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Antiferromagnetic interlayer exchange coupling in $Ga_{1-x}Mn_xAs$/GaAs diluted ferromagnetic semiconductor multilayers JAE-HO CHUNG, S.J. CHUNG, SANGHOON LEE, Korea University, B.J. KIRBY, J.A. BORCHERS, NIST Center for Neutron Research, Y.J. CHO, X. LIU, J.K. FURDYNA, University of Notre Dame — We use neutron reflectometry to investigate the interlayer exchange coupling between $Ga_{0.97}Mn_{0.03}As$ ferromagnetic semiconductor layers separated by non-magnetic Be-doped GaAs spacers. Polarized neutron reflectivity measured below the Curie temperature of $Ga_{0.97}Mn_{0.03}As$ reveals a characteristic splitting at the wave vector corresponding to twice the multilayer period, indicating that the coupling between the ferromagnetic layers are antiferromagnetic (AFM). When the applied field is increased to above the saturation field, this AFM coupling is suppressed. This behavior is not observed when the spacers are undoped, suggesting that the observed AFM coupling is mediated by charge carriers introduced via Be doping. The behavior of magnetization of the multilayers measured by DC magnetometry is consistent with the neutron reflectometry results.

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