Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Spin accumulation in Fe/MgO/Ge heterostructures
A.T. HANBICKI, S.-F. CHENG, R. GOSWAMI, O.M.J. VAN 'T ERVE, B.T. JONKER, Naval Research Laboratory — We have investigated the injection of spins into n-type Ge(001) from Fe through an MgO tunnel barrier using 3-terminal Hanle measurements. While significant progress has been made in Si, spin research in Ge is still at a nascent stage, due in part to the fact that significant Fermi level pinning at the Ge interface makes it difficult to efficiently inject carriers. We observe here precessional dephasing of the spin accumulation in an applied magnetic field (the Hanle effect) in Fe/MgO/Ge structures for both forward and reverse bias. We determine spin lifetimes and corresponding spin diffusion lengths for injection into Ge substrates of varying carrier concentration and see a trend of increasing spin lifetime with decreasing doping density. At room temperature, spin lifetimes range from τ_s = 50 ps to 123 ps as the carrier concentration is reduced from n=8x10^{17}cm^{-3} to 2x10^{16}cm^{-3}. We will discuss the spin-RA product as a function of carrier concentration and the role of interface states. The observed room temperature injection of spins shows that despite persistent Fermi level pinning, spin accumulation is possible in the surface of Ge. This work was supported by core programs at NRL.

A.T. Hanbicki
Naval Research Laboratory

Date submitted: 16 Nov 2011 Electronic form version 1.4