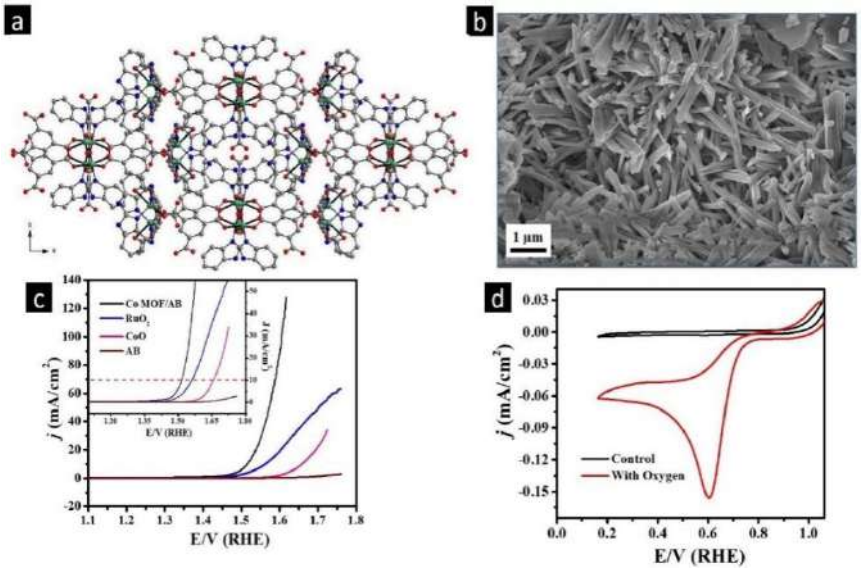


Figure 1:*(a) 3D View of [$Co_4(BTC)_3$ $(BIM)_6$] along c-axis, (b) FESEM Images for the Co-MOF, (c) LSVs for OER by Co-MOF/AB, Commercial RuO_2, CoO (after TGA) and AB in 1 M KOH Electrolyte at a Sweep Rate of 5 mV/s, (d)Cyclic Voltammogram for the ORR by the Co-MOF modified GCE in Oxygen saturated 0.1 M KOH Electrolyte at a Sweep Rate of 10 mV/s. The Control Experiment was carried out in Argon saturated Electrolyte.*

Poster Presentation-71

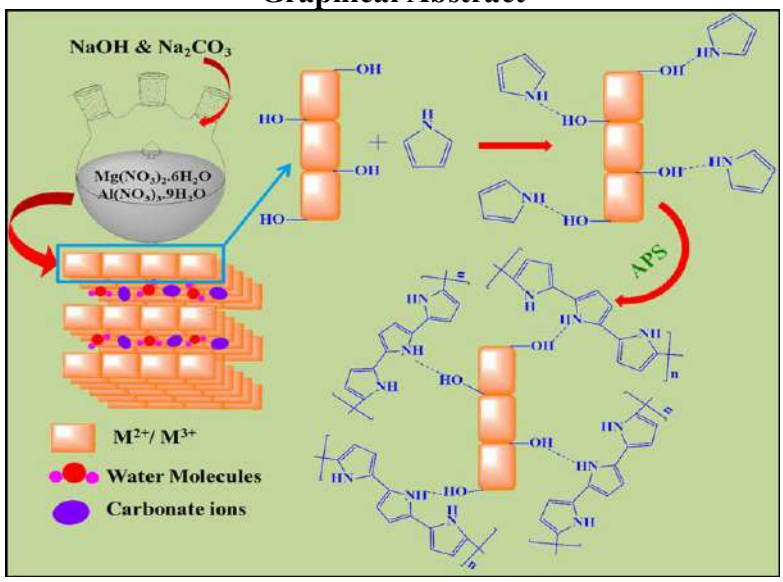
Synthesis of Polypyrrole Modified Layered Double Hydroxides for Efficient Removal of Cr(VI)

Sumanta Sahu and Raj Kishore Patel
Department of Chemistry, National Institute of Technology, Rourkela 769008, Odisha, India
Email: imsumantasahu@gmail.com

Abstract: Designing a stable, selective and efficient adsorbent for the removal of pollutants like chromium poses serious concern. Herein, an organic-inorganic hybrid material, polypyrrole modified Mg-Al layer double hydroxides has been reported as an adsorbent for Cr(VI) removal. The inorganic framework Mg-Al layer double hydroxides (LDHs) are synthesized via co-precipitation followed by hydrothermal treatment. The synthesized LDHs are enriched with polypyrrole coating via in-situ oxidative polymerization followed by microwave irradiation. The structure of the as-synthesized composite was delineated using various characterization techniques like FESEM, TEM, XRD, FTIR, RAMAN, BET, TGA-DTA and XPS which confirmed the successful formation of polypyrrole modified layer double hydroxides nanosheets (PPY-LDHs). The PPY-LDHs are applied towards the abatement for Cr(VI) from aqueous solutions at varying temperatures. The adsorption data fits well to Langmuir isotherm, and pseudo-second-order kinetics models suggesting monolayer

chemisorption in the superficial and interlayer regions. The adsorption mechanism is proposed which asserts that the removal of Cr(VI) onto the adsorbent was a combined effect of reduction of Cr(VI) to Cr(III) and chemical sorption which takes place through ion-exchange in the interlayer regions; on the surface through electrostatic attractions and hydrogen bonding. Hence, PPY-LDHs is an ideal adsorbent for the treatment of Cr(VI).

Graphical Abstract



Poster Presentation-72

Chitosan Hybrid Polyacrylic Acid Nanocomposite Hydrogels for Wound Healing Applications

Anuradha Biswal and Sarat K. Swain*
Department of Chemistry, Veer Surendra Sai University of Technology, Burla, Sambalpur 768018, Odisha, India
Email: skswain_chem@vssut.ac.in

Abstract: When nanostructured materials are incorporated in the conventional gels, wound healing behaviour is enhanced due to high stability, good selectivity as well as improved antifungal and antibacterial properties. In the present work, chitosan (C) hybrid poly (acrylic acid) (PAA) nanocomposite hydrogels are synthesized using *in situ* technique by incorporation of nano $CaCO_3$ and reduced gold nanoparticles (Au Nps). As-synthesized PAA/C- $CaCO_3$/Au nanocomposite hydrogels are characterized by UV-visible spectroscopy, FTIR spectroscopy, X-ray diffraction (XRD) and scanning electron microscopy (SEM). The molecular interactions and the functionality of the polymeric chains are studied from the FTIR spectrum. From morphological analysis, it is found that the synthesized nanocomposite hydrogels contain micropores of non-uniform size. The particle size distribution of the incorporated nanomaterials is investigated by dynamic light scattering (DLS) technique. From the

thermogravimetric analysis (TGA), it is noticed that the synthesized nanocomposite hydrogels have higher thermal stability due to the combined effect of nano $CaCO_3$ and Au Nps. The wound healing properties of the as-synthesized nanocomposite hydrogels are investigated by *in vitro* method. The antibacterial properties of the synthesized materials is studied ant it is found that nano gold and $CaCO_3$ are responsible for enhancing the antibacterial behaviour of the nanocomposite hydrogels. The combining effect of nano $CaCO_3$ and Au Nps on the PAA/C hybrid polymeric chains, the antifungal and antibacterial behaviour of the composite hydrogel are enhanced which enables the material used for wound healing.

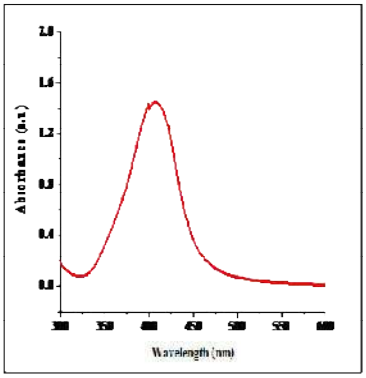
Keywords: Au nanoparticles, *In situ*, Morphology, Wound healing, Nano $CaCO_3$.

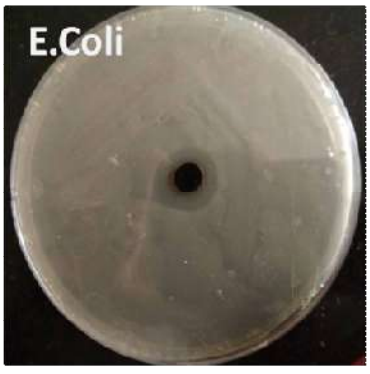
Poster Presentation-73

Fabrication of Carboxymethyl Cellulose-Alginate based Nanocomposite Films with Antibacterial Applications

Mamata Das and Jasaswini Tripathy*
Department of Chemistry,School of Applied Sciences, KIIT Deemed to be University, Bhubaneswar 751024, Odisha, India
Email: jtripathyfch@kiit.ac.in

Abstract: Polymeric nanocomposites fabricated from polysaccharides have been extensively used in food industry, packaging, biomedical applications, protective films and coatings, etc due to their properties such as biocompatibility, nonantigenicity, nontoxicity and ability to improve wound healing. The embedding colloidal nanoparticles and graphene based nanofillers into the polymer matrices is an effective method for enhancing the functions of these functional materials.Carboxymethyl cellulose, Alginate, Graphene oxide and Ag nanoparticles based hybrid nanocomposite films have been prepared by solvent casting method. The polymeric nanocomposite is characterized by FTIR Spectroscopy, XRD, SEM, TEM and TGA-Analysis. The formation silver nanoparticles have been confirmed by UV-Vis spectroscopy. Further, the formation of silver nanoparticles is evident from the XRD patterns of polymer nanocomposites. The presence of graphene oxide has been confirmed from the corresponding peaks observed in the FTIR-spectra analysis of the polymer nanocomposites as well as thermogravimetric analysis.The films showed very good antibacterial activity on Escherichia coli.



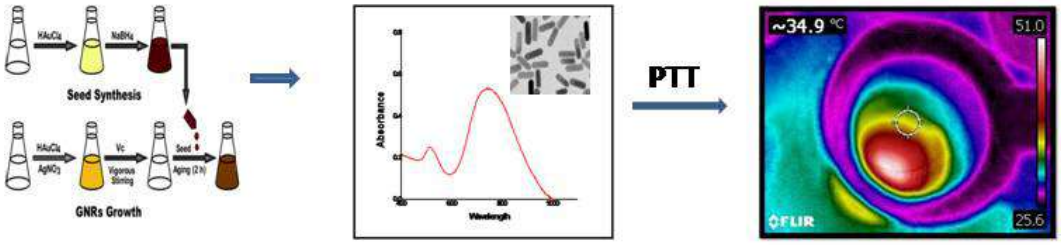


Poster Presentation-74

Synthesis of Surface functionalized Gold Nanoparticulates for Cancer Therapy

Rupayana Panda and Jasaswini Tripathy*
Department of Chemistry, School of Applied Sciences, KIIT Deemed to be University, Bhubaneswar 751024, Odisha, India
Email: jtripathyfch@kiit.ac.in

Abstract: Currently a popular area in nanomedicine is the implementation of nanoparticles for cancer diagnosis and therapy. Nanotechnology has revolutionized cancer therapies. Among various cancer therapy modalities, photothermal therapy (PTT) has gained popularity and very quickly developed in recent years due to minimally invasive treatments for patients.Among the available NIR light□responsive nanomaterials, gold nanorod has become attractive options owing to its excellent optical properties, ease of synthesis and outstanding photothermal conversion efficiency. Peptide conjugated gold nanorods have been synthesized for photothermal therapy of breast cancer cells MDA-MB 231. The nanoparticles have been characterized by FTIR and UV-Visible spectroscopy. The size of the nanoparticles have been determined using Zeta sizer and TEM. The photothermal response of nanoparticles has been tested using laser studies. The cytotoxicity of the nanoparticles has been evaluated using MTT assay. The high perfoming functionalized gold nanorods exhibit great potential in tumor targeting and photothermal therapy.



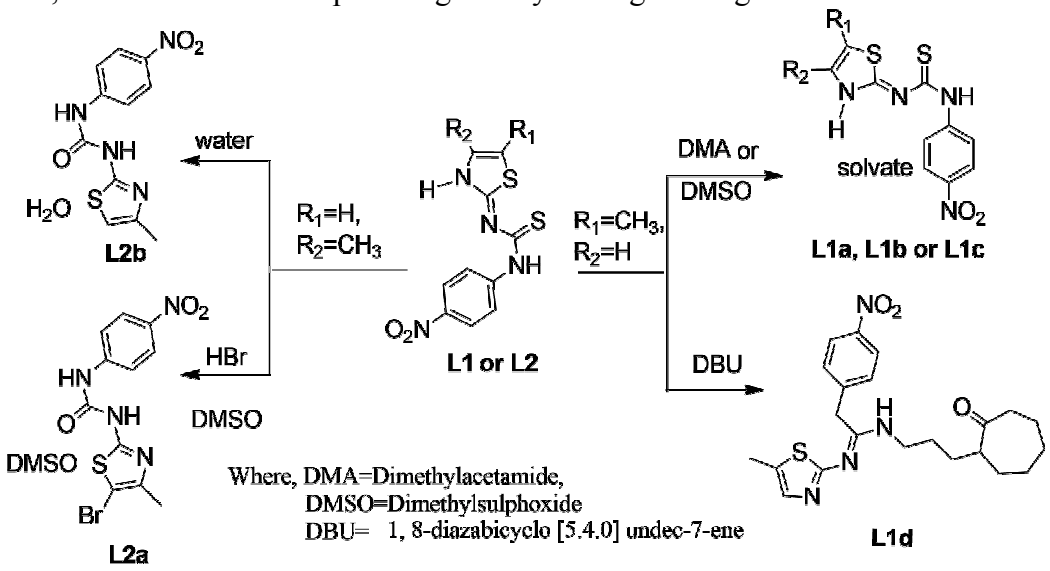
Poster Presentation-75

Intriguing Aspects of Chemical Reactivities of Aminothiazole Derivatives Possessing Amine-Imine Tautomerism

Nithi Phukan, Jubaraj Bikash Baruah*
Department of Chemistry, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India

Abstract: Intriguing reactivities of positional isomers 1-(5-methylthiazol-2-yl)-3-(4-nitrophenyl)thiourea (**L1**) and 1-(4-methylthiazol-2-yl)-3-(4-nitrophenyl)thiourea (L2) towards environment polluting ions such as mercuric, fluoride, bromide and solvents provide scope to study various self-assemblies formed under different conditions and allied applications. The solid state structures of **L1** and **L2** revealed that both adopt the imine form. However, the number of symmetry independent molecules in asymmetric units as well as the

packing patterns of these two compounds have distinguishable features. The asymmetric unit of **L1** has three symmetry non-equivalent molecules. The packing patterns of these two positional isomers differ as **L1** has two arrays of dimeric self-assemblies in contrast to the single array found in the packing of **L2**. The reactivity of **L1** and **L2** with solvents was explored through crystal structure elucidation. The compound **L1** forms solvates with N,N′-dimethylacetamide or dimethylsulphoxide. The structural analysis of solvates of L1 provided avenues to study conformational adjustments. An unusual example of a metastable solvate of L1 with N,N′-dimethylacetamide was isolated. A ring-opening reaction of 1,8-diazabicyclo [5.4.0] undec-7-ene with **L1** has been observed. The compound **L2** underwent hydrolysis cum bromination with hydrobromic acid in dimethylsulphoxide. The reactivities of **L1** and **L2** towards mercuric and fluoride ions contributed to chemodosimetric signal transductions. The study establishes the impact of subtle changes in structure, reaction and crystallization conditions, which can influence pre-designed crystal engineering.



Scheme 1: *Reactivity of **L1** and **L2** towards Different Solvents.*

Reference:

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Poster Presentation-76

Zeolite and Its Applications

Saloni Nanda[1],Samikhya Panigrahy[1],Sushree Akankshya Dhar[1], Twinkle Sahu[1], Nitish Kumar Sahu[1], Saswati Dhar[1], Priyanka Priya Khuntia[1], Subhakanta Dash[1],Itishree Mohanty[1], and Matruprasad Dash[2]

[1]*Department of Chemistry, Synergy Institute of Engineering and Technology, Dhenkanal, Odisha, India*

[2]*Department of Physics, Synergy Institute of Engineering and Technology, Dhenkanal, Odisha, India*

Abstract: Zeolites are hydrated aluminosilicate minerals of the family of microporous solids. Zeolites, also called molecular sieves, are traditionally referred to as a family of aluminosilicate materials consisting of orderly distributed micro pores in molecular dimensions. They have been widely used as highly efficient catalysts, adsorbents, and ion exchangers in petrochemical industries and in our daily life. Beyond these traditional applications, zeolites are playing an increasingly important role in many sustainable processes. In particular, zeolites have found promising applications in the fields of renewable energy and environmental improvement, such as biomass conversion, fuel cells, thermal energy storage, CO_2 capture and conversion, air-pollution remediation, and water purification, etc. These applications make zeolites potential candidates as solutions to the sustainability issues in our society. In this contribution, an overview of the current and potential applications of zeolites as a resource material is presented.

Keywords: Zeolite, Aluminisilicate material, Catalysis, Adsorbent, Fuel cell

Poster Presentation-77

Smart Materials and Environment

Bipranarayan Mallick*

Model Degree College, Rayagada, Odisha, India

Email: bipranarayanmallick01@gmail.com

Abstract: A smart material should possess a chain of capabilities exhibiting a number of properties and that exciting new materials with such characteristics will be needed in new advances in synthetic polymer chemistry. A large number of innovative methods are developed for the reduction of hazardous wastes like carcinogenic organic solvents, hazardous materials, and nuclear contamination, which has very disastrous effect on environment. For these, polymeric smart materials are finding useful applications in polymer catalysts, which are very useful in waste reduction, catalyst recovery, and catalytic reuse. The polymeric smart coatings have been developed that are capable of detecting and removing toxic nuclear contaminants. Such applications of smart materials involving catalysis chemistry and chemistry for reduced contamination methodology are especially applicable to environmental problems.

Keywords: Smart materials, Hazardous waste, Nuclear contamination

Poster Presentation-78

Synthesis, Characterizationof Chitosan-grafting-Poly(acrylonitrile)/Zn-Al Layered Double Hydroxide/Cu nanocomposites for packaging applications

Shaikh Nazrul[1, 2],Lingaraj Behera [2], Sarat Kumar Swain [1, *]

[1]Department of Chemistry, Veer Surendra Sai University of Technology, Burla, Sambalpur -768018, Odisha, India, [2] P. G. Department of Chemistry, North Orissa University, Takatpur, Baripada -757003, Odisha, India, Email: skswain_chem@vssut.ac.in

Abstract: In the large field of nanotechnology, polymer based nanocomposites have drawn serious attention both from industry and academic sections of current research and development. The present work deals with the application of a relatively new class of hybrid filler such as nano copper doped Zn-Al layered double hydroxides (LDHs) for synthesizing polymer based nanocomposites.We have synthesized nano copper doped Zn-Al layered double hydroxide reinforced CS-g-PAN nanocomposites bya simple and environmentally friendly *in situ* polymerization technique. The nanocomposites are characterized by FTIR, XRD, TGA, FESEM,HRTEM, EDS, and oxygen permeability Test. The interaction between hybrid filler and polymer is studied by FTIR. The XRD pattern indicates the presence of Zn-Al LDH, copper, chitosan and polyacrylonitrile in the nanocomposites. TGA reveals CS-g-PAN/Zn-Al LDH/Cu nanocomposites have more thermal stability over Chitosan, virgin PAN and CS-g-PAN copolymers. The surface morphology of copper nanoparticles was confirmed from the FESEM and the HRTEM images. The presence of nano copper and Zn-Al LDH in nanocomposites improves the antibacterial properties. The synthesized nanocomposites have appreciable thermal stability in combination with reduction in oxygen permeability and antibacterial activities by which the material is suitable for packaging applications.

Keywords: LDH, Cu nanoparticles,Nanocomposites, Chatacterization

Popular Article

Popular Article

SUSTAINABLE CHEMISTRY

Dr. Sarat Chandra Das

Former President, Orissa Chemical Society

Science is the gift of nature. Chemistry is a part of the gift. Why the question of sustainability of chemistry comes ? With the enormous enhancement of science and all its allied subjects individuality has merged into mass. Now a days chemistry as an independent species does not exists. If we look back for a couple of years Nobel prize in chemistry is shared by eminent scientists worked on biological science, life sciences. It is a good signal chemistry is becoming multi dimensional in its applications. Basic chemistry learning and research is now supposed to reach at a saturation point. People feel the concept and definitions have become obsolete now a days . There is no fume and smell in a chemical laboratory. Computer simulation says the environment of a chemical reaction. Recently I had the opportunity of visiting few top chemistry department of the world in USA. I could guess no dynamism in chemistry research in the laboratory. Few scientists spoke about its applications and utilisations in the society. If this trend goes the sustainability of chemistry will be in fix.

Currently there is attack on all sides with plastic industry. It has become a question of environment issues. Since plastics have replaced over steel, stone, cement and many hard materials it is widely accepted as economic, user friendly material. When it became non degradable the question of environment issues came to the front. Why chemistry will not find any solutions for it. Why our chemists shall not design all degradable plastics so that even after its use it will be recyclable. This is the job of the chemists and chemical technologists. The developed countries those who shout about the environment concern for the use of plastics they consume maximum amount of plastics and polythene per head per annum in comparison to other countries. Let the chemists solve this problem

Paints and coatings play an important aspect of modern chemistry with rapid urbanisation of many developing countries. A handful of companies are engaged in this field of research. Hardcore chemists can solve this problem in designing the molecular structure of organic dyes so that it shall have more durable and anti corrosion quality when it is applied to our buildings or even in our day today use.

Role of chemistry in the field of agriculture is now more challenging before a chemists. Whether it is an application of pesticide or fertiliser or even watering the field, chemists shall have to resolve these issues which is currently neglected in many countries. Farmers does not have any qualitative idea of using pesticides or insecticides in the field. Only

quantitatively he applies in the field for more products As a result of which he performs hard work but its expenses he gets less yield. Applications of chemistry is now essential in the field of agriculture keeping in mind of latest technology and production in general. Farming with nano technology should be explored by our chemists.

In automobile industry the role of chemists is equally important. Many developed countries they adopt it. Still we lack to a substantial amount in this field. Moulding of material, light weight equipments, heat resistant structures are the main concerns before a chemists. We are to design the chemical structure of the light material which shall have wide applications in automobile industry. Basic research is needed in this field. Modifications of crystalline structure of a material to meet the need of the industries is essential.

Pharma industry is another branch where chemists are engaged for high level research. Since it is directly related to life cycle of human beings as well as plant and animals chemistry has an important role for it. Many multinational companies are the pioneer in this field of research. Still it should come down to base level pharma companies who can go for an intensive investigation in this field. Chemists has a major role to play for it. Choosing the right composition of a drug depending upon its multifacial applications in the job of a chemists. Hardly this is done in many places. This field can be explored by the chemists.

Now time has come let the chemistry research should go green in our laboratory also in our environment. Recently a research article published in Organic letters a journal by American chemical society which tells about the synthesis of many life saving drugs by using green catalysts. This is used in place of reactive, corrosive and many explosive chemicals which are replaced by green catalysts that helps chemists to synthesise new compounds. An important aspect is that it is working out at room temperature using water as solvent. Chemistry research and subject preparation should be angled towards green level now a days. When substantiality comes we the chemists should give importance to basic concepts and its implementation at grass root level of the subject.

Orissa chemical society constitute an elite and enlightened mass of the chemistry and chemical technologists. They shall focus more at base level of chemistry teaching, learning and research. When we think our self to be compared with other fellow chemists of different countries let us introspect our self what & How we have contributed to our own people and state for the sustainable chemistry and its research.

Jai Jagannath

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