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Magnetic and Chemical Depth Profiles of an Exchange-Biased MnO/GaMnAs Bilayer BRIAN KIRBY, Los Alamos National Laboratory, JULIE BORCHERS, National Institute of Standards and Technology, JIM RHYNE, MICHAEL FITZSIMMONS, Los Alamos National Laboratory, XINYU LIU, JACEK FURDYNA, University of Notre Dame — There is a great deal of interest in development of high Curie temperature (Tc) ferromagnetic (FM) semiconductors for use in spintronic applications. GaMnAs may be a candidate for such applications, as it shows true long range FM order among Mn at Ga sites, and has a relatively high Tc (up to 173 K). For many device applications, the ability to pin the magnetization of a FM semiconductor to a preferred direction is highly desirable. This can be achieved by exchange coupling a GaMnAs layer to an adjacent antiferromagnetic (AFM) layer in order to produce an exchange-bias in the FM layer. We report on polarized neutron reflectivity and x-ray reflectivity studies of a GaMnAs film exchange biased by an AFM MnO overlayer. Using the depth sensitivity of these reflectivity techniques, we have chemically and magnetically characterized the MnO/GaMnAs interface, and have investigated the magnetization reversal process by comparing the magnetic depth profile at the coercive field to the profile at magnetic saturation.

Brian Kirby
Los Alamos National Laboratory

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