

Study of Photocatalytic Reaction with Oxygen Molecules in the Nano-rods ZnO Film Prepared by Hydrothermal Growth

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We demonstrate enhanced persistent ultraviolet (UV) photoconductivity of ZnO nanorods (NRs) array by post-treatment at various temperature. Well-aligned ZnO NRs arrays were obtained by two steps growth, seeding by RF magnetron sputtering and nano-rods growth by hydrothermal method. After growth process, the samples were annealed from 150 °C to 450 °C. As in **Fig. 1**, FE-SEM observation showed decreasing size and arising nano-holes in the samples annealed at 450 °C. The X-ray diffraction (XRD) shows a (002) orientation for all samples, corresponding to ZnO hexagonal wurtzite structure. Showing a remarkable improvement of crystallinity in ZnO NRs. The photoconductivity of ZnO NRs was observed under vacuum and in oxygen atmosphere. The photoconductivity was increased with increasing the annealing temperature. In the function of oxygen atmosphere variation, **Fig. 2**, shows the photoconductivity was decreased with increasing of oxygen pressure, the amount of oxygen molecules in the system play an important role to control the photoconductivity due to oxygen molecules assisted electron-hole pairs in the recombination process

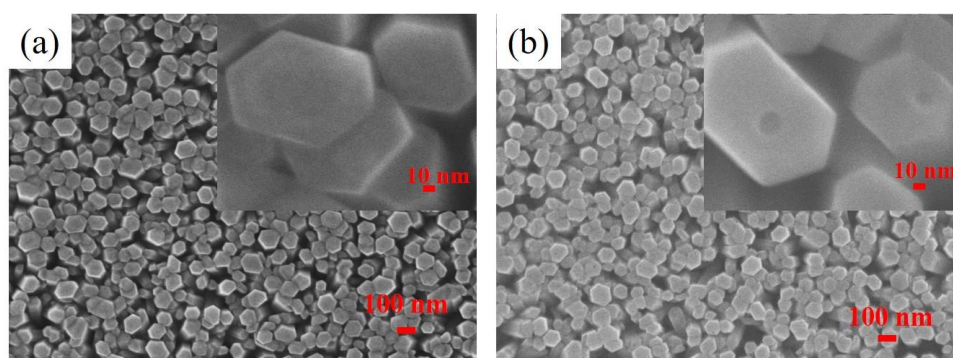


Fig. 1. FE-SEM images of ZnO nano-rods (a) as-grown and (b) annealed sample at 450 °C

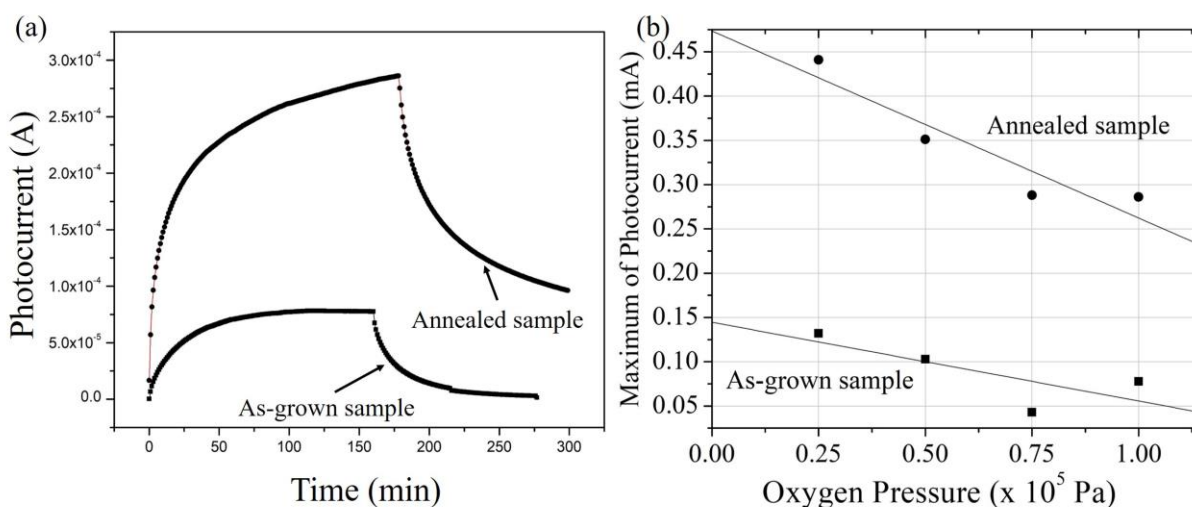


Fig. 2. (a) The photo-current time response of as-grown and annealed samples and (b) saturated photocurrent dependence on the oxygen pressure.