

Executive Summary of the UGC Minor Research Project

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Synthesis of some Group II b Chalcogenide nanoparticles by a Polyol method.

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Objectives:- Synthesis of nanoparticles by solution colloidal methods provides a most efficient path way where particles are first nucleated and then grown to a desired size by a controlled reaction of precursor molecules. The widely used methods require high temperature and uses air sensitive and highly poisonous reagents. On the other hand, lower temperature, convenient macroemulsion-based methods generally yield particles of much lesser quality with a wider size distribution.

Polyol method is a method which proved very attractive with regard to the preparation of nanoscale particles. Here, a metal precursor is heated in a high boiling alcohol. Owing to high temperature during the synthesis, the process yields well crystallized materials. Also the polyol medium efficiently complexes the surface of the particles and consequently the particle growth is limited. Furthermore, agglomeration of particles is prevented. But this method has not been well investigated with regard to its suitability for the synthesis of nanoscale sulphides such as CdS, ZnS or HgS. The proposed work aimed at adopting this method for the preparation of nanoscale transition metal sulphides using metal complexes.

Keeping this in mind, it was proposed to synthesise and characterize some metal complexes. The utility of these complexes with regard to suitability for use as single source molecular precursors for the synthesis of metal chalcogenide particles in the nano regime was proposed to be studied.

Work Done: - As proposed in the project, the lab work was completed by the end of December 2012. A thio complex of Cadmium using tetramethylthiuram monosulphide was prepared and tried as precursor for nanoparticles by polyol method, using ethylene glycol and propylene glycol as high boiling solvents. Some encouraging results were obtained.

It was found that cadmium acetate complexes of tetramethylthiuram monosulphide can act as a good nanoprecursor when using ethylene glycol as well as propylene glycol as high boiling solvent in the polyol method

The Principal Investigator also participated in some international and national seminars related to the topic of work.

The work was published in two peer reviewed journals.

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Principal Investigator