Effect of Seed Layer Deposited by Spin Coating Method for Growth of ZnO Nanorods Array

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1. Introduction

Zinc oxide (ZnO) materials are widely used in the fields of optoelectronics due to their electrical and optical properties. We are developing a vertically aligned ZnO nanorods-array for the dyesensitized solar cells (DSCs) application. The ZnO array could provide the direct electron transfer paths to increase the cell efficiency. The previous studies [1] have revealed that the array is affected by the thickness and roughness of ZnO seed lyaer. Spin coating and chemical bath deposition methods are chosen to form the seed layer and the array, respectively, in this report.

2. Experimental

A seed layer solution was prepared by mixing zinc acetate dihydrate with 2-methoxyethanol. The solution was stirred at 60°C for 30 min with an addition of 10 drops of ethanolamine as a stabilizer. Then the solution was deposited and spin coated on the cleaned normal glass substrates followed by a heat treatment at 100°C for 10 min. In order to investigate a surface morphology of the seed layer, the spin coating speed and the number of spin coating were varied. The formed seed layer was annealed finally at 350°C for 1 hour.

3. Results and Discussions

It is confirmed that a thickness of the seed layer is controlled by the number of spin coating. Scanning Electron Microscopic (SEM) images reveal that the seed layer spun coated by 5 times with the spin coating speed of 4000 rpm shows a homogenously spread layer as below. Optimal formation shown conditions will be discussed and ZnO nanorods array will be shown.



Fig.1 Seed layer spin coated 5 times at 4000 rpm.

[1] H. Ghayour et al., Vacuum 86 (2011)101-105 and T.A. Nirmal Peiris et al., J.Nanopart Res. 15 (2013) 2115.