TM-P045

Fabrication of ZnO and CuO Nanostructures on Cellulose Papers

Goli Nagaraju, Yeong Hwan Ko, and Jae Su Yu*

Department of Electronics and Radio Engineering, Kyung Hee University, Seocheon-dong, Giheung-gu, Yongin-si, Gyeonggi-do 446-701, Republic of Korea

The use of cellulose papers has recently attracted much attention in various device applications owing to their natural advantageous properties of earth's abundance, bio-friendly, large-scale production, and flexibility. Conventional metal oxides with novel structures of nanorods, nanospindles, nanowires and nanobelts are being developed for emerging electronic and chemical sensing applications. In this work, both ZnO (n-type) nanorod arrays (NRAs) and CuO (p-type) nanospindles (NSs) were synthesized on cellulose papers and the p-n junction property was investigated using the electrode of indium tin oxide coated polyethylene terephthalate film. To synthesize ZnO and CuO nanostructures on cellulose paper, a simple and facile hydrothermal method was utilized. First, the CuO NSs were synthesized on cellulose paper by a simple soaking process, yielding the well adhered CuO NSs on cellulose paper. After that, the ZnO NRAs were grown on CuO NSs/cellulose paper via a facile hydrothermal route. The as-grown ZnO/CuO NSs on cellulose paper exhibited good crystalline and optical properties. The fabricated p-n junction device showed the I-V characteristics with a rectifying behaviour.

Keywords: ZnO, CuO, nanostructures, hydro thermal synthesis, celluous paper, p-n junction

TM-P046

Fabrication, Structure and Gas Sensing Properties of Pt-functionalized ZnS Nanowires

Soohyun Kim, Sunghoon Park, Jihwan Jung, Chongmu Lee*

Department of Materials Science and Engineering, Inha University, 253 Yonghyun-dong, Nam-gu, Incheon 402-751, South Korea

Pt-functionalized ZnS nanowires were synthesized on Au-deposited c-plane sapphire substrates by thermal evaporation of ZnS powders followed by wet Pt coating and annealing. The NO_2 gas sensing properties of multiple-networked Pt-functionalized ZnS nanowire sensors were examined. Scanning electron microscopy showed the nanowires with diameters of 20-80 nm. Transmission electron microscopy and X-ray diffraction showed that the nanowires were wurtzite-structured ZnS single crystals. The Pt-functionalized ZnS nanowire sensors showed enhanced sensing performance to NO_2 gas at 150^{o}C compared to pristine ZnS nanowire sensors. Pristine and Pt-functionalized ZnS nanowire sensors showed responses of 140-211% and 207-488%, respectively, to 1-5 ppm NO_2, which are better than or comparable to those of many oxide semiconductor sensors. In addition, the underlying mechanism of the enhancement of the sensing properties of ZnS nanowires by Pt functionalization is discussed.

Keywords: Nanowires, ZnS, Pt, Functionalization, Gas sensor