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Growth of ZnO Nanowires without the mixture of other ZnO nanostructures SAMUEL MENSAH, Michigan Tech University, VIJAYA KAYSTHA, Michigan Tech University, YOKE KHIN YAP, Michigan Tech University — We describe a new procedure to grow pure ZnO nanowires without the mixture of other ZnO nanostructures like nanobelts and nanocombs. A variety of ZnO nanostructures have been grown on oxidized Si substrates by a vapor phase transport process at temperatures ranging from 900 –500 deg. C. A mixture of ZnO and graphite powders are used as raw materials and result in the growth of nanobelts, nanocombs, and nanorods at various temperature zones when Au catalysts are used. We found that pure ZnO nanowires can be grown on catalyst free substrates. This is obtained at the temperature zone 500 to 600 deg. C, a region beyond those for growing nanobelts and nanorods. The crucial step is the need of an Au-coated substrate adjacent to the plain substrates. Long nanowires with uniform diameter less than 50 nm were obtained. Field-emission scanning electron microscopy (FESEM) analysis shows that the gold vapor from the adjacent substrates creates the nucleation sites on the catalyst free substrates to initiate the nanowire growth. Characterization of these ZnO nanostructures was conducted by X-ray powder diffraction (XRD), high-resolution transmission electron microscopy (HRTEM), Raman spectroscopy and photoluminescence (PL). Details of these will be discussed in the meeting.

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