

Title: Effect of annealing process on the physical properties of ZnO nanorods and their performances as photodetectors

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Abstract: This study examines the impact of thermal annealing on ZnO nanorods produced by vapour phase transport. Nanorods were annealed at temperatures of 300, 500, and 700 °C. It has been demonstrated through X-ray diffraction that the annealing process led to an increase in crystalline size from 34 to 51 nm, indicating improved crystallinity. The optical bandgap decreased from 3.28 to 3.22 eV as a result of defect minimization during annealing. Due to increased crystallinity and fewer defects, annealing increased the dark conductivity from 0.8 to 2 S/cm, as shown by electrical experiments. After annealing, the photosensitivity increased from 10 to 35 and the responsivity rose from 0.18 to 0.48 A/W. The quantitative results demonstrate that annealing modifies the physical properties of ZnO nanorods and improves their photodetection capabilities.

Keywords: ZnO nanorods; Thermal annealing; Vapour phase transport; Crystallite size; Optical bandgap;

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