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Aspect ratio enhancement of ZnO nanowires using silicon microcavity

J. P. Kar, S. N. Das, J. H. Choi, Y. A. Lee[*], T. Y. Lee[*], J. M. Myoung[,†]**

Information and Electronic Materials Research Laboratory, Department of Materials Science and Engineering, Yonsei University;
[*]Nanobio Fusion Device Laboratory, Department of Electrical and Electronic Engineering, Yonsei University;
[**]Information and Electronic Materials Research Laboratory, Department of Materials Science and Engineering
(jmmyoung@yonsei.ac.kr[†])

A great deal of attention has been focused on ZnO nanowires for various electronics and optoelectronics applications. in the pursuit of next generation nanodevices, it would be highly preferred if well-ordered ZnO nanowires of lower dimension could be fabricated on silicon. Before the growth of nanowires, silicon substrates were selectively etched using silicon nitride as masking layer. Vertical aligned ZnO nanowires were grown by metal organic chemical vapor deposition on patterned silicon substrate. The shape of nanostructures was greatly influenced by the micropatterned surface of the substrate. The aspect ratio, packing fraction and the number density of nanowires on top surface are around 10, 0.8 and 10^7 per mm^2, respectively, whereas the values are 20, 0.3 and 5×10^7 per mm^2, respectively, towards the bottom of the cavity. XRD patterns suggest that the nanostructures have good crystallinity. High-resolution transmission electron microscopy confirmed the single crystalline growth of the ZnO nanowires along [0001] direction.

Keywords: ZnO, Nanowires, MOCVD, Etching

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Effect of annealing atmosphere on the properties of chemically deposited Ag2S thin films

S. M. Pawar[†], S. W. Shin, C. D. Lokhande[*], J.H. Kim

Department of Materials Science and Engineering, Chonnam National University;
[*]Thin Film Physics Laboratory, Department of Physics, Shivaji University
(spawar_81@yahoo.co.in[†])

The silver sulphide (Ag2S) thin films have been chemically deposited from an alkaline medium (pH 8 to 10) by using a silver nitrate and thiourea as a Ag and S ion precursor sources. Ethylene Damine tetraacetic acid (EDTA) was used as a complexing agent. The effect of annealing atmosphere such as Ar, N2+H2S and O2 on the structural, morphological and optical properties of Ag2S thin films has been studied. The annealed films were characterized by using X-ray diffraction (XRD), scanning electron microscopy (SEM) and optical absorption techniques for the structural, morphological, and optical properties, respectively. XRD studies reveal that the as-deposited thin films are polycrystalline with monoclinic crystal structure, is converted in to silver oxide after air annealing. The surface morphology study shows that grains are uniformly distributed over the entire surface of the substrate. Optical absorption study shows the as-deposited Ag2S thin films with band gap energy of 0.92eV and after air annealing it is found to be 2.25 eV corresponding to silver oxide thin films.

Keywords: Silver sulphide, thin films, X-ray diffraction, monoclinic, optical absorption