H_2S gas sensing properties of hydrothermally grown ZnO nanorods and CuO modified ZnO heterostructures by photochemical method and their sensing mechanism study

김재현, 용기중*
포항공과대학교 화학공학과
(kyong@postech.ac.kr*)

This study reports the H_2S gas sensing properties of ZnO and CuO/ZnO heterostructure nanorod bundles and an investigation of their sensing mechanism. The CuO/ZnO heterostructure nanorods were prepared by deposition of CuO nanoparticles on the hydrothermally grown ZnO nanorods using photochemical method; scanning electron microscopy (SEM), x-ray diffraction (XRD) and transmission electron microscopy (TEM) confirmed that the obtained CuO/ZnO heteronanostructures were highly crystalline. The H_2S gas sensing properties of CuO/ZnO heterostructure nanorod bundles were evaluated in air containing dilute H_2S gas at sensing temperatures Ts ≤ 500 °C. The response of CuO/ZnO nanorod bundle sensor to H_2S gas was enhanced, compared to bare ZnO nanorods, showing an exponential increasing tendency with Ts. X-ray photoelectron spectroscopy analysis results indicated that the enhanced response of CuO/ZnO nanorod bundle sensor is due to chemical conversion of CuO into Cu_2S upon H_2S exposure, which acts as an electrical gate in the CuO/ZnO nanorods sensor structure.