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Synthesis and characterization of alanine-capped water soluble zinc sulfide nanoparticles

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Semiconductor nanoparticles have attracted considerable attention due to their size depended photophysical and photochemical properties. They possess application in various fields such as light emitting diodes, photoconductors, catalysis, optical sensors and in novel biomolecular applications like DNA detection etc. Zinc sulfide is one such material having application in various field relating to solar energy conversion and biological applications. It is well known that semiconductor nanoparticles are themselves highly unstable like fluorescent probes in biological labelling and diagnostics, hence semiconductor nanoparticles must be water-soluble. For this reason, a new direction of biological surface modification of semiconductor and metal nanoparticles with antibodies and peptides received more attention lately. In the present work, we have synthesised L-alanine passivated ZnS nanoparticles. L-Alanine, an amino acid, is used as a capping agent in a view to increase the dispersion ability of the nanoparticles. Herein, we report on the optical and morphological properties of ZnS nanoparticles as a function of temperature. The employed synthetic method successfully yielded water soluble ZnS nanoparticles with quasi-spherical shape morphology. Temperature varied from slightly above temperature to about 90°C. The synthesized zinc sulfide nanoparticles were characterized by UV-visible spectrophotometer, Fourier Transform Infrared (FTIR) spectrophotometer, Transmission Electron Microscopy (TEM) spectrophotometer and X-Ray Diffraction (XRD) spectrophotometer. The prepared ZnS nanoparticles show effective photocatalytic activity towards the degradation of methylene blue dye under visible light irradiation for their probable application in waste water treatment.

Biography

Thapelo Mofokeng is pursuing his Master's degree in Department of Chemistry with concentration in Nanotechnology at Vaal University of Technology. His research interest includes "Synthesis of nanoparticles, their toxicity and application in catalysis and biological systems". More specifically his work examines amino acid-capped metal sulfide nanoparticles and their toxicity for biological imaging.

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