Synthesis of CuO-ZnO p-n heterojunction for gas sensor

허승현*, Le Thuy Hoa
울산대학교
(shhur@ulsan.ac.kr*)

Zinc oxide (ZnO) has been extensively explored as a useful semiconducting material for many kinds of electronic devices due to its wide band gap, large exciton binding energy and versatility in its morphology such as 0-dimensional (0-D) nanoparticles, 1-D nanowires and nanorodes, 2-D sheets and 3-D arrays. Recently, p-n heterojunction between ZnO and other semiconductor materials is regarded as key technology in many electronic and optoelectronic devices such as gas sensors due to its good efficiency and sensitivity. Copper oxide (CuO) is known as a p-type semiconductor material with narrow band gap, low processing cost and good electrical and optical properties. In this study, we report a new type of p-n heterojunction structure composed of 1-D ZnO nanorodes and 0-D CuO nanoparticles that can effectively attract toxic gas such as NO_2 by maximizing the p-n junction points over other structures using facile, low-cost, low-temperature and scalable solution-based process. The 1-D ZnO / 0-D CuO p-n heterojunction fabricated in this study showed highly improved responsivity and shorter recovery time over 1-D ZnO alone in the NO_2 sensing even at low concentration.