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Synthesis and Magnetic Properties of Cobalt doped ZnO Nanowires RAMAKRISHNA PODILA, JIAN HE, AMAR NATH, APPARAO RAO, DEPARTMENT OF PHYSICS AND ASTRONOMY, CLEMSON UNIVERSITY, CLEMSON, SC, 29634 COLLABORATION, DEPARTMENT OF CHEMISTRY, THE UNIVERSITY OF NORTH CAROLINA AT ASHEVILLE, ASHEVILLE, NC, 28804 COLLABORATION — Here we report the synthesis of cobalt (Co) doped ZnO nanowires using a chemical vapor deposition technique. About 50 mM aqueous solution of $ZnCl_2$ and Co $(CH_3COO)_2$ was injected (rate of 0.1ml/min)into a quartz tube reactor maintained at 550°C. A constant flow (10:1) of O_2 and H_2 was maintained at 500 sccm. The as-prepared nanowires are typically $\sim$1-2 micrometers in length and tens of nanometers in diameter. X-ray diffraction, scanning electron microscopy and energy dispersive X-ray spectroscopy were employed to confirm the presence of the Co atoms in the nanowires. Significant ferromagnetism was observed in the 2 atomic % Co-doped ZnO nanowires with a coercive field of 50 Oe. Furthermore, no saturation of magnetic moment was observed up to a field of 5T and 5K. A Curie-Weiss law fit to the temperature dependent magnetic susceptibility data yielded a magnetic moment μ=1.99μ_B for Co^{2+} ion, consistent with the low spin state. Based on Hall measurements and Seebeck coefficient data, the nature of the carriers and origin of magnetism in Co doped ZnO nanowires will be presented.

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