

Characterization of Various Size ZnO Nanorods Prepared by RF Sputtering and Hydrothermal Method

Chi-Shiuan Yen, Huai-Yi Chen, Horng-Show Koo, 賴瓊惠

Electronics Engineering

Engineering

chlai@chu.edu.tw

Abstract

In this paper, we used RF sputter to deposit the ZnO seed layer of 0.6 μm in thickness, which was then immersed in zinc nitrate hexahydrate $[\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}]$ and hexamethylenetetramine ($\text{C}_6\text{H}_{12}\text{N}_4$) mixture solution of different concentrations for the growth of ZnO nanorods by hydrothermal method. After annealing at different temperatures, thermal field emission scanning electron microscope (TFSEM) was used to observe the arrangement and growth of ZnO nanorods. We found the concentration of the mixture solution of $\text{C}_6\text{H}_{12}\text{N}_4$ and $\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ would affect the thickness and crystallization of ZnO nanorods, and the annealing temperature would change their columnar arrangement structure. The arrangement structure of the ZnO nanorods grown in the mixture solution of 0.2M concentration had more gaps and pores. Under this condition, we successfully fabricated a dye-sensitized solar cell (DSSC), of which the performance could be further improved by using ZnO nanorods prepared by many different methods.

Keyword : ZnO nanorod, dye-sensitized solar cell (DSSC), hydrothermal method and RF sputtering