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Ferromagnetism in CuO-ZnO multilayers SUDAKAR CHANDRAN, Department of Physics and Astronomy, Wayne State University, Detroit, MI 48201, B.J. KIRBY, NIST Center for Neutron Research, National Institute of Standards and Technology, Gaithersburg, Maryland 20899, K. PADMANABHAN, G. LAWES, R. NAIK, Department of Physics and Astronomy, Wayne State University, Detroit, MI 48201, SANJIV KUMAR, NCCCM, Bhabha Atomic Research Centre, ECIL Post, Hyderabad 500062, India , V.M. NAIK, Department of Natural Sciences, University of Michigan-Dearborn, Dearborn, MI 48128 — The magnetic properties of CuO-ZnO heterostructures are examined to elucidate the origin of the ferromagnetic signature in Cu doped ZnO. The CuO and ZnO layer thickness varied from 15 nm to 350 nm, and we observed no significant diffusion of either Cu^{2+} in the ZnO layers or of Zn^{2+} in the CuO layers using Rutherford backscattering spectrometry. Bulk magnetization measurements established that the multilayers exhibit a ferromagnetic moment at room temperature, with a saturation magnetization ($\sim$2-5 emu/cc of CuO) that depends on the CuO size, but not the CuO-ZnO interfacial area. Polarized neutron reflection studies suggest that the ferromagnetism arises from the CuO layers, and not from the interdiffusion of CuO and ZnO. These results indicate that the ferromagnetism in these multicomponent structures arises from the uncompensated surface spins of CuO nanoparticles in the layer rather than from regions of interdiffusing ZnO and CuO.

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