

DECLARATION

I, Madhuchhanda Choudhury bearing Registration No. Ph.D/2029/12 dated 12.09.12 hereby declare that the subject matter of the thesis entitled “**Preparation of Metal Oxide Semiconductor Quantum Dots and Their Applications as Nano Gas Sensor**” is the record of work done by me and that the contents of this thesis did not form the basis for award of any degree to me or to anybody else to the best of my knowledge. The thesis has not been submitted in any other University/ institute.

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PREFACE

This thesis contains original research on semiconductor quantum dot gas sensors. Quantum dots are three dimensionally confined structures in nm range. Due to size quantization, some new phenomena like enhancement in band gap, large surface to volume ratio etc. occur in the “samples. These properties make them very attractive candidates for developing quantum dot “gas sensor”. In the present investigation, quantum dots of three different materials have been synthesized. These are: ZnO, SnO₂ and Fe₂ O₃ and tested for sensing of three reducing gases namely acetone, ethanol and methanol.

The thesis is divided into six chapters. Each chapter is split into several sub-sections. The first chapter contains the concept nano materials and quantum dots, properties and technological importance. The second chapter contains the literature survey while 3rd chapter discusses synthesis procedures of quantum dots by quenching method. The fourth chapter contains characterizations of synthesized quantum dots by Optical absorption spectroscopy X-ray diffraction (XRD) study, High Resolution Transmission Electron Microscopy (HRTEM), Optical Absorption Spectroscopy study is mainly adopted for revealing the band gap while XRD and HRTEM studies are mainly used to study the quantum dot size and the surface morphology. In fifth chapter, the applications of quantum dots gas sensors have been discussed. In present study, reducing gases been chosen. In sixth chapter the present work is concluded with further direction of research in this field.

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