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Electrical Detection of Spin Accumulation at a Ferromagnet-Semiconductor Interface X. LOU, C. ADELMANN, University of Minnesota, M. FURIS, S.A. CROOKER, Los Alamos National Laboratory, C.J. PALMSTRØM, P.A. CROWELL, University of Minnesota — We report a direct electrical transport measurement of spin accumulation in epitaxial Fe/GaAs heterostructures. This result is obtained in lateral transport devices consisting of two Fe Schottky tunnel barriers at the opposite ends of a lightly n- doped GaAs channel. Polarized spin accumulates near the forward- biased GaAs/Fe Schottky interface, resulting in an additional voltage that is observed between the channel and the ferromagnetic drain contact. We establish that the spin accumulation, which can also be observed with Kerr microscopy, occurs when unpolarized electrons are incident on the interface. The voltage due to the electron spin accumulation is suppressed in a small transverse magnetic field as a result of precession. The width of the voltage peak is determined by a combination of spin diffusion and relaxation and can be modeled accurately using parameters determined from transport and optical experiments. These results demonstrate that Fe/GaAs Schottky barriers can be used as electrical spin detectors as well as injectors. This work was supported by DARPA, ONR, NSF- MRSEC, and LANL.

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