

Influence of Deposition Parameters in Solution-based Process on the Characteristics of ZnO Nano-Structure

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Zinc oxide(ZnO) is one of the versatile semiconducting materials due to its chemical and electrical properties such as resistivity control over the range 10^{-3} to $10^5 \Omega \cdot \text{cm}$, transparency in the visible range, high-electrochemical stability, non-toxicity. Zinc oxide is also an attractive material with wide band gap (3.37 eV) and high excitation binding energy (60 meV) at room temperature. It has many potential applications in short-wave device, ultraviolet laser, thin-film gas sensor and wearable devices. In this study, various ZnO nano-structures including flower-like, chrysanthemum-like as well as thin films were synthesized by a solution-based deposition method designed by a combination of a continuous flow reactor process and a spin coating method, and then they were characterized to investigate the influences of the processing parameters on the performance of ZnO. XRD, SEM, EDX, UV-vis Spectroscopy, and XPS were employed in the characterization of the prepared structures and films. Based on the characterization, it was found that flow rate, annealing temperature, pH, reaction time, and precursor concentration exerted an effect on the properties of ZnO.