

# Synthesis and Characterization of ZnO Nanostructure by using Hydrothermal Method

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**Abstract**—ZnO and Polyethylene glycol (PEG) assisted ZnO nanorods were synthesized using the hydrothermal method at temperature of 180°C for 24hr. The method involved growth of ZnO nanorods using aqueous solution of zinc chloride as a Zn<sup>2+</sup> source and ammonia solution (NH<sub>3</sub>) to adjust the pH value of resultant solution. Polyethylene glycol (PEG) was used as a surfactant. The concentration of surfactant (PEG) was change while concentration Zinc Chloride and Ammonia solution had constant. The influences of the PEG on the morphological, structural and optical properties of the ZnO nanostructures were studied. The X-ray diffraction pattern of the as-grown ZnO nanorods and relevant analyses confirm the well crystallized hexagonal (wurtzite- type) structure. SEM observation revealed that ZnO product was grown in the form of nanorods that were united together to form 3D flower like morphology. The photoluminescence spectroscopy of PEG assisted ZnO revealed that band edge emission peak at 406 nm and a defect related blue emission peak at 477nm. PL characterization shows no changes in spectra of PEG assisted ZnO as concentration of PEG changed. The bandgap of pure ZnO is 3.29eV which is carried out by UV-Vis spectroscopy. The bandgap of PEG assisted ZnO decreased as compare to pure ZnO.

**Keywords:** ZnO, Hydrothermal Method, Nanostructures, etc.