# Structural and Optical Properties of Microwave Synthesized Silver Doped ZnS Encapsulated by NaCMC

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## Abstract

The main aim of this work is to synthesize non-toxic, biocompatible inorganic luminescent nanoparticles (NPs) of zinc sulphide (ZnS) doped with Ag+ ions using chemical precipitation method. This communication reports synthesis of silver doped ZnS encapsulated by sodium carboxy methyl cellulose (NaCMC) and its characterization. The effect of efficient heating by microwaves were utilized to achieve faster reaction rates. The effect of dopant (silver) concentration on the photoluminescence behavior of the composite as a new approach for the preparation method was studied. Synthesis involves chemical co-precipitation method using zinc acetate and thioacetamide as ZnS precursors, silver nitrate as dopant salt, carboxy methyl cellulose as capping agent and water as solvent. The synthesized samples were characterized for their structural and optical properties. Substitutional doping of silver in to the ZnS lattice was indicated by the XRD studies. The nanocrystallite size increased with Ag concentration. The presence of silver dopants was indicated by EDS analysis. The band gap energies obtained from UV – Vis spectroscopy for all samples were higher than that of bulk value (3.68 eV) indicating quantum confinement effect. Photoluminescence measurements indicated maximum intensity at certain optimum concentration of added silver dopant. The difficulty in substitutional doping of Ag in to ZnS faced in earlier works has been overcome in our work due to microwave heating and this also influences the growth mechanism. As Ag is known for its antimicrobial properties, the Ag doped NaCMC capped ZnS samples are suitable for possible application as nanoscale fluorescent probes for potential biological and medical applications.