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A SIMPLE METHOD OF ZNO NANOPARTICLE SYNTHESIS AND EFFECT OF SURFACTANT ON THEIR OPTICAL PROPERTIES

Wahida Rahman, Samiran Garain,
Tapas Ranjan Middy, Dipankar Mandal*

Organic Nano-Piezoelectric Device Laboratory, Department of physics,
Jadavpur University Kolkata 700032, India.

*e-mail: dipankar@phys.jdvu.ac.in

ABSTRACT

In his work, we have synthesized ZnO nanoparticles with different morphologies based on the choice of selective surfactant. The morphology of the ZnO structured was controlled by hydrothermal reaction conditions, Zn source and surfactant. For structural study and analysis, the fabricated nanostructures were characterized using the X-ray diffraction (XRD). The effect of synthesis process on morphology and thereby the optical properties have been studied. The UV-vis absorption spectra reveal a strong UV absorbance which owes to the recombination of an electron in the zinc interstitial and a hole in the valance band.

Keywords: Hydrothermal synthesis of ZnO nanostructure, effect of surfactant, absorbance spectra

INTRODUCTION

The development of nanomaterials is attracting attentions due to their unique optical properties that are different from conventional bulk materials [1-3]. Optical properties of inorganic nanomaterials depend on the different synthesis process. It is well known that the size, morphology, and structure of nanomaterials significantly influence their optical properties and their applications. ZnO is a widely studied well-known n-type semiconductor ($E_g \sim 3.37$ eV at 300 K) having higher exciton binding energy (60 meV) as compared to the other semiconducting materials, exhibits more resistive nature to radiation and is used as a multifunctional material for piezoelectric, ferroelectric and ferromagnetic devices [4, 5]. Due to its wide band gap of 3.37 eV at room temperature, it is being extensively used in short-wavelength light-emitting, ultraviolet lasing, and many other versatile properties, namely, UV and visible emission, electrical conductivity [6]. Furthermore, optical transparency of ZnO also finds several promising applications in gas sensors, photovoltaic devices and solar cells [7-10].

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