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Controlled growth of ZnO/SnO_2 mixed nanowires by carbon assisted thermal evaporation process

T. Tharsika[1], A.S.M.A. Haseeb[1]*, S.A. Akbar[2] and M.F.M. Sabri[1]

[1]*Department of Mechanical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia*
[2]*Department of Materials Science and Engineering, Ohio State University, 2041 College Road, Columbus, OH 43210, USA*

This work reports the controlled growth of ZnO/SnO_2 mixed nanowires, fabricated by the bottom up process of carbon assisted thermal evaporation method, through vapor-liquid-solid (VLS) mechanism. In this study, SnO_2, ZnO and activated carbon powders are used to grow ZnO/SnO_2 mixed nanowires with the help of a gold catalyst on alumina substrate. Tin, zinc, and gold eutectic compounds promote a nucleation site for the deposition of ZnO/SnO_2 mixed nanowires synthesized at 900°C. The crystalline structures of ZnO/SnO_2 nanowires are analyzed by X-ray diffraction (XRD). The morphological characterization of fabricated products is performed by field-emission scanning electron microscopy (FESEM). A sharp peak of XRD patterns exhibits the high crystallinity of the ZnO/SnO_2 mixed nanowires. FESEM images show that the length of nanowires increased from 2 μm to 80 μm with the increase of growth time from 30 min to 120 min. These mixed nanowires could find potential applications in chemical gas sensors and optoelectronic devices.

Key words: Carbon assisted thermal evaporation method, ZnO/SnO_2 nanowires, vapor-liquid-solid mechanism

*haseeb@um.edu.my