

Development of Well-aligned Zinc Oxide Nanorods as Photo Electrodes Applying for Dye-sensitized Solar Cell

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During recent decade, ZnO nanostructures has attracted much more interest for potential applications for dye-sensitized solar cell (DSSC) applications [1]. Because ZnO has promising characteristics such as high bandgap energy of 3.37eV, strong excitonic energy of 60 meV at room temperature, and thermal stability, etc., [2].

In this research, we have successfully developed a novel reducing annealing technique to grow well-aligned ZnO nanorods (NRs) from as-deposited ZnO film on ITO glass, which was completely different from other current fabrication techniques of ZnO nanostructures. During ZnO NRs growth, the zinc catalysts come from reducing of ZnO film instead of any additional seeds or catalyst. With controlling the annealing parameters, well-aligned ZnO NRs could be obtained with good reproducibility.

ZnO film (thickness 500nm) was deposited on ITO glass by RF (13.5MHz) magnetron sputtering method [3]. Sequentially, the reducing annealing was applied to fabricate ZnO NRs on ZnO film in forming gas (1.9% H₂ in N₂) at 450°C. The obtained ZnO NRs were shown in Fig. 1. The structural, optical and electric properties of as-deposited ZnO films and obtained ZnO NRs were characterized.

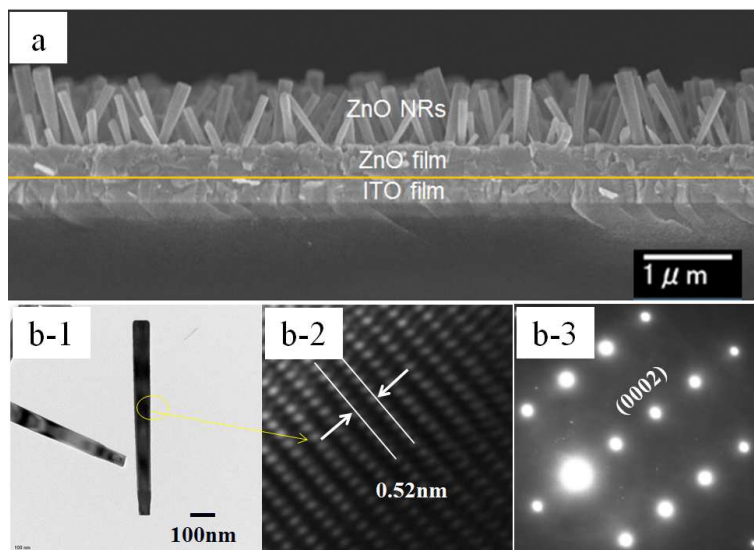


Fig. 1 Characterization of obtained ZnO NRs on ITO glass by (a) SEM cross section image, (b-1) TEM bright field image, (b-2) high-resolution image and (b-3) SAED patterns of this nanorod.

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