

ABSTRACT

INDEX NO- 10/08/Phys./18

D/O/R- 08/01/2008

TITLE- An Investigation of Electronic Properties in Oxide and Sulphide Nanoclusters in Dielectric Background.

Resubmitted by- Moumita Barman.

At present more importance has been given on wide band gap nano-materials. Nano-structures have attracted steadily growing interest due to their unique, fascinating properties as well as their possible role in the new types of nano-scale device in contrast to the bulk materials. The nature of the quantum confinement of charge in such a system provides an unique opportunities of study both from science and technology view point.

In this present research an electrical method of characterizing a nano-system have been done. The nano-meter scale inclusion exhibit electrical properties containing confinement effect and strong electrical non-linearity with apparent manifestation of electrical noise. The nano-scale pattern formation has yield interesting result beside controlling the size by controlling the parameter of preparation.

The synthesis of nano- structures are realized by natural self assembly of different nano-structures (namely oxides and sulphides of some d and f band metallic elements- wide band semiconductors e.g ZnO, CuO, CuS, TiO, MoS, NiS etc) in strong dielectric /firm capping background. The self assembly is to be exploited following a chemical si-tu process followed by sol-gel process.

Formation of ionic nano-clusters NiS within polymeric substrate is distinct and clear from I-V characteristics curve. From the study of optical absorption spectroscopy one can assume that as if three type of sized dependent nano-composite formed and it is confirmed that NiS nano -cluster is a small band gap semiconductor. Formation of nano-clusters of Co doped ZnO in sintered specimen is distinct and clear from I-V characteristics curve. From the results of optical absorption spectroscopy study one can assume that as if three type of sized dependent nano composite formed and it is confirmed that Co doped ZnO nano composite is amazing.

The various experimental investigation are carried out over the developed specimen are XRD, AFM for micro-structure and morphology examination. The electronic properties are to be probed using spectro-photometric, Impedance spectroscopy, photoluminescence, and DC volt Ampere with temperature variation set up.

This work involves chemical/ electrochemical sol-gel growth of DMS (dilute magnetic semiconductors) materials, characterization and electrical transport studies.

Keywords: quantum confinement, synthesis, nano-composite.

Supervisors Signature

Candidate's Signature

Moumita Barman.

1. *Tapas Ranjan Mridha 17/1/17*

Tapas Ranjan Mridha

Professor

Department of Physics

Jadavpur University

Kolkata-700032

2. *Aloke Kumar Sarkar 17.2.17*

Dr. Aloke Kumar Sarkar

Associate Professor, Physics (Retd.)

Bijoy Krishna Girls' College

5/3, M. G. Road, Howrah-711 101