Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Modulating Spin Relaxation with Light and a Novel Spintronic Room Temperature Infrared Photodetector[1] MD IFTEKHAR HOSSAIN, Dept of ECE,VCU, Richmond, VA,23284, SAUMIL BANDYOPADHYAY, EECE Dept., MIT, Cambridge, MA 02139, JAYASIMHA ATULASIMHA, Dept of MNE,VCU, Richmond, VA,23228, SUPRIYO BANDYOPADHYAY, Dept of ECE,VCU, Richmond, VA,23284 — We report modulating the spin relaxation rate in an InSb nanowire with infrared (IR) light. The nanowire is fashioned into a spin valve with cobalt and nickel contacts using electrochemical self-assembly. The spin relaxation length is long in the dark since ˜96% of the electrons occupy the lowest conduction subband at room temperature, which results in near elimination of the D'yakonov-Perel' (DP) spin relaxation. Under IR illumination, electrons are excited to higher subbands by IR photons, resulting in the revival of the DP relaxation and a threefold shortening of the spin relaxation length [1]. This changes the resistance of the spin valve and therefore has applications in a novel spintronic IR photodetector that can ideally work at room temperature with infinite light-to-dark contrast ratio, infinite detectivity and zero dark current if all other spin relaxation mechanisms are eliminated and spins can be injected into the nanowire and detected with 100% efficiency. This work is supported by the NSF under grant CMMI-1301013. [1] M. I. Hossain, et al., Nanotechnology, 26, 281001(2015)

[1]This work is supported by the NSF under grant CMMI-1301013.

Md Iftekhar Hossain
Virginia Commonwealth Univ

Date submitted: 01 Nov 2015 Electronic form version 1.4