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Magnetic properties of Ga1-xMnxAs/Ge heterojunctions JONATHAN LEINER, XINYU LIU, JACEK FURDYNA, MARGARET DOBROWOLSKA, University of Notre Dame — It has been shown that the incorporation of Mn in substitutional and interstitial positions of GaAs is linked to the Fermi level of GaMnAs during the growth [1]. Additionally, experiments with samples that are doped with either Be or Si reveal the role of the Fermi level in determining Tc [2]. To further investigate this effect, we deposited Ge in varying thicknesses on top of GaMnAs layers. Germanium is very nearly lattice matched to GaMnAs, and the valence band offset of the two materials (∼0.54 eV) places the top of the valence band as well as the Mn acceptor level of GaMnAs significantly below the top of the valence band of Ge. Thus, when Ge is grown on GaMnAs, the incorporation of Mn has already been fixed during its growth, but the holes are drained off into Ge. SQUID measurements on these samples show that the Tc of the GaMnAs drops very rapidly when layers of Ge are deposited over it, the decrease in Tc scaling roughly with the thickness of the Ge layers. This behavior is consistent with the expected "draining away" of holes from the GaMnAs layer into the Ge. Results of our efforts to fine-tune the amount of holes removed from GaMnAs by Ge will be presented.

[1] Wojtowicz et al., Physica E 25, 171 (2004).
[2] Cho et al., JAP 103, 07D132 (2008); APL 93, 262505 (2008).

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