria such as E.coli in dark.

OPE 42

THERMAL AND ANTIMICROBIAL FINISHING ON TEXTILES USING GREEN TECHNOLOGY

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Abstract

Medical textiles are one of the most rapidly expanding sectors in the technical textile market. Textiles have been inseparable aspects in the evolution of Human Comfort. In the recent years, Comfort has become mandatory in medical textiles. Textiles with Multifunctional Finishes – Thermal Coolant and Antimicrobial Finishes are given to provide comfort to human beings. This project aims to provide thermal comfort and resistance to microbes particularly to Human eye This research work aims to provide a thermal comfort and resistance to microbial attack particularly to Human eye. The development of eye pillow with Coolant and Antimicrobial effect of finishes are achieved by using a selected eco friendly medicinal herb -Glycyrrhiza glabra (Yashtimadhu). The extraction of the herb is done by direct extraction method by using distilled water as the selected solvent among the other solvents like methanol, ethanol, chloroform, acetone and distilled water and it is applied on to the cotton fabric by pad – dry – cure method in an optimized process conditions. The mordant alum was used as a binding agent to fix the herbal extract on to fabric. The treated and untreated samples are tested in a standard testing method like ISO 11092- Thermal resistance, Wettability, Wickability, SEM, FTIR and Antimicrobial tests – AATCC 100, AATCC 147, AATCC 30 Agar Diffusion and Broth Dilution tests against Staphylococcus aureus. The 50% concentration of Glycyrrhiza glabra treated fabric showed the best coolant and antimicrobial activity and it had a good natural dyeing property with an excellent yellow shade. It also showed good resistance to washing up to 12-18 cycles.

OPE 43

ONE POT MULTI-COMPONENT SYNTHESIS OF NOVEL 2-AMINO -4H –CHROMENES USING CYCLIC NUCLEOPHILES

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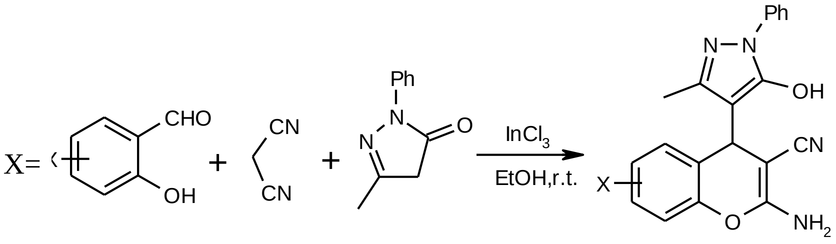
Abstract

The conventional procedures in organic synthesis utilize stepwise formation of individual bonds and therefore require many synthetic steps. In contrast to such multistep processes, one-pot transformations based on multicomponent reactions have gained great importance in modern organic synthesis. The focal theme is the exploration of new multicomponent reactions involving Malononitrile. A simple and convenient method for the one-pot three-component synthesis of 3-pyranyl indoles has been accomplished by tandem Knoevenagel–Michael reaction of 3-cyanoacetyl indole with various aromatic aldehydes and malononitrile catalyzed by $InCl_3$ in ethanol under reflux conditions.

2-Aminochromenes are widely employed as pigments, cosmetics, potential agrochemicals and represent an important class of chemical entities being the main constituents of many natural products. Fused chromenes exhibit a wide spectrum of biological applications such as antimicrobial, antiviral, mutagenic, antiproliferative, sex pheromone, antitumor and central nervous system activities.

Synthesis of 2-amino-4-pyrazol-4-yl-4*H*-chromenes



OPE 44

SYNTHESIS AND CHARACTERIZATION OF NANOSIZE POLYANILINE WITH BENZALKONIUMCHLORIDE

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Abstract

Polyaniline/benzalkonium chloride was synthesized in the aqueous solution of aniline (ANI) and cationic surfactant of benzalkonium chloride (BAC) by chemical method using $K_2S_2O_8$ as an oxidant. Various molar ratio of BAC was changed with 0.1 M ANI and prepared different concentration polymer, during this process BAC play as surfactant and dopant. The synthesized polymer were characterized by UV, FTIR, CV, SEM, TEM and electrochemical impedance spectroscopy measurements and the results are analyzed. The FTIR absorption band at 2800-3200cm $^{-1}$ assigned to aliphatic C-H stretching of long alkyl chain of BAC. The peak showed in 3600-3900cm^{-1} is due to presence of benzene ring of BAC. From FTIR spectral behaviour of polymer confirmed incorporation of BAC in PANI. UV-VIS spectra showed the band at 600nm due to n-π^* transitions of quinine-imine groups in polyaniline. The SEM analysis of polymer exhibits mixed granular flower like structure of doped nanosize polyaniline. EDAX analysis further confirmed the presence of BAC. Cyclic voltammetric behaviour also showed the oxidation peaks at 0.3067, 0.6763V and reduction peaks at 0.1428V and 0.4656V. The TEM behaviour also shows the formation of nanosized (100nm) polymer.

Keywords: Polyaniline, Benzalkoniumchloride, Cyclic voltametry, Morphology and Impedance

OPE 45

GREENER APPROACH IN THE SYNTHESIS OF SILVER NANOPARTICLES

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Abstract

Silver nanoparticles (AgNPs) was synthesized from $AgNO_3$ by greener method using plant material *Cissus quadrangularis* twig. Fresh twig was collected from the plants in the University garden. The collected twig was used for the extraction. The extraction was carried out at different thermal condition (at room temperature, at 60°C and at 100°C). The extracts thus obtained were used as green chemical reducing agent as well as stabilizing agent. The reaction mixture containing the extract and $AgNO_3$ solution was varied to specific pH. The UV-Visible absorbance (Surface Plasmon Resonance) of the reaction (between Ag^+ ions and extract of *Cissus quadrangularis*) mixture was monitored and the formation of silver nanoparticles was confirmed by the SPR band. The XRD results also confirm the presence of AgNPs. The reduction of $AgNO_3$ to Ag^0 using *Cissus quadrangularis* twig is considered to be a greener approach.

Key words: AgNPs, Greener synthesis, *Cissus quadrangularis*, SPR.

OPE 46

ANTIBACTERIAL EFFECT OF COTTON FABRIC USING α-Fe_2O_3 NANOPARTICLES - CHITOSAN COMPOSITE

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Abstract

α-Fe_2O_3 nanoparticles were prepared by self assembly method. Chitosan was prepared from the crab shell. α-Fe_2O_3 nanoparticle-chitosan composite was prepared. Synthesized materials were characterized by XRD and SEM analyses. XRD confirmed the α-Fe_2O_3 crystal structure and average particle size of 27 nm. SEM and AFM images were obtained to observe the morphology of the α-Fe_2O_3 nanoparticles. The α-Fe_2O_3 nanoparticles, α-Fe_2O_3 nanoparticle-chitosan composite were coated on cotton fabric. The coated cotton fabrics were characterized by SEM. The antibacterial activity of α-Fe_2O_3 nanoparticles, α-Fe_2O_3 nanoparticles-chitosan composite coated cotton fabric was tested with *Escherichia coli*. Higher antibacterial activity was observed for α-Fe_2O_3 nanoparticle-chitosan composite coated fabric.

Keywords: α-Fe_2O_3 nanoparticles, chitosan, synthesis, characterization, cotton.

OPE 47

SYNTHESIS OF RUTILE TIO_2-PANI COMPOSITE FOR DYE DEGRADATION

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Abstract

Rutile TiO_2 was prepared by hydrolysis method using ethanolic $TiCl_4$ as precursor. Aniline was used to prepare PANI by in-situ chemical polymerization. TiO_2/ PANI composite was prepared by thermosolvolysis method. The prepared powder was characterized by XRD analysis and average particle size was calculated as 22 nm. The formation of TiO_2/PANI composite was also verified by FT-IR spectrum by the observation of shift of peak corresponding to pristine PANI. SEM images of TiO_2 and TiO_2/PANI composite showed flake like structure. TiO_2/PANI composite was subjected to photo-catalytic degradation of cationic dye (Methylene Blue). The degradation efficiency of TiO_2/ PANI composite on dye was monitored by UV-Vis spectrophotometer. The results revealed that the TiO_2/PANI composite has shown as efficient catalyst.

Keywords: TiO_2/ PANI, Photocatalyst, Methylene Blue, Degradation.

OPE 48

SYNTHESIS OF AU NANOPARTICLES STABILIZED BY POLY (*N*-VINYL-2-PYRROLIDONE) AND PREPARATION OF POLYANILINE/AU NANOCOMPOSITE

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Abstract

Poly (*N*-vinyl-2-pyrrolidone) stabilized gold colloidal solution was synthesized by chemical method from a mixture of $HAuCl_4$ with methanol. Pristine polyaniline and polyaniline/Au nanocomposite were prepared by chemical method. The formation of AuNPs was confirmed by surface plasmon resonance at 530 nm. The polyaniline and polyanilie/Au nanocomposite were subjected to absorption analysis with UV-vis spectrophotometer. The absorption peaks due to benzenoid and quinoid rings of polyaniline was observed as broad peaks in polyanilie/Au nanocomposite. From the X-ray diffraction analysis, the average particle size of 42 nm was calculated for polyaniline/Au nanocomposite. The formation of polyaniline/Au nanocomposite was also verified by FT-IR spectrum by the observation of shift of peak corresponding to pristine polyaniline.

Keywords: Polyaniline/Au nanocomposite, Synthesis, Characterization.

OPE 49

A STUDY ON THE SYNTHESIS OF TIO_2

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Abstract

TiO_2 is an important photocatalyst owing to its strong oxidizing power, non-toxicity and long-term photostability. The catalytic activity of TiO_2 is dependent on its specific surface area, which is certainly dependent on the crystal size. This work has been focussed on synthesizing TiO_2 by using Titanium tetraiso-propoxide (TTIP) and 0.1M nitric acid. TTIP (1 ml) was added to nitric acid (20 ml) and stirred vigorously for 5 h at 70^oC. The solution was kept under ageing for 12 h, filtered and the powder obtained was dried at room temperature without calcination step. The synthesized TiO_2 powder was then characterized using XRD and SEM analyses. XRD result confirmed the presence of anatase TiO_2 in the amorphous form with average particle size of 70 nm. SEM analysis showed clustered spherical morphology. The crystallinity of TiO_2 synthesized was improved on ageing for a week.

Keywords: TiO_2, amorphous, anatase, photocatalyst.

OPE 50

GREEN SYNTHESIS OF GOLD NANOPARTICLES USING COLEUS AROMATICUS EXTRACT

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Absract

Greener synthesis of gold nanoparticles (AuNPs) from auric chloride using *Coleus aromaticus* leaf extract was experimented. Preparation of *Coleus aromaticus* aqueous extract was performed at three different thermal conditions such as room temperature, 60°C and 100°C. The reaction between the solution of auric chloride and *Coleus aromaticus* aqueous extract was regularly monitored by UV-Visible spectroscopy with SPR band at 580 nm. The synthesized gold nanoparticles was found to be fcc phase by XRD analysis, which were indexed at 111, 200, 220 and 311 planes. Spherical shape was identified and confirmed by SEM images and EDX spectrum for gold nanoparticles.

Key words: Auric chloride, AuNPs, *Coleus aromaticus,* Green synthesis.

OPE 51

ELECTROCHEMICAL BEHAVIOUR OF CADMIUM ION ON 2,5BIS (4-METHYL PIPERA-1-ZYL METHYL)1,4 HYDROQUINONE MODIFIED WAX IMPREGNATED GRAPHITE ELECTRODE

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Abstract

2,5bis (4-methyl pipera-1-zyl methyl) 1,4 hydroquinone was coated on wax impregnated graphite electrode(WIGE) by electrodeposition using cyclic voltammetry technique. The modified electrode was characterized by scanning electron microscopy (SEM), energy-dispersive X-ray analysis (EDX) and Cyclic Voltammetry. The pH study was performed for 1mM Cd^{2+} ion solution and the optimum pH 2 was found for analytical purpose. The electrochemical behaviour for Cd^{2+} ion on modified WIGE was studied by changing sweep rates and concentration of Cd^{2+} ion. The chronoamperometry and chronocoloumetry experiments for different concentrations of Cd^{2+} ion in 0.5M KCl medium shows that diffusion co-efficient values for Cd^{2+} ion are decreased with increasing concentration. The interference study on modified WIGE was performed by equimolar mixture of Cu^{2+}, Hg^{2+}, Pb^{2+} and Cd^{2+} ions. This shows that Hg^{2+} ion is highly interfered with Cd^{2+} ion. The detection limit of Cd^{2+} was found by cyclic voltammetry technique in the range of 1×10^{-5}M. s

OPE 52

SINGLE-PHASE Mn_3O_4 NANOPARTICLE SYNTHESIS VIA IONIC LIQUID – ASSISTED ROUTE

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Abstract

A new class of Mn_3O_4 nanoparticle is synthesized using 1-n-butyl-3-methylimidazolium trifluoromethane sulfonate [BMIM] [TfO] ionic liquid assisted green synthesis method at room temperature. The thermal behavior, phase structure, morphology and magnetic properties of the samples are characterized by Thermogravimetric Analysis (TGA), X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FT-IR), Field Emission Scanning Electron Microscopy (FESEM) and Vibrating Sample Magnetometer (VSM) studies. The phase pure Mn_3O_4 nanocrystals with 40 nm narrow particle size distribution are obtained with the significant influence of ionic liquid. The synthesized Mn_3O_4 nanoparticles show the superparamagnetic behavior.

Keywords: Nanostructured materials, Magnetization, Mn_3O_4, Superparamagnetism

OPE 53

IONIC LIQUID (1-*N*-BUTYL-3-METHYLIMIDAZOLIUM HEXAFLUOROPHOSPHATE) ASSISTED SYNTHESIS OF MGO NANOPARTICLES BY SOL-GEL METHOD

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Abstract

Nanocrystalline MgO nanoparticles in cubic phase structure were synthesized via sol-gel process using 1-*n*-butyl-3-methylimidazolium hexafluorophosphate (BMIM PF_6^-) ionic liquid. The sol-gel products ($Mg(OH)_2$) were annealed at 300 ºC for 2 hours. The annealed products were systematically investigated by X-Ray Diffraction (XRD) and Scanning Electron Microscope (SEM). XRD pattern convey the purity, crystallinity and the mean particle size of the particles. SEM images evidence well defined surface morphology with particles in discrete state. Our experimental showed that the special characteristics of ionic liquid played a significant role to produce controlled size isomeric nanoparticles with distinct morphologies. The reported method, which is performed in ionic liquid under sol-gel condition, is friendly to environment and which opens a new window to improve the physico-chemical properties of MgO nanoparticles.

Keywords: ionic liquid, sol-gel, MgO nanoparticles, capping agent.

OPE 54

TREATMENT AND RECYCLE OF AUTOMOBILE WASTEWATER BY OZONATION

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Abstract

Automobile water service workshop wastewater was collected from M/s Nithya motors, Authorized agent for Hero motors, Karaikudi. The collected waste water was effectively treated by ozonation at 2.5gpl concentration of ozone gas. The maximum decolonization has achieved at 6 minutes. The untreated and treated waste water were analyzed for pH, conductivity, TDS, TSS, sulfate, chloride and COD. In addition the Oil and Grease level also analyzed. The treated wastewater was recycled for automobile water service.

Keywords: Waste water, oil, grease, ozonation, recycle, treatment

OPE 55

GREEN SYNTHESIS OF TIO_2 NANOPARTICLES USING NATURAL PLANT EXTRACT

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Abstract

Development of green nanotechnology is generating interest of researchers toward eco-friendly biosynthesis of nanoparticles. The need for environmental non-toxic synthetic protocols for nanoparticles synthesis leads to the developing interest in biological approaches which are free from the use of toxic chemicals as by-products, use of external agents and environmental hazards. Titanium dioxide (TiO_2) is an n-type semiconductor, a very interesting material was synthesized by a simple, cost effective and environmental friendly route using titanium tetrachloride and ethanolic leaf extract of *nelumbo nucifera* (lotus). TiO_2 nanoparticles were prepared via titanium hydroxide precipitation by vigorous stirring at 60°C followed by thermal decomposition at 700°C. TiO_2 nanoparticles are characterized by X-ray diffraction (XRD) and scanning electron microscopic (SEM) analysis. TiO_2 nanoparticles demonstrating the XRD pattern which is in good agreement with the JCPDS No.21-1272. SEM images demonstrated the morphology of spherical shape with fine agglomerated particles and average size were in the range of 100-200nm. The low cost of this method of synthesis as well as its simplicity and efficiency offers an alternative to chemical synthetic methods of TiO_2 nanoparticles.

Keywords: Green synthesis, TiO_2, *nelumbo nucifera*, XRD, SEM

OPE 56

SPECTRAL AND ELECTROCHEMICAL STUDY OF HOST-GUST INCLUSION COMPLEX BETWEEN 2, 4-DINITROANILINE AND β-CYCLODEXTRIN

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Abstract

The formation of host-guest inclusion complex of 2, 4-Dinitroaniline(2,4-DNA) with nano-hydrophobic cavity of β-cyclodextrin (β-CD) in solution phase were studied by UV-visible spectrophotometer and electrochemical method (cyclic voltammetry, CV). The prototropic behaviors of 2, 4-DNA with and without β-CD was studied by Spectro photometrically. 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-DNA was confirmed by ^{1}H NMR, FT-IR, XRD and SEM analysis. A schematic representation of this inclusion process is proposed by computational molecular docking studies using patch dock server.

Key words: β-Cyclodextrin, 2, 4-Dinitroaniline, Inclusion complex, Patch dock server

OPE 57

EFFECT OF VARIOUS CONCENTRATION OF IODIDE/ TRI IODIDE REDOX COUPLE FOR POLY (ETHYLENE OXIDE) BASED PLASTICIZED POLYMER ELECTROLYTES

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Abstract

Plasticized polymer electrolyte films containing poly ethylene oxide (PEO) –KI and NaI/I_2 with different plasticizers are prepared by solvent casting technique. The prepared electrolytes salt complexation is confirmed by X-ray diffraction and FT-IR analyses. The ionic conductivity of the electrolytes is determined by AC impedance studies. Thermal stability and the surface morphology of the plasticizers polymer electrolytes are examined by using thermo gravimetric/differential thermal analysis and scanning electron microscope respectively. The highest ionic conductivity is 4.9×10^{-3} Scm^{-1} has been observed among the plasticizers by AC impedance.

Key words: Poly (ethylene oxide), plasticizers, KI, polymer electrolytes.

OPE 58

COMPARISON STUDY OF SOLID POLYMER ELECTROLYTE FOR DYE SENSITISED SOLAR CELL

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Abstract

A comparison of solid Polymer electrolyte based on PMMA for dye sensitised solar cell (DSSC) was prepared by solution casting method. In the first method PMMA worked as a polymer and alkali potassium iodide and iodine act as salt. In another method plasticiser PC was introduced in addition to the conducting salt. The two electrolytes are characterised by XRD, SEM, FT-IR and ionic conductivity measurements. From the results it is shows that plasticizer incorporated polymer electrolyte have highest ionic conductivity. This is due to increase the segmental mobility and flexibility of the polymer electrolyte by the addition of the plasticizer.

Key words: solid polymer electrolyte, PMMA, dye sensitised solar cell

OPE 59

SYNTHESIS AND CHARACTERIZATION OF INCLUSION COMPLEXES OF A SOLUBLE β-CYCLODEXTRIN POLYMER WITH DAPSONE DRUG AND ITS IN-VITRO DRUG RELEASE STUDIES

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Abstract

β-Cyclodextrin (β-CD) polymer was Synthesized by different techniques like Kneading, Co-precipitation and ultrasonic methods. The water soluble polymers were synthesized from citric acid and choline chloride with β-CD, through one step polymerization procedure. The synthesized polymer characterized by FT-IR, SEM, XRD, and DSC analyses. Dapsone drug acts as a guest molecule for the inclusion complex process with a novel non-toxic cationic β-cyclodextrin polymer (Cβ-CDP). A practically insoluble antileprotic drug is to improve the solubility and dissolution rate through the inclusion complexes of dapsone with Cβ-CDP. The stoichiometric ratio (1:1) and Stability constant $K_{1:1}$ of inclusion complex was calculated by phase solubility studies. The results showed that the dissolution rates of Dapsone were obviously increased by the inclusion complexation with Cβ-CDP.

Keywords: Cationic β-cyclodextrin polymer, Dapsone, Inclusion Complex, Dissolution rate.

OPE 60

PREPARATION OF PH SENSITIVE CHITOSAN-G-POLY(ACRYLAMIDE)/ SODIUMALGINATE COMPOSITE HYDROGEL BEAD FOR CONTROLLED RELEASE OF RIFAMPICIN

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Abstract

The use of Chitosan based hydrogels has recently gained great important in view of low toxicity and high biocompatibility. A novel pH-sensitive composite hydrogel beads composed of Chitosan-g-poly (acrylamide)/sodium alginate (CTS-g-PAM/SA) was prepared. The homogeneous SA/Chitosan-acrylamide solution was dropped into $Zncl_2$ solution and cross linked by Zn^{2+} ions. The swelling behaviors of cross linked beads were investigated in simulated gastric fluid (SGF) and simulated intestinal fluid (SIF). Rifampicin was loaded in beads with the high loading efficiency. The controlled release profiles of rifampicin loaded beads were studied at different pH environment for simulating gastrointestinal conditions. The structure and surface morphology of the composite hydrogel beads were characterized by FTIR and SEM, respectively. The cumulative release ratio of rifampicin (RF) from the composite hydrogel beads were analyzed and quantified by using UV-visible spectroscopic. The rate of release of drug was enhanced by simulated gastric fluid than that of intestinal fluid.

Keywords: Composite hydrogel bead, pH-sensitive, Controlled release, Rifampicin

OPE 61

EFFECT OF PH ON CHITOSAN-ZnO NANOSTRUCTURE AND ITS PROPERTIES

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Abstract

Zinc oxide (ZnO) has received considerable attention because of its unique optical, semiconducting, piezoelectric, and magnetic and gas sensing properties. ZnO nanostructures exhibit interesting properties including high catalytic efficiency and strong adsorption ability. Recently, the most investigated application of ZnO is in biosensing because of its high isoelectric point (9.5), biocompatibility, and fast electron transfer kinetics. In the present investigation, we made a systematic study on the morphological structure of prepared chitosan-ZnO composite with different pH condition and optimized the pH range to obtain chitosan-ZnO nanostructures. To prepare the materials, zinc chloride, chitin and sodium hydroxide were used as a precursor. The instrumental analysis revealed that standard peak of ZnO at 424 cm^{-1} was noticed in the FTIR spectrum. X-ray diffraction patterns was match well with standard ZnO and the structure grew along [0 0 1] direction with good crystallinity. Nanostructures were confirmed by transmission electron microscopy (TEM) and Scanning electron microscopy (SEM).

Keywords: ZnO, Nanostructure, PH variation, XRD techniques, TEM.

OPE 62

AN AMPEROMETRIC BIOSENSOR BASED ON ENZYME IMMOBILIZATION ONTO CONDUCTING POLYMER FOR POLYPHENOL ANTIOXIDANTS

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Abstract

In general antioxidants are substances that may protect cells from the damage caused by unstable free radicals. The first biosensor was developed by Updike and Hicks in the year 1967 and after that many biosensors have been fabricated and used. Biosensor can be defined as a “compact analytical device or unit incorpating a biological or biologically derived sensitive ‘recognition’ element integrated or associated with a physio-chemical transducer”. Development of new methods of immobilization of enzymes sensor surfaces is an active area of research. Self-assembled mono- and multi layers were used to construct biosensors. Gorizia, Italy (2000) developed an amperometric solid binding biocatalysts. Wang et al. (2000) constructed polyphenols oxidase enzyme (PPO) encapsulated in silica sol-gel matrix for amperometric biosensors. Perez et al. (2006) developed PPO entrapped in polyacryamide microgels biosensors. Zhang et al. (2009) immobilized PPO in polyaniline –ionic liquid-carbon nano fiber composite and achieved high E_a ($kJmol^{-1}$) value and high conductivity. Yongan Tan et al. (2010) fabricated amperometric biosensor for catechol based on polyaniline-polyphenol oxidase. All of these advantages are suitable for commercial and practical applications. This review focuses on the current status of biomolecule immobilization techniques on conducting polymer and their application in the development of amperometric biosensors.

Keyword: Biosensor, Conducting polymer, Polyphenol oxidase, Biomolecule immobilization

OPE 63

AN EFFICIENT SYNTHESIS OF 8-BENZYLAMINOQUINOLINES UNDER SOLVENT-FREE CONDITIONS

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Abstract

In the last two decades it has become increasingly clear that the chemical and allied industries, such as pharmaceuticals, are faced with serious environmental problems. An important issue in green chemistry is the use of organic solvents. The use of many traditional organic solvents, such as chlorinated hydrocarbons, has been severely curtailed. Indeed, so many of the solvents that are favored by organic chemists have been blacklisted that the whole question of solvent use requires rethinking and has become a primary focus, especially in the manufacture of pharmaceuticals. At present, many industries have started to earnestly adopt green chemistry and other sustainable practices. Particularly the pharmaceutical companies are focusing their effort on minimizing solvent use and in replacement of many traditional organic solvents, such as aromatic hydrocarbons, by more environmentally friendly alternatives. The medicinal chemical community has been under increased pressure to produce, in an environmentally vanished fashion, the myriad of drugs requirement by society for short period of time. Because of high molecular complexity in drug discovery accompanied by time constraints, the primary driver of pharmaceutical green chemistry has become the development of efficient environmentally benign synthetic protocols. This can be achieved through the proper choice of starting materials, economic methodologies with a minimum number of steps, the appropriate use of green solvents reagents, and efficient strategies for product isolation and purification. Thus, green chemistry has emerged as a discipline that permeates all aspects of synthetic chemistry. The practice of green chemistry not only leads to environmental benefits but also economic and social benefits. Quinoline is a heterocyclic scaffold of paramount importance to human race. Several quinoline derivatives isolated from natural resources or prepared synthetically are significant with respect to medicinal chemistry and biomedical use. The utility of quinoline derivatives in the areas of medicine, food, catalyst, dye, materials, refineries and electronics is well established. So the compounds that we are interested in targeting are quinoline derivatives. Here we have to generate a biologically important compound 8-benzylaminoquinoline under solvent free conditions by simple grinding method using mortar and pestle. This would be a significant accomplishment since existing technology for synthesizing quinoline derivatives in the laboratory involves much more abrasive, less environmentally benign conditions.

OPE 64

INFLUENCE OF THERMO-OXIDATION ON MECHANICAL, SURFACE AND THERMAL PROPERTIES OF LOW DENSITY POLYETHYLENE (LDPE) FILM

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Abstract

Blown low density polyethylene (LDPE) films added with oxo-biodegradable additive containing pro-oxidant were subjected to thermo-oxidation in an oven at 70°C for varying time periods. The changes in mechanical and surface properties were studied using tensile strength, elongation at break, wettability, surface morphology using SEM, surface topology by AFM, functional groups by FTIR spectroscopy, absorbance spectra by UV-Vis spectroscopy. The thermally aged films with pro-oxidant additive added polyethylene (PE) exhibited a higher level of oxidation as revealed by increase in their carbonyl index than the pristine PE. In addition to it, the DSC melting behavior showed a slight increase in crystallinity (%C) and melting temperature (Tm) of the polymer containing oxo-biodegradable additive. The SEM micrograph revealed the increase in the size of cracks and grooves, according to the increase in the concentration of pro-oxidant additive and the surface roughness also supports the same through AFM image. The increase in the wettability and surface free energy of the thermally aged samples were attributed to the formation of hydrophilic groups on the polymer surface by thermo-oxidation. The pro-oxidant additive offered a new insight into the thermo-oxidation strategy for PE and can be widely used in packaging industry.

Keywords: LDPE, pro-oxidant additive, thermo-oxidation, wettability, FTIR, AFM.

OPE 65

ENERGY TRANSFER IN EXERCISE

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Abstract

The human body must receive a continuous supply of chemical energy to perform its many complex functions. Energy derived from the oxidation of food is not released suddenly at some kindling temperature because the body's cells, unlike a combustion engine, cannot use heat energy. If they could, our fluids would actually boil and our tissues burst into flames. Rather, the chemical energy trapped within the bonds of the carbohydrate, lipid, and protein molecules is extracted in small amounts during enzymatically controlled reactions, which occur in the relatively cool, watery medium of the cell. This slow extraction process reduces the loss of energy as heat and provides for much greater efficiency in energy transformations. These transformations enable the body to make direct use of chemical energy for biologic work. In a sense, energy is supplied to the cells as it is needed. The story of how the body maintains its continuous energy supply begins with adenosine triphosphate, or ATP, the special carrier for free energy. The energy in food is not transferred directly to the cells for biologic work. Rather, this "nutrient energy" released through oxidation is harvested and funneled as an accessible form of chemical energy through the energy-rich compound ATP. The potential energy within the ATP molecule is utilized for all of the energy-requiring processes of the cell. This energy receiver-energy donor cycle, in essence, represents the two major energy-transforming activities of the cell: (a) the formation of energy-rich ATP from the potential energy in food, and (b) the use of the chemical energy in ATP for biologic work.

OPE 66

SYNTHESIS, CRYSTAL STRUCTURE AND BIOLOGICAL EVALUATION OF COPPER(II) COMPLEXES OF TETRADENDATE AMINE AND ITS SCHIFF'S BASE

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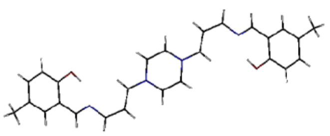
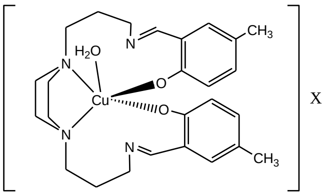
Abstract

A series of mononuclear copper(II) complexes containing various counter ions such as acetate, chloride, perchlorate, nitrate and sulphate have been synthesized with newly-derived N_2O_2 donar ligand. The ligand was synthesized by condensation of 1,4-bis(3-aminopropyl) piperazine and 5-methyl salicylaldehyde. Single crystals of the ligand was obtained by slow concentration of methanolic solution of the compound and analyzed by single crystal X-ray diffraction analysis. The single crystal of the ligand revealed that ligand having monoclinic crystal system and the formation of schiff's base is confirmed by the presence of C=N bond in crystal structure. The complexes have been synthesized and studied by analytical techniques like electronic spectra and electrospray ionization mass spectrometry (ESI-MS). The Schiff bases and their Cu(II) complexes have been screened for antibacterial (Escherichia coli, Staphylococcus aureus, Bacilus subtilis and Pseudomonas aeruginosa) activities by disc diffusion method, the comparative study of inhibition values indicates that the complexes exhibit higher antimicrobial activity than the free ligand. The DNA cleavage studies with plasmid DNA have shown that all the complexes induce extensive DNA cleavage in the presence of mercaptopropionic acid among all, the complexes of counter ion acetate, chloride and nitrate show better cleavage activity than perchlorate and sulphate ions.





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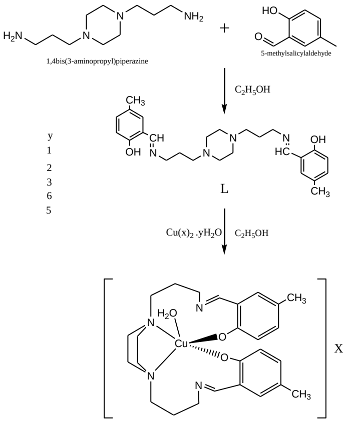

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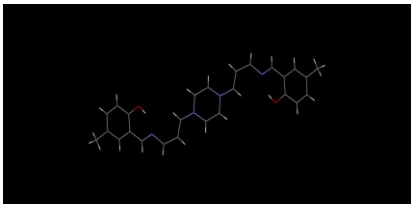
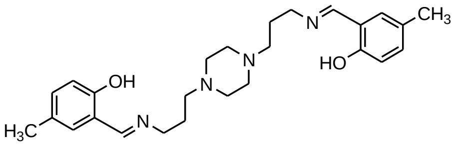
SCHEME-1





OPE 67

APPLICATION OF PHYSICOCHEMICAL DATA FOR WATER QUALITY ASSESSMENT OF WATERCOURSES IN THE KARUR MUNICIPALITY (SOUTH INDIA)

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Abstract

The paper presents water quality evaluation based on 2 year monitoring programme in the Karur Municipality region of South Tamil Nadu. The studies were carried out from 2010 to 2012 by surface water analysis at 7 various sites, by groundwater analysis at 15 various sites and by soil analysis at 6 various sites. Sampling sites included rather urbanized or developed lands, farming fields and non polluted city recreational areas such as check dam and forests. Most of the watercourses were sampled quarterly, one to two samples within the upper course of the watercourse and the other near its mouth dilution/polluted sites. In all samples, fifteen parameters of water quality were determined: pH, total suspended solids, dissolved oxygen, water temperature, oxygen saturation, 5 day biochemical oxygen demand, chemical oxygen demand, chloride, sulphate and of course heavy metals too. Interpretation of the obtained results revealed that examination of those basic physicochemical parameters permits to discriminate initially watercourses with respect to level of water contamination. During the research, a large dataset was obtained and it was described by statistical analysis. The paper presents relation between analysed parameters and influence of land exploitation mode on water quality and describes variation of the results both in space and time.

OPE 68

SPECTRAL AND ELECTROCHEMICAL CHARACTERISTICS OF DIHYROXYBIPHENYL: EFFECTS OF SOLVENTS, ACID–BASE CONCENTRATIONS, PREPARATION AND CHARACTERIZATION OF SOLID COMPLEX WITH Β-CYCLODEXTRIN AND ITS INCLUSION EFFECTS

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Abstract

Inclusion complex of Dihydroxybiphenyl (DHBP) with β-cyclodextrin (β-CD) has been investigated by FT-IR, Scanning Electron Microscopy (SEM), XRD, Cyclic Voltammetric method, UV/visible and Fluorescence Spectroscopy. It was testified that the inclusion complex was formed between β-CD and DHBP. The formation constant (K) 1:1 and the 1:2 stoichiometric of complexation was determined and schematic diagram proposed. The experimental results indicated that the inclusion processes is an exergonic and spontaneous process. The solid complex of 4,4-dihydroxybiphenyl (DHBP) with β-cyclodextrin(β-CD) is characterized by FT-IR, Scanning electron microscopy (SEM), X-Ray Diffraction methods. FT-IR, XRD and SEM analysis confirmed the Solid inclusion and to provide information on the behaviors of DHBP inside the cavity of β-CD. It was found that the molecule, two benzene ring entered into the cavity of β-CD. Concerning the structure of the inclusion complex, two –OH groups of DHBP in β-CD cavity has been confirmed by Rasmal tool computational analysis

Keywords: Dihydroxybiphenyl; β-Cyclodextrin; pH effects; Inclusion complex

OPE 69

SPECTROSCOPIC AND ELECTROCHEMICAL STUDIES OF INCLUSION COMPLEXES OF 2-NAPHTHOL WITH β-CYCLODEXTRIN NANOCAVITY IN AQUEOUS AND SOLID PHASES

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Abstract

The spectroscopic and electrochemical properties of 2-naphthol (2-NT) has been studied in various pH and different nano hydrophobic β-cyclodextrin (β-CD) concentrations. The aqueous phase inclusion complex of 2-NT with β-CD was analysed by UV spectroscopy and Cyclic Voltammetric (CV) technique. The UV absorption process for the neutral and anionic form of conjugated chromophoric 2-NT is enhanced due to the formation of a 1:1 inclusion complex with β-CD nanocavity, but in CV the peak current is decreased with increasing β-CD concentration due to the 2-NT included into the β-CD nanocavity. The formation of this aqueous phase complex has been confirmed by Benesi-Hildebrand plot for both UV and CV techniques and also mechanism is proposed to explain the inclusion complex. The solid phase complex of β-CD nanocavity with 2-NT is investigated by FT-IR, XRD, SEM and TG-DTA methods.

Keywords: β-Cyclodextrin, 2-naphthol, pH effects, Inclusion complex, solid complex

OPE 70

STUDY OF DOUBLE LAYER CAPACITOR BASED ON PVA AND PEO GEL-FABRIC ELECTROLYTE

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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 oxide (PEO) . EDLCs were fabricated using the above GPE and gel coated textile fabrics. The EDLC behaviour was characterized by Cyclic Voltammetry, AC Impedance analysis and Charge Discharge studies.

Keywords: Electrochemical double-layer capacitor, Textile supercapacitor, Gel Polymer Electrolyte

OPE 71

COMPARISON OF DOUBLE LAYER CAPACITORS BASED ON THIN FILM, GEL, GEL -TEXTILE FABRIC ELECTROLYTES

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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 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

OPE 72

PREPARATION AND CHARACTERISATION OF PMMA/MWCNT BASED COUNTER ELECTRODE FOR DSSC

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Abstract

Different types of molar ratios of conducting polymer Poly (methylmethacrilate, PMMA) /MWCNT composite counter electrode materials were prepared by Ultra sonication method and it’s characterised. These materials were also investigated for photo catalytic activities and its electrochemical behaviours by impedance studies. The fabricated PMMA/MWCNT based counter electrode materials for dye sensitized solar cells (DSSC) as a photo electrode. The 0.5 molar ratio exhibited best efficiency of solar radiation in DSSC. This type of electrode may be utilised for a low-cost counter electrode for DSSC.

Keywords: Conducting polymers, PMMA, MWCNT, counter electrode

OPE 73

ELECTROANALYSIS OF CITICOLINE ON POYPYRROLE MODIFIED GLASSY CARBON ELECTRODE

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Abstract

Citicoline was determined by electrochemically using polypyrrole modified glassy carbon as a working electrode. The cyclic voltammetric behavior of citicoline was studied in aqueous acidic, neutral and alkaline conditions. From cyclic voltammetric studies one anodic peak was observed in all pH media (pH 1.0 - 13.0). The influence of pH, scan rate and concentration revealed irreversible electron transfer and the oxidation was diffusion controlled adsorption. A systematic study of influence of various experimental parameters that affect the stripping voltammetric response was carried out and the maximum peak current conditions were arrived at. Calibration was made under maximum peak current conditions. The lower limit of detection of citicoline using the proposed stripping voltammetric method was 50 ppb. The relative standard deviation obtained for 5 identical measurements was 2.3% and it reveals good reproducibility of the stripping method.

Keywords: Citicoline, Cyclic voltammetry, Stripping voltammetry, Polypyrrole, Modified glassy carbon electrode.

PPE 01

RESIDENTIAL SINGLE-PHASE TRANSFORMERLESS PHOTOVOLTAIC INVERTER SYSTEM

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Abstract

The need for a cleaner environment and the continuous increase in power demands makes decentralized renewable energy production, like solar and wind, more and more interesting. Decentralized energy production using solar energy could be a solution for balancing the continuously increasing power demands. This continuously increasing consumption overloads the distribution grids as well as the power stations, therefore having a negative impact on power availability, security and quality. One of the solutions for overcoming this is the grid-connected photovoltaic (PV) system. PV inverter systems can be improved in terms of efficiency using transformerless topologies, but new problems related to leakage current need to be dealt with. There is a strong trend in the photovoltaic inverter technology to use transformer less topologies in order to acquire higher efficiencies combining with very low ground leakage current. In this paper, a new topology, based on the H-bridge with a new ac bypass circuit consisting of a diode rectifier and a switch with clamping to the dc midpoint, is proposed. The topology is simulated and experimentally validated, and a comparison with other existing topologies is performed. High conversion efficiency and low leakage current are demonstrated.

Keywords: Leakage current, parasitic capacitance, switching converter.

PPE 02

MICROCONTROLLER BASED INTELLIGENT BOOST CONVERTER FOR MAXIMUM PEAK POWER TRACKING FOR SOLAR PHOTOVOLTIC MODULE

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Abstract

The objective of the paper is to present a novel cost effective and efficient microcontroller based MPPT system for solar photovoltaic system to ensure fast maximum power point operation at all fast changing environmental conditions. Since the MPP varies, based on the irradiation and cell temperature, appropriate algorithms must be utilized to track the MPP. This is known as maximum power point tracking. Different MPPT algorithms, each with its own specific performance, have been proposed in the literature. These techniques differ in many aspects like complexity, convergence speed, hardware implementation, sensors required, cost, range of effectiveness and need for parameterization.

PPE 03

PHASE-SHIFTED FULL-BRIDGE SERIES-RESONANT DC-DC CONVERTERS FOR HYBRID VEHICLE APPLICATIONS

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Abstract

Usually Resonant converter can be operated narrow load range. But this converter can be operated in wide range. That’s from light load to heavy load with higher efficiency. This paper presents the design of a phase-shifted full-bridge series resonant converter (PS-FB SRC). The proposed FB SRC features a novel two-mode operation. It is operated in series resonant mode at normal loads. The switching frequency is varied to regulate the output voltage. The fixed-frequency phase-shifted pulse width modulation, on the other hand, is used to adjust the effective duty cycle and regulate the output voltage at light loads. The proposed converter exhibits high conversion efficiency for wide-range load conditions.

Keyword: Conversion efficiency, phase-shifted full-bridge converter, series resonant converter (SRC).

PPE 04

ELECTRODEPOSITION AND CHARACTERIZATION OF NI-SI_3N_4 NANOCOMPOSITE COATING

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Abstract

Ni-Si_3N_4 nanocomposite coatings were prepared under direct current method using acetate bath. Surface morphology, microstructure, and crystal orientation of the Ni and Ni – SI_3N_4 nanocomposite were investigated by scanning electron microscope and X-ray diffraction analysis respectively. The effect of incorporation of Si_3N_4 particles in the Ni nanocomposite coating on the microhardness, corrosion behaviour has been evaluated. Smooth composite deposits containing well-distributed silicon nitride particles were obtained. The preferred growth direction was also influenced by silicon nitride 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 9 g/l. When silicon nitride nanoparticles were absent from the electroplating bath the growth took place preferentially on (111) oriented planes. However, silicon nitride in small amount acts towards improving the growth of grains of this orientation and the structure of electro deposited nickel and nickel nano composite coatings were cubic. The microhardness of the nickel nano composite coatings was higher than that of pure nickel due to dispersion-strengthening & matrix grain refining and increased with the increase of incorporated Si_3N_4 particles content. The corrosion potential (E_{corr}) in the case of Ni-Si_3N_4 nanocomposite had shown a negative shift, confirming the cathodic protective nature of the coating. The corrosion resistant of Ni-Si_3N_4 nanocomposite coating was more than that of electrodeposited nickel coating in 3.5% NaCl solution.

Keywords: Electrodeposition, Nanocomposite coating, Acetate bath, Silicon Nitride, SEM, XRD.

PPE 05

PULSE ELECTRODEPOSITION OF NI-W ALLOY DEPOSITS OBTAINED FROM TRI AMMONIUM CITRATE BATH

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Abstract

Pulse plating is used to achieve nano Ni-W alloy deposits from tri ammonium citrate complexed alkaline bath. The optimized bath gave alloy electrodeposits with 32.8 wt % of W. The alloy was obtained from the reduction of Nickel tungstate complex containing citrates. The addition of NH_4Cl favored the ternary complex containing ammonia. The additions of W reduced the crystallite size of all crystals of predominant planes. The crystallite sizes were of the order of nm. Surface morphology studies revealed the alloy surface was covered by long needle like crystals. The grain size was in the range of 50 nm to 80 nm. The EDAX analysis revealed the wt % of W in the alloy is 30.99. Hall-Petch relation was found to be obeyed. Electrochemical polarization studies revealed that, the corrosion potentials of nickel became nobler with W addition and corrosion current densities decreased. Electrochemical impedance studies revealed that, the charge transfer resistances were increased and the capacitance of the double layer decreased with W additions.

Keywords: Nano deposits, Pulse plating, Induced Co-deposition, Surface morphology Corrosion resistance.

PPE 06

CHEMICAL DEGRADATION OF NEYVELI LIGNITE BY PHOSPHOMOLYBDIC ACID

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Abstract

Lignite is a complex macromolecule of aromatic polymer and difficult structure of the material. Those lignite were structurally investigated at a various kinds of chemical reaction. Particularly , depolymerization or chemical degradation reaction is carried out to enhance the solubility of neyveli lignite treated with highly dispersed catalyst of the phosphomolybdic acid. Lignite was depolymerized with phenol using heteropolyacid catalyst. After the reaction the product was extracted with pyridine .To improve the efficiency of the pyridine extractability is high as compared to the raw lignite. Depolymerization reaction is carried out was confirmed by depends on the pyridine extractability. After the depolymerization, the product was analysed by spectral data.The spectral data reported to establish the structure of the lignite.

Keywords: lignite, heteropoly acid, phenol.

PPE 07

A HYBRID ACTIVE POWER FILTER WITH A SERIES RESONANCE CIRCUIT TUNED AT THE FUNDAMENTAL FREQUENCY

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Abstract

In this paper, a hybrid active power filter (HAPF) with a series resonance circuit tuned at the fundamental frequency is proposed for simultaneously suppressing harmonic currents and compensating highcapacity reactive power in high- or medium-voltage power systems. To reduce its rated capacity, the active power filter is shunted to the series resonance circuit by a matching transformer and, thus, greatly reduces its current requirements as well as voltage ratings of semiconductor switching devices. The passive power filters are used to compensate the reactive power with a constant capacity. The validity and effectiveness of this novel HAPF system have been verified by simulation and industrial application results.

Keyword: Active filters, harmonic distortion, reactive power control.

PPE 08

A NOVEL NON-ENZYMATIC HYDROGEN PEROXIDE SENSOR BASED ON POLYPYRROLE NANOTUBE-GOLD NANOPARTICLE MODIFIED (PPY-AU$_{NANO}$) GOLD ELECTRODE

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Abstract

A novel approach to fabricate hydrogen peroxide (H_2O_2) sensors was developed based on polypyrrole nanotubes - gold nanoparticle nanohybrides (PPy-Au$_{nano}$) modified gold electrode. The Polypyrrole nanotubes were synthesized by using the complex of methyl orange (MO)/$FeCl_3$ as a template. The gold nanoparticles were electrochemically deposited on the Polypyrrole nanotube dispersed in nafion membarane over the gold electrode. The surface area of the PPy and PPy-Au nanoparticles modified electrodes were investigated. The resulting Polypyrrole and Polypyrrole (PPy)-nafion (NF)-gold nanoparticles (Au) composite was characterized by scanning electron microscope (SEM), cyclic voltammetry, electrochemical impedance spectroscopy (EIS), UV-Vis and FT-IR spectroscopy. The results showed that this sensor has a favorable catalytic ability for the reduction of H_2O_2. The modified electrode has exhibited better stability and sensitivity.

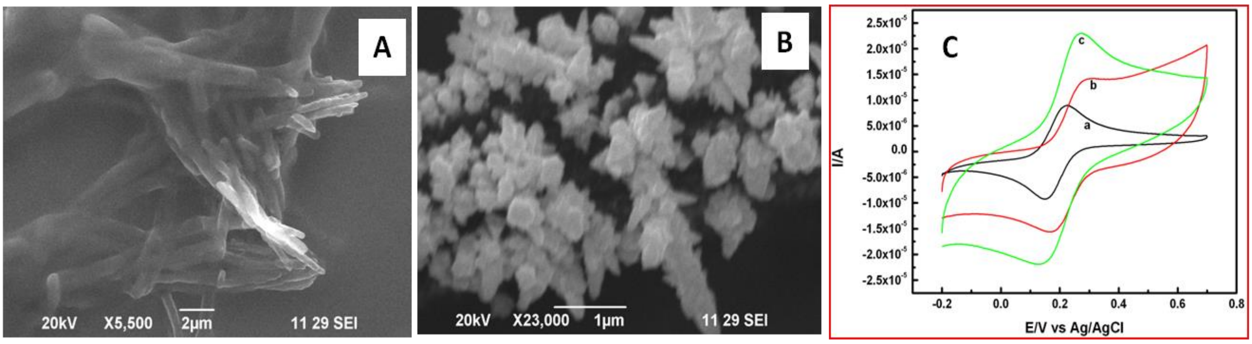

Fig.1 SEM images of (A) PPy nanotubes dispersed in Nafion solution; (B) PPy nanotubes-gold nanoparticles and (C) Cyclic voltammogram of (a) Bare Au electrode; (b) PPy and (c) PPy-Au modified gold electrode in phosphate buffer solution containing 1mM $[Fe(CN)_6]^{3-/4-}$ as a redox probe.

PPE 09

SYNTHESIS OF ZIRCONIUM DOPED CHITOSAN-MGO NANOPARTICLES FROM CHITIN BY CHEMICAL PRECIPITATION METHOD

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Abstract

Doping is a widely used method to improve the electrical and optical properties of semiconductors. However synthesis route is also very important to get different nanostructures and different properties. Zirconium doped was with Chitosan-MgO nanostructure using chitin as biosurfactant, Magnesium chloride as source material, Zirconyl oxychloride as dopant and sodium hydroxide as precipitating agent. The functional groups of resultant nanocomposite such as chitosan and respective metal oxides were confirmed by FTIR spectroscopy and UV-vis spectroscopy. The Crystallite size and particle size distribution of synthesized materials was confirmed by X-ray diffraction analysis. Surface morphology of Zirconium doped chitosan-MgO nanoparticles was confirmed by scanning electron microscopy (SEM). The chemical composition of Mg/O/Zr was confirmed by energy dispersive analysis (EDAX).

Keywords: Zirconium oxy chloride, Chitosan-MgO nanostructure, XRD techniques, SEM.

PPE 10

OPTICAL PROPERTIES OF ZINC OXIDE NANOPARTICLES PREPARED USING STARCH SURFACTANT BY CHEMICAL PRECIPITATION.

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Abstract

ZnO has become one of the most important functional materials with the unique properties of near-UV emission, good optical transparency, electric conductivity, and piezoelectricity. Applications include use as gas sensors, nanoscale lasers, solar cells, and photocatalysts. In this investigation zinc oxide nanoparticles were prepared from chemical precipitation method. Zinc chloride as source material, sodium hydroxide as precipitant and wheat starch used as a surfactant. The crystallite size of ZnO nanoparticle size range from~29–32nm is evidence by XRD. The functional groups at 1573 cm^{-1} for starch and 421cm^{-1} for ZnO using FTIR spectroscopy. The rod like structure of ZnO nanoparticles was confirmed by scanning electron microscopy (SEM) and Transmission electron microscopy (TEM). The optical properties of ZnO nanoparticles are confirmed by Fluorescence spectroscopy.

Keywords: Wheat starch, ZnO, Nanoparticles, Optical properties.

PPE 11

PREPARATION AND CHARACTERIZATION OF CHITOSAN-ZnO/ACRYLONITRILE COMPOSITE

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Abstract

The Chitosan-ZnO/Acrylonitrile composite were prepared by hydrothermal synthesis using Chitin, zinc chloride and acrylonitrile. The precipitate was formed with addition of NaOH. The precipitate was washed several times and neutralized and finally filtered using suction pump. The prepared chitosan-ZnO/Acrylonitrile composite was oven dried at 100°C and characterized by different techniques. Fourier transforms infrared spectroscopy (FTIR) and UV–vis absorption spectroscopy (UV–vis) confirmed the formation of polyacrylonitrile with Chitosan-ZnO composite. Electrochemical properties of the composites were studied by Cyclic Voltammetry (CV) and Electrochemical Impedance Spectroscopy studies.

Keywords: Chitosan, ZnO, Acrylonitrile, Electrochemical properties.

PPE 12

ELECTRODEPOSITION OF CHITOSAN-METAL OXIDE AND ITS EFFECT ON CORROSION RESISTANCE

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Abstract

A survey of literature reveals that the conducting polymers were used in the mild steel as anticorrosive and inhibitor. However limited information was available on connected to chitosan-metal oxide composite coating on steel particularly with biopolymer-metal/ metal oxide composites. Chitosan is a biopolymer next to starch is widely used in corrosion inhibition of mild steel without causing environmental problems. Chitosan possess good biocompatibility, chemical resistance, mechanical strength, antimicrobial properties and thermal stability and have been utilized successfully in biotechnology, for different applications. The hydroxyl apatite chitosan nanocomposite was obtained on stainless steel to provide better corrosion protection. The main aim of this study is to fabricate Chitosan-metal oxide nanocomposites by electrodeposition technique. The formed thin films were characterized by X-ray diffraction, scanning electron microscopy, Energy dispersive analysis (EDX), impedance spectroscopy and polarization studies. This electrochemical property was utilized in the present work to analyze the effect of chitosan-metal oxide composite film on mild steel from electrodeposition and its corrosion resistance property.

Keywords: Chitosan, Chitosan-metal oxide, Electrodeposition, Corrosion resistance.

PPE 13

SYNTHESIS AND CHARACTERIZATION OF CHITOSAN-COPPER OXIDE NANOPARTICLES PREPARED BY HYDROTHERMAL METHOD.

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Abstract

Copper oxide nanoparticles have been of considerable interest due to the role of CuO in catalysis, in high-Tc super conductors, and in gas sensors. There have been various methods to prepare ultrafine CuO, such as sol-gel, precipitation, hydrothermal, solid state reaction and alkoxide-based synthesis. Chitosan has been widely used, as it has various properties such as microbial resistance, non-toxicity, biodegradabitility and metal ion absorptibility. Due to the abundance, low cost and good chemical and biological properties, chitosan is widely used in medicine, nutrition, cosmetics, paper making and several other application fields. In the present work, it is aimed to prepare chitosan-CuO nanoparticles using chitosan as surfactant material and sodium hydroxide as precipitating agent. For this conversion, various concentrations of copper sulphate and sodium hydroxide were used. The functional group was identified using FTIR and UV-Vis spectroscopy, crystallite size by XRD and the chemical composition was confirmed by energy dispersive analysis (EDAX). The surface morphology of chitosan-CuO nanoparticles are confirmed by SEM analysis.

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

PPE 14

DECOLORIZATION OF REACTIVE DYE WASTEWATER AND REUSE BY ADVANCED OXIDATION PROCESS

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Abstract

The Reactive dye wastewater was ozonated in a reactive column system to access its efficiency for decolorizing of the color. The ozone consumption was used at 4.5gpl for various concentration of the dye wastewater to decolorize and it is achieved decolorization efficiency at the maximum of 12 minutes. Dye wastewater was analyzed before and after ozonation treatment. The samples were analyzed to study the pH, conductivity, color, TSS, TDS, chloride, sulfide and COD parameters. The treated wastewater was reused for bleaching and dyeing process.

Keywords: wastewater, treatment, ozonation, decolorization, reuse

PPE 15

EFFECTIVE DECOLORIZATION AND REUSE OF MONOCHLORO REACTIVE DYE WASTEWATER USING OZONATION

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Abstract

The reactive dye wastewater of YMXR reactive dye was ozonated in a column set up to access its efficiency for decolorizing the organic dye color. In various concentration of the dye wastewater was treated and it is achieved decolorizing efficiency at the maximum of 10 minutes, contact time at ozone consumption of 4.5gpl. The reactive dye wastewater was analyzed before and after ozonation treatment. The samples were analyzed for the parameters like pH, conductivity, color, TSS, TDS, chloride, sulfide and COD. However the corresponding parameters from the reactive dye wastewater was determined and the treated wastewater was reused or recycled.

Keywords: wastewater, ozonation, decolorization, reuse, COD.

PPE 16

ULTRASONICATOR TREATMENT OF DOMESTIC WASTEWATER AND REUSE

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Abstract

Ultrasonicator is one of the most advanced tools for wastewater treatment. It is used to reduce toxic and unwanted materials. Domestic wastewater treatment was done by ultra-sonication. The wastewater was collected from PG men's hostel, Alagappa University, Karaikudi. The initial and final (treated) wastewater analyzed for color, pH, conductivity, TSS, TDS and COD. Then the ultra-sonic treated water was reused for plant cultivation. The wastewater has most effectively utilized for reuse.

Keywords: Ultra-sonication, COD, wastewater, TDS, TSS, reuse.

PPE 17

DOMESTIC WASTEWATER TREATMENT AND REUSE BY OZONATION

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Abstract

Ozonation is one of the most important useful techniques for next generation. It is used to reduce toxic and unwanted material. The wastewater collected from PG men's hostel, Alagappa University, Karaikudi. The domestic wastewater treated by ozonation and reuse. The initial and treated wastewater characterized by color, pH, TDS, TSS, conductivity, hardness and COD. Then the treated wastewater was reused effectively for plant cultivation.

Keywords: Ozonation, wastewater, conductivity, COD, reuse.

PPE 18

A SELECTIVE NH_3 GAS SENSOR BASED ON $BINBO_4$ NANOPOWDER SYNTHESIZED BY NIOBIUM-CITRATE COMPLEX PROCESS

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Abstract

Bismuth niobate ($BiNbO_4$) nanopowder was synthesized by a low temperature niobium-citrate complex process. Thermal analysis (TG/DTA), X-ray powder diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscope (TEM) and energy dispersive x-ray spectroscopy (EDX), diffuse reflectance spectra (DRS), impedance analysis and Brunauer-Emmett Teller (BET) were used to characterize the precursor/calcined powder. Anorthic Phase $BiNbO_4$ was obtained after calcining the precursor at 600 ^oC for 1h. TEM analysis showed an average particle diamerer of 20 nm. From the diffuse reflectance spectral measurement, the band gap was found to be 3.20 eV. The temperature dependent conductivity process was calculated to be 0.18 eV. The BET results indicated that the surface area of $BiNbO_4$ nanopowder was 36.20 m^2/g. Finally, the gas sensing behavior of $BiNbO_4$ nanopowder was studied with gases like liquid petroleum gas (LPG), ammonia (NH_3) and ethanol (C_2H_5OH) as a function of various controlling factors like operating temperature, concentration of the gas and response time. It revealed that $BiNbO_4$ is a very promising material for the detection of ammonia (80%) at relatively lower operating temperatures.

PPE 19

NANOMETAL OXIDE DOPED SILICA CATALYST PREPARED BY SOL–GEL METHOD: CHARACTERIZATION AND PHOTOCATALYTIC STUDY

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Abstract

Nanometal oxide doped silica catalyst was prepared by sol-gel method. The crystal structure and surface morphology of the material was characterized by means XRD and scanning electron microscopy (SEM) studies. In the application side, the prepared nanometal oxide doped silica catalyst for photodegradation of unwanted color constituents present in the organic dye.

Keywords: Sol–gel, Dye, Metal oxide, Silica catalyst, Photodegradation

PPE 20

SYNTHESIS AND PHOTOCATALYTIC ACTIVITY OF SOL-GEL DERIVED MoO_3-ZnO NANOCOMPOSITE

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Abstract

MoO_3-ZnO nanocomposites have been synthesized by sol-gel method using templating agent. The crystal structure and surface morphology of the prepared nanocomposites have been characterized by X-ray spectroscopy, scanning electron microscopy, diffuse reflectance spectroscopy (DRS) and photoluminescence. The photocatalytic activity of the nanocomposites for selective azo dyes has been studied under UV and visible light irradiation.

Keywords: Sol–gel method, MoO_3-ZnO, Nanocomposite, Photodegradation.

PPE 21

STUDIES ON BSA- CHITOSAN FORMATION OF SELF-ASSEMBLED NANOPARTICLES IN DRUG DELIVERY APPLICATION.

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Abstract

Chitosan was modified by coupling with BSA. Chitosan hydrophobically modified water soluble polymers, also known as hydrophobized polymers, are water soluble polymers that are modified by hydrophobic groups such as alkyl, arolkyl, and deoxycholic acid. When they are dissolved in water, hydrophobized polymers can self-aggregate due to their intermolecular hydrophobic interactions. By this process, unique hydrogel nanoparticles with a hydrophobic core and hydrophilic shell can be prepared, which is a new approach for preparing the monodispersed hydrogel nanoparticles. This kind of hydrogel structure is suitable for trapping hydrophobic substances, such as fluorescent probes and various proteins, under mild conditions. Because of the hydrophobic core and hydrophilic shell need to be biodegradable and nontoxic. Chitosan, *a*-(1,4)-link glucosamine unit, is produced by deacetylation of chitin, which is extracted from the shells of crabs, shrimp, and krill. It has several characteristics such as biocompatibility, biodegradability, positive charge, nontoxicity, and bioadhesivity, which makes this macromolecule act as an ideal drug delivery material. To fulfil a wide utility in drug delivery applications, nanoparticles with different sizes and structures were prepared by different methods. The critical aggregation concentration (CAC) of the self-aggregate of hydrophobically modified chitosan with BSA was determined by measuring the fluorescence intensity of the pyrene as a fluorescent probe. The CAC value in phosphate-buffered saline (PBS) solution (pH 7.4) was 5 to10^{-2} mg/mL. The average particle size of self-aggregates of hydrophobically modified chitosan in PBS solution (pH 7.4) was 210.8 nm with a unimodal size distribution ranging from 100 to 500 nm. A scanning electron microscopy study showed that the formation of near spherical shape nanoparticles had enough structural integrity. The Self-aggregated nanoparticles exhibited an increased loading capacity (19.85 (0.04 to 37.57 (0.25%) with an increasing concentration of BSA (0.1-0.5 mg/ mL).

Keywords: Chitosan; nanoparticles; self-aggregates;BSA

PPE 22

CONDITIONS FOR ELECTRODEPOSITION OF TIN-COBALT ALLOY FROMTARTRATE BATHS

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Abstract

Tin-cobalt alloys basically designed to replace hazardous chromium had already partly replaced the latter in industries. They are currently used for plating fasteners of all kinds and in solar energy conversion. The present work deals with studies and development on Sn-Co alloy deposition following eco friendly process. Optimization of plating parameters such as bath constituents, current density, pH and temperature was done through Hull Cell studies. Cathode current efficiency and throwing power were examined at different current densities, temperatures and pHs. The specific conductivity of the bath was measured in the absence and in the presence of tartrate. UV studies were also carried out. The electrochemical behaviour of tin-cobalt alloy deposition process was followed with the aim of understanding the mechanism of the deposition process on the most stable, catalytic and reproducible platinum electrode surface.

Keywords: Tin-Cobalt alloy, alloy plating, Hull cell, throwing power.

PPE 23

ECO-FRIENDLY FINISHING OF COTTON WITH MICROCAPSULES OF NEEM OIL

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Abstract

Antibacterial textiles of long durability are needed for wide spread application where health and hygiene is essential. Microencapsulation is a novel technique which encapsulates the core material within the wall material for their controlled, sustained release at the time of need. In the present study neem oil, a constituent of *Azadirachata Indica* has been encapsulated into biopolymer gum acacia by coacervation technique. The microcapsules of neem oil were confirmed by light microscopic analysis. The natural fiber cotton was impregnated with the microcapsule by pad- dry- cure method. Scanning Electron Microscopic analysis confirmed the existence of microcapsules on cotton fabric. The antibacterial efficacy of the fabric towards the gram negative bacteria (E.coli) was studied by agar diffusion method. Development of strong inhibition zone proved the antibacterial characteristics of neem oil. Hence, finishing of cotton with non-toxic, biodegradable microcapsules of neem oil is an eco-friendly method.

Keywords: Antibacterial textile, *Azadirachata Indica*, Coacervation, Gum acacia, Microcapsule

PPE 24

STATUS OF GROUND WATER QUALITY IN CHENNAI

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Abstract

Chennai is the fourth largest metropoltian city in India. The aim of the present study carried out was to assess the status of the groundwater potential to meet the water requirement in chennai districts falls in part of Korattalaiyar-Arniyar river basin.the discharge of the industrial and municipal sewerages into most of the surface water bodies and into groundwater aquifer system either directly or indirectly in most of the places,both the surface water and ground water get polluted and contaminated to a maximum extent.now it is necessitated to assess the quantum of such impact and its appropriate remedial measures to find a lasting solution.but the present status of groundwater can be make use off by doing better water management,conservation and by recycling of waste water generated and wasted.

Keywords : Groundwater,Chennai,Water quality.

PPE 25

SONOPHOTOCHEMICAL DEGRADATION OF DIRECT BLUE 1 DYE CATALYZED BY PHOSPHOTUNGSTIC ACID IMMOBILIZED ON TIO_2 NANOPARTICLES

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Abstract

TiO_2 is the most widely used photocatalyst owing to its availability, nontoxicity, photostability. The photocatalytic activity was enhanced by the immobilization of phospotungstic acid on TiO_2. phospotungstic acid ($H_3PW_{12}O_{40}$) immobilized on TiO_2 was synthesized by conventional as well as one pot method using $TiCl_4$ as a precursor. The synthesized catalysts were characterized by X-Ray diffraction (XRD), UV-Diffused reflectance spectroscopy (UV-DRS), scanning electron microscopy (SEM) and Fourier transform infra red spectroscopy (FT-IR). The synthesized catalysts were subjected to photocatalytic dye degradation with Direct blue 1 dye. The parameters such as catalyst concentration, pH, dye concentration and time were studied. Sono, photo and sono-photo catatalytic dye degradation processes were studied individually. One pot method prepared catalyst showed better efficiency of dye degradation than conventionally prepared catalyst. Sono-photo catalytic process showed better degradation efficiency than sono and photo process.

Key words: TiO_2, Phospotungstic acid, Sono photo catalyst, Degradation, Dye

PPE 26

ROLE OF PHOSPHATE AND LUBRICANT IN THE METAL FORMING OF STEEL

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Abstract

A majof factor affecting the formability of steel is interfacial frictional force between the steel and the forming die. In this investigation, the phosphate coating with various lubricants (solid & liquid) have been studied by tribological tests(co-efficient of friction by pin-and-disc-method) to evaluate the tribological performance.The corrosion resistance of steel with phosphate and various lube coating (sodium stearate soap,oil,molybdenumdisulphide,and graphite)have been studied in 3.5%sodium chloride by chemical methods,linear polarization,potentiodynamic polarization,and AC impedance (EIS).The results investigate the synergistic effect of phosphate and lube coating in improving the corrosion protection and tribological properties of the steel in metal forming processes.

Key words : Phosphating, lube coating, Friction coefficient,disc testing,polarization.

PPE 27

EFFECT OF PMMA POLYMER CONCENTRATION USED IN GEL ELECTROLYTE FOR PHOTOVOLTAIC BEHAVIOUR OF DSSC

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Abstract

The plasticized polymer gel electrolyte was prepared from solution casting technique using PMMA. Ethylene carbonate, propylene carbonates were used as plasticizers. Two different ratios were used for preparation of electrolyte as 20:80 and 25:75. The conductivity behaviour of prepared electrolyte was studied from impedance analyser and the other important properties such as, morphology, crystal structure; thermal properties were characterized from SEM, XRD and DG/DTA. Best ionic conductivity exhibited for 20:80 ratio of polymer electrolyte in DSSC applications.

Keywords: Gel electrolyte, Conducting polymers, PMMA, Plasticizers.

PPE 28

PREPARATION AND CHARACTERIZATION OF PMMA-PEO BLEND-BASED POLYMER GEL ELECTROLYTE

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Abstract

The plasticized polymer gel electrolyte was prepared from solution casting technique using PMMA and PEO. Ethylene carbonate, propylene carbonates were used as plasticizers. Electrochemical behaviour of prepared electrolyte was studied from impedance analyser and the other important properties such as, morphology, crystal structure; thermal properties were characterized from SEM, XRD and DG/DTA. The prepared polymer blend electrolyte exhibited best ionic conductivity.

Keywords: Gel electrolyte, Conducting polymers, PMMA, PEO.

EFFECT OF PMMA POLYMER CONCENTRATION USED IN GEL ELECTROLYTE FOR PHOTOVOLTAIC BEHAVIOUR OF DSSC

, XRD and DG/DTA. Best ionic conductivity exhibited for 20:80 ratio of polymer electrolyte in DSSC applications.

Keywords: Gel electrolyte, Conducting polymers, PMMA, Plasticizers.