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Electrical Spin Injection and Detection in Silicon: Effect of Interface States JONAS BEARSDLEY, YONG PU, Ohio State University Department of Physics, ADRIAN SWARTZ, PAT ODENTHAL, UC Riverside Department of Physics, ANDREW BERGER, DONGKYUN KO, VIDYA BHALLAMUDI, PETER CHRISTOPHER HAMMEL, Ohio State University Department of Physics, ROLAND KAWAKAMI, UC Riverside Department of Physics, EZEKIEL JOHNSTON-HALPERIN, JON PELZ, Ohio State University Department of Physics — We have observed (using the local Hanle method) electrical spin injection into n and p type Si through a Fe/MgO/Si tunnel, with an effective spin lifetime of ∼130ps and an extremely large spin RA product as high as ∼0.1 MΩ*μm^2 at low bias and temperature. Both the spin-RA and the differential resistance decrease exponentially with bias at temperatures below 150K. The effective spin lifetime weakly depends on temperature, decreasing by ∼30% from 10K to 300K. We observe the inverse Hanle effect when an external magnetic field is applied parallel to the magnetization, possibly indicating the presence of stray fields near the Si surface. These observations roughly agree with other local Hanle spin injection studies in Silicon and GaAs, but differ strongly from the results expected for injection into bulk Silicon. The two stage tunneling model through localized states (LS) developed by Tran *et al* (**PRL** 102; p. 036601) can explain the large magnitude of the observed spin RA, and we have developed an extended LS model which can explain the voltage dependence, which will be discussed in another talk.

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