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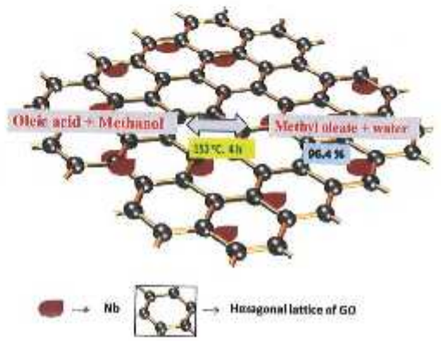
CONTENTS

379 Catalytic activity of niobia supported graphene oxide for esterification of oleic acid

Niobia loaded GO has been used as catalyst for esterification of oleic acid. In this reaction, 96.4% of methyl oleate is obtained under the reaction conditions of 150 °C for 4 h reaction time. This novel niobia loaded GO as heterogeneous catalyst shows excellent catalytic activity and reusability in esterification of oleic acid.

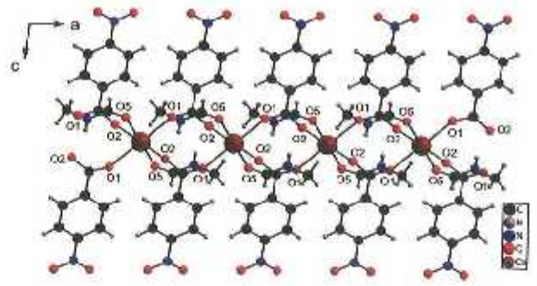


S Kanimozhi, A Pandurangan* & P Hemalatha

Notes

387 On the syntheses and structures of two calcium coordination polymers containing terminal amide ligands

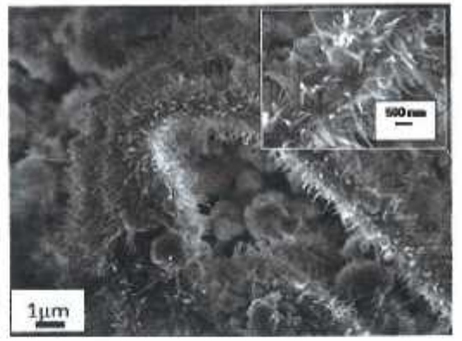
The syntheses and crystal structures of two calcium coordination polymers, viz., $[Ca(NMF)_2(4\text{-nba})_2]$ (4-nba = 4-nitrobenzoate; NMF = N-methylformamide) and $[Ca(BA)_2(4\text{-nba})_2]$ (BA = benzamide) are reported. A unique μ_2-η^1:η^1 bridging bidentate 4-nba ligand links the hexacoordinated Ca(II) ions situated on a special position in both compounds into a one-dimensional chain with Ca···Ca separations of 5.561 and 5.482 respectively.



Bikshandarkoil R Srinivasan* & Kiran T Dhavskar

393 One pot non-emulsion based hydrothermal synthesis of urchin-shaped hydroxy sodalite using waste coal fly ash

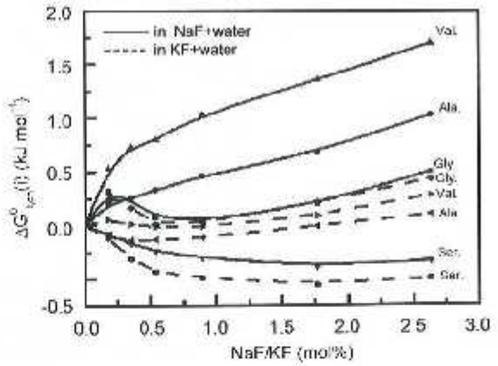
Urchin-shaped hydroxy sodalite particles are synthesized by one pot non-emulsion based hydrothermal conversion of coal fly ash at 100 °C for 96 h in the absence of any surfactants. BET surface areas of the particles are found to be 193, 197, 82 and 44 $m^2 g^{-1}$ for the reaction time of 24 h, 48 h, 72 h and 96 h, respectively. FESEM images reveal that the thread-ball-like particles are converted into urchin-shaped hydroxy sodalite on increasing reaction time from 24 h to 96 h at 100 °C. EDX analysis indicates Si/Al and Na/Al ratios of 1.28 and 1.03, respectively, which are close to the stoichiometric composition of hydroxy sodalite.



Rituparna Das, Subhajit Aich & Milan Kanti Naskar*

399 Solubility and transfer Gibbs free energetics of glycine, DL-alanine, DL-nor-valine and DL-serine in aqueous sodium fluoride and potassium fluoride solutions at 298.15 K

The amino acids, glycine, DL-alanine, DL-nor-valine and DL-serine, show salting-in effect in aqueous-KF, whereas in aqueous NaF solutions, only glycine and DL-serine show salting-in effect. DL-serine shows the highest stability in both KF and NaF solutions. The values of Gibbs free energy due to acid-base, hydrogen bonding, and dispersion types of interactions show that all the amino acids are more stable in aqueous KF rather than in aqueous NaF solutions. K^+ imparts stronger dispersion interaction as compared to Na^+ to stabilise larger amino acids.

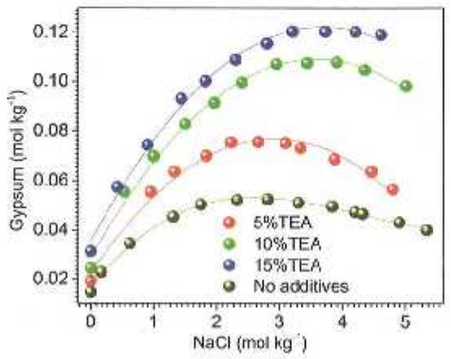


Sanjay Roy*, Partha Sarathi Guin, Kalachand Mahali & Bijoy Krishna Dolui*

407 Effect of hydroxyl alkyl amines on the solubility behavior of calcium sulphate dihydrate (gypsum) in the aqueous sodium chloride system at 35 °C

Jignesh Shukla & Arvind Kumar*

Addition of hydroxyl alkyl amines (ethanolamine, diethanolamine and triethanolamine) at 35 °C alters the solubility of $CaSO_4 \cdot 2H_2O$ in NaCl solutions significantly. At any equal concentration of hydroxyl alkyl amines in the solution, the order of $CaSO_4 \cdot 2H_2O$ solubility enhancement is: EA < DEA < TEA. The addition of hydroxyl alkyl amines shifts the solubility maximum of $CaSO_4 \cdot 2H_2O$ towards higher concentration of NaCl in solution.



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Graphene oxide-supported gold nanocomposites for highly sensitive sandwich immunosensor for α-fetoprotein detection

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A graphene oxide-Au NPs sensor platform combined with a multiple-enzyme labeled detection antibody-carbon sphere bioconjugate has been used as the basis for an ultrasensitive electrochemical immunosensor to detect the cancer biomarker, α-fetoprotein (AFP). Greatly enhanced sensitivity has been achieved by using the bioconjugates featuring horseradish peroxidase (HRP) and Ab2 linked to carbon nanospheres (Ab2-HRP-Au-PDA-carbon sphere) at a high ratio of HRP/Ab2. After a sandwich immunoreaction, the Ab2-HRP-Au-PDA-carbon sphere captured onto the electrode surface produces an amplified electrocatalytic response due to the reduction of enzymatically oxidized thionine in the presence of hydrogen peroxide. The increase of response current is proportional to the AFP concentration in the range of 0.01-20 ng/mL, with the detection limit of 3 pg/mL. This amplification strategy is a promising platform for detection of other proteins and clinical applications.

Keywords: Nanocomposites, Immunosensors, Gold nanoparticles, Sandwich immunosensors, Graphene oxide, α-Fetoprotein

Immunoassays based on specific antigen-antibody recognition for analytical purposes have been an attractive subjected for clinical diagnosis[1,2] environmental analysis[3], and the food industry[4]. α-fetoprotein(AFP), an oncofetal glycoprotein with a molecular mass of about 68 kDa[5], is well-known as a tumor marker. In healthy human serum, the average concentration of AFP is typically below 25 ng/mL, and an elevated AFP concentration in adult plasma may be an early indication of some cancerous diseases including hepatocellular cancer, yolk sac cancer, liver metastasis from gastric cancer, testicular cancer, and nasopharyngeal cancer[6]. Thus, it is necessary to detect AFP for clinical diagnosis. Several methods and strategies such as fluorometry atomic studies[7], absorption spectrometry[8], and enzyme-linked immunoassay (ELISAs)[9] have been reported for the determination of AFP. Electrochemical immunoassays seem to be excellent candidates for the rapid and inexpensive diagnosis of genetic diseases and for the detection of pathogenic biological species of clinical interest, due to their advantages such as simple pretreatment procedure, fast analytical time, precise and sensitive current measurements, and inexpensive and miniaturizable instrumentation[10]. Recently, numerous immunological methods for determining the concentration of AFP by electrochemical imunoassays have been reported[11,12]. In the development of electrochemical immunosensing strategies, the stability or activity of the immobilized biocomponents and signal amplification of the immunoconjugates are two key factors[13]. Attempts have been reported in the literature to improve the stability or activity of the immobilized biocomponents by using various novel materials such as organic-inorganic composite materials[14], carbon nanotubes[15], and other nanomaterials[16].

Carbon nanomaterials have attracted considerable attention in electrochemical biosensors because of their extraordinary physical properties and remarkable conductivities[17]. While CNTs have been widely used as labeling particles in immunoassays with excellent sensitivity, problems that need to be overcome include nanotube heterogeneity and purity. Recently, porous carbon nanospheres (CNSs) have also displayed unique advantages owing to the tunability of particle size and shape as well as the resident porosity that promotes diffusion of guest molecules through interconnected micropores[18]. A "green" synthetic approach has been developed that involves