

Efficient UV sensor fabricated with Sb doped ZnO nanorod arrays: synthesized by a facile, single-step hydrothermal reaction

김동형, 이민석, 김도경, 용기중[†]
포항공과대학교
(kyong@postech.ac.kr[†])

Conventional modulation methods, such as doping and alloying, generally require rather complex processes, such as multi-step high-temperature reactions, gas-phase growth, high-vacuum processes, etc. Alternatively, in the current study, the facile and cost-effective synthesis of Sb-doped ZnO nanorod arrays (NRAs) is achieved using a simple hydrothermal growth process at 95 C. Through a single-step reaction, Sb atoms are substitutionally doped at the Zn atom sites with control of the Sb concentration. Sb dopants and Sb-induced oxygen vacancies increase the electron concentration in the ZnO NRAs, enhancing the electrical conductivity of the ZnO NRAs and inducing the further adsorption of ambient oxygen molecules on the nanorod surface. Upon UV irradiation of the highly oxygen-adsorbed, Sb-doped ZnO NRAs, the desorption of oxygen induces greater conductivity changes compared to the undoped samples. Based on this enhanced resistivity change, UV sensor devices were fabricated, and an improved reversible UV sensing performance was observed, with a 9-fold enhancement in the photocurrent of the ZnO NRAs after Sb doping.