Influence of Solution Concentrations on the optical and structural properties of ZnO Nanostructures by Hydrothermal Technique

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The ZnO nanostructures have been grown by hydrothermal technique. The reactant solutions used for the growth of the ZnO were zinc nitrate hexahydrate (Zn(NO$_3$)$_2$·6H$_2$O) and methenamine (C$_6$H$_{12}$N$_4$). The ZnO nanostructures were grown with various concentrations of the reactant solution. The structure and optical properties of the ZnO nanostructures have been characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD) and room-temperature photoluminescence (PL) spectra. PL spectra shows that the intensity of near band edge emission (NBE) is increased and full width at half maximum (FWHM) become narrow as the concentration of the reactant solution increases. The preferential c-axis orientations of (001) ZnO were observed in the XRD spectra. The ZnO nanorod become flowerlike structure and the diameter of the rod increased as the concentration increases.