Zno nanorods formation for dye-sensitized solar cells applications

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Abstrak

Different morphologies of zinc oxide (ZnO) can be obtained through various synthesizing methods, such as that of the water bath. By synthesizing under various conditions, different ZnO morphologies can be seen as the result of the water bath method. Replacing ZnO nanoparticles with vertically aligned ZnO nanorods results in a much higher energy conversion efficiency. Yet vertically aligned nanorods can only be grown through difficult and expensive methods. Several researchers have studied the growth of one-dimensional (1D) nanorods on homogeneous film with various growth conditions. However, there has been little in the way of research on ZnO nanorods grown on ZnO seed layers using the water bath method. In this research, vertically aligned nanorods with an optimum size ratio were formed through a simple water bath method. This method reveals that the ZnO nanorods are well aligned and grown with a high density and uniformity on the substrate. Their X-ray diffraction patterns reveal that the nanorods are grow in the [001] direction. The density, diameter, and length of the ZnO nanorods can be altered by changing the growing condition. All of the samples were characterized using a scanning electron microscope, X-ray diffraction, and micro Raman spectroscopy. To investigate crystal growth, zinc nitrate and zinc acetate were used when preparing the solution. The results demonstrate that the morphology and alignment of ZnO nanorods are determined by the precursor’s type and deposition time.