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Structural features in nano-ZnO-Folic acid conjugate system

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Zinc oxide (ZnO) nanoparticles (grown in the template of folic acid) are biologically useful, luminescent material. It can be used for multifunctional purposes, such as biosensor, bioimaging, targeted drug delivery and as growth promoting medicine. Though, ZnO is categorized as: "generally recognized as safe" (GRAS) but ZnO nanoparticle system may be cytotoxic. ZnO nanosystem could be of important relevance in the context of nanomedicine, where targeted treatment of biological systems at molecular level is a necessity. ZnO quantum dots with their surface modification and bio-conjugation for selective destruction of tumor cells and their potential use for drug delivery applications is the cardinal issue of this presentation..

In this context, sol-gel chemical method was used to develop the uniform size ZnO nanoparticles, agglomeration of the these particles to large sizes was prevented due to surface charge density of folic acid in the medium. The characteristic wurtzite crystalline structure of ZnO nano particles in the X-ray diffraction analysis has been confirmed. Also, the structural morphology and size determination through TEM, and the band gap analysis of the synthesized particles have been performed. For the detailed micro structural analysis and any surface vacancy related studies in the wurtzite folic acid capped ZnO nanomaterials, the material has been subjected to positron annihilation spectroscopic studies using positron life time measurements and the Doppler broadening line shape studies with 'S' and 'W' parameter analysis. A two detector coincidence Doppler broadening(CDB) of positron annihilation radiation studies to probe the differences of highly pure as prepared ZnO oxide nano material sample and the bio-templated sol-gel grown sample, considering their ratio curves of CDB annihilation radiation, has also been undertaken. The results show important surface structural features (owing to elemental analysis) due to folic acid conjugation, which are identified with the characteristic stretching group frequencies in FT- I.R. spectroscopic studies. The possible bio-medical application in relation to the structural properties observed can be further projected to aqueous dispersed state properties of inorganic ZnO nanoparticles (average size 4 nm), with their surface modification and bio-functionalization with folic acid at physiological pH~ 7-7.5 for bio-imaging and targeted therapeutic applications which will be discussed with respect to their emission properties.

Biography

Bichitra Ganguly is a PhD from Calcutta University (1986) and pursued postdoctoral studies in IPN, Orsay under French CNRS, has varied interest in Applied Nuclear Science, as well as in micro-structural aspects, polymeric materials, surface science and nanomaterials. She has taught special courses in University classes and has supervised three students for PhD under different subject heads. She has published more than 60 papers in refereed journals and worked as Guest Editors for scientific journals.

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Towards large scale preparation of carbon nanostructures in molten salts

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Recent progress in the preparation of graphitic carbon nanostructures, including carbon nanotubes (CNTs), spherical carbon nanoparticles and graphene by electrochemical erosion of graphite cathodes in molten LiCl is presented. LiCl molten salt can react with graphite both chemically and electrochemically to produce carbon nanostructures. Corrosion of graphite in molten LiCl can lead to the formation of different microstructures comprising exfoliated carbon sheets and nanosheets, pitted particles and carbon nanorods. In contrast, the electrochemical erosion of a graphite cathode during the electrolysis of molten lithium chloride salt can be used for the preparation of carbon nanotubes and spherical carbon nanoparticles. Graphene nanosheets can be synthesised in a large scale by electrochemical peeling of graphite in molten LiCl. The graphene nanosheets produced were found to possess a high degree of graphitization.

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