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Synthesis and characterization of cellulose nanocrystals (whiskers) by sono-chemical hydrolysis

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In this communication Classical hydrolyses leading to formation of cellulose nanocrystals with rod-like morphology using hardwood and softwood or whiskers for the nanoparticles synthesized have been studied. Cellulose nanocrystals were extracted and consequently subjected to acid hydrolysis and the resulting nanocrystal suspensions, with the appropriate concentrations, were further subjected to sonication. This led to surface modification in terms of change in the functionality or grafted sulfate groups, which are primarily negatively charged. These whiskers form stable layers at the air-water interface in the presence of a suitable cationic amphiphilic molecule. The cellulose whiskers obtained from hydrolysis with sulfuric acid or with hydrochloric acid was treated with different solvents like water, and a-protic solvents like N,N-dimethyl formamide (DMF), dimethyl sulfoxide (DMSO), and N-methyl pyrrolidone (NMP). The presence of sulfate ester groups on the whisker surfaces after hydrolysis with sulfuric acid was the deciding factor in their dispersability in polar aprotic solvents. These whiskers dispersions in organic solvents could be interesting precursors or intermediates for the preparation of whisker nanocomposites.

A novel spherical cellulose nanocrystal suspension was prepared by sono-chemical hydrolysis of microcrystalline cellulose with mixed acids under ultrasonic treatment. Structures with different colors and liquid crystal organizations were observed at different concentrations. These characteristics hold lot much of promise in terms of their use as functional materials.

The synthesized nanocrystals were analyzed using different analytical tools like SEM, TEM, XRD, UV spectroscopy etc. and their particle size is also determined.

Biography

Kulkarni Shrikant R. has completed his Ph.D. in Green Chemistry and has got very rich teaching experience for 30 years. He has got many research papers to his credit in the areas of Green Nanochemistry and Separation Science in particular. He has been dealing with subjects like analytical, Green and Industrial, Materials Chemistry for years together to undergraduate and post graduate engineering students.

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Variation of SnO_2 nanostructures by changing the evaporation rate using modified Physical Vapor Deposition (PVD)

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Different nanostructures of Tin dioxide (SnO_2) were grown using modified Physical Vapor Deposition (PVD) technique. Mo boat (99.99%) was used as an evaporation source. Specific amount of pure Sn (99.999%) powder was rapidly evaporated in an oxygen atmosphere. The boat assembly was encapsulated in an indigenously fabricated quartz tube chamber (length of 100 mm, diameter of 25 mm), having a gas inlet windows of 50 mm length and 5mm width. The whole assembly was enclosed in high vacuum chamber. During evaporation O_2 pressure of 1 Torr was kept constant and base pressure of the vacuum chamber was maintained at 10^{-5} Torr. By controlling the current passing through Mo boat the rate of evaporation was changed. This resulted in different nanostructures such as nanocrystal, nanowires etc.., i.e. by changing the evaporation rate as observed from scanning electron microscope (SEM). X-ray diffraction (XRD) pattern confirm the crystallinity and purity of the grown SnO_2 nanostructures. Only peak related to SnO_2 was found and no other impurities were detected within detection limit of XRD.

Biography

K. N Tripathi has completed his Ph.D at the age of 25 years from University of Delhi, India and postdoctoral studies from University of New Castle upon Tyne, UK. He has been Prof. and Head, Department of Electronic Sciences, University of Delhi, South campus, Delhi and also Dean Research. He is the Vice-chancellor of Galgotias University, Yamuna expressway Gautam Budh Nagar U.P., India. He has organized number of national and international conferences and delivered number of invited talks at national and international fourms. He has published more than 150 papers in reputed journals.

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