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Electrical Spin Injection and Detection in Silicon Nanowires SHIXIONG ZHANG, SHADI DAYEH, Center for Integrated Nanotechnologies, Los Alamos National Laboratory, YAN LI, SCOTT A. CROOKER, National High Magnetic Field Laboratory, Los Alamos National Laboratory, DARRYL L. SMITH, Theoretical Division, Los Alamos National Laboratory, S. T. PICRAUX, Center for Integrated Nanotechnologies, Los Alamos National Laboratory — We report on the electrical injection and detection of spin-polarized electrons from cobalt contacts into n-type Si nanowires through Al2O3 tunneling barriers. Analysis of local (2 terminal) and non-local (4 terminal) spin valve signals at 4 K on the same nanowire device using a standard spin-transport model suggests that high spin injection efficiency (about 30%) and long spin diffusion lengths (about 6 micron) are achieved for these nanoscale structures. These values compare favorably to those reported for spin transport devices based on comparably-doped bulk Si. The spin valve signals are strongly influenced by temperature, bias current and by the geometry of the ferromagnetic

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