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Effect of interfacial reactions on spin injection from Fe contacts into (Al,Ga)As C. ADELMANN, X. LOU, X.Y. DONG, J. STRAND, B.D. SCHULTZ, P.A. CROWELL, C.J. PALMSTROM, University of Minnesota, Minneapolis, MN 55455, S. PARK, M.R. FITZSIMMONS, Los Alamos National Laboratory, Los Alamos, NM 87545 — The effect of interfacial Fe/Al_{0.1}Ga_{0.9}As reactions on spin injection from Fe into Al_{0.1}Ga_{0.9}As has been studied by annealing of the heterostructures. For Fe layers grown at 0°C, annealing at 250°C leads to an increase in spin injection by up to a factor of 3. Interfacial modifications are evidenced by an increase in the Fe/Al_{0.1}Ga_{0.9}As Schottky barrier height but no Fe/Al_{0.1}Ga_{0.9}As reactions were evident from X-ray diffraction at annealing temperatures <350°C. The influence of Fe growth temperature on spin injection has also been studied and found to be different from annealing effects. *In situ* X-ray photoelectron spectroscopy showed that Fe growth at 175°C leads to the formation of a ~ 20 Å thick interfacial reacted layer, which appears to be correlated with spin injection with the opposite sign than for low temperature grown Fe layers or after annealing. These findings are in qualitative agreement with changes in the interfacial magnetic properties of Fe_{0.5}Co_{0.5}/GaAs determined by polarized neutron reflectometry. Supported by DARPA, ONR, and NSF-MRSEC.

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