

## The effects of annealing temperature and seed layer on the growth of zno nanorods in a chemical bath deposition process

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### Abstrak

Zinc oxide (ZnO) nanorods have been considered as a potential semiconductor oxide material for the application of dye-sensitized solar cells (DSSC). Various experiments have been conducted to improve its nanostructural characteristics and functional properties in order to make it well suited for enhancing DSSC' performance. Inspired by such studies, the ZnO nanorods array was grown on indium tin oxide (InSn2O3, ITO) substrate in the present work. For this purpose, a seed solution was prepared at low temperature (0oC) using zinc nitrate tetrahydrate and hexamethylenetetramine. The ZnO seed layers were deposited onto ITO glass using a spin-coating technique and further annealed at two different temperatures, 200 and 400 oC. The seeding was also varied between one, three and five layers, prior to the growing process using the chemical bath deposition method (CBD). The results showed that the annealing temperatures significantly influenced the ZnO nanorods' growth. The optimal condition was achieved by using three seed layers annealed at 200oC, providing an average diameter of 157.58 nm, the biggest crystallite size (up to 59.63 nm), and a band-gap energy (Eg) of 3.27 eV. Based on the obtained properties, the growth of ZnO nanorods on ITO substrate in this work has the potential to be used for the application of dye-sensitized solar cells.