Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electrical spin injection and detection in Si nanowires[1] SHIXIONG ZHANG, YAN LI, SHADI A. DAYEH, DARRYL L. SMITH, SCOTT A. CROOKER, S. TOM PICRAUX, Los Alamos National Laboratory — While electrical spin injection and detection in bulk Si has now been established, the availability of high quality single crystalline silicon nanowires has stimulated considerable interest in demonstrating spin-polarized transport in these 1-dimensional structures. Here, we report our efforts to electrically inject spin-polarized electrons from cobalt contacts into n-type silicon nanowires through Al_2O_3 tunnel barriers. The electrically doped nanowires were synthesized by the vapor-liquid-solid process with a cold wall chemical vapor deposition system using silane and phosphine precursors. Low temperature magneto-transport studies have shown spin-valve like behavior in both two-terminal and four-terminal lateral devices. The spin-valve signal as functions of temperature and bias voltage will be discussed. We will also show the influence of defects and trap states on the stability of nanowire devices.

[1]Supported by the Los Alamos LDRD program

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Date submitted: 29 Nov 2011 Electronic form version 1.4