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Role of Spin dependent Inelastic Scattering in Spin Torque Devices SAYEEF SALAHUDDIN, SUPRIYO DATTA, ECE, Purdue University — Spin torque devices are commonly modeled by looking only at the spin dependent transmission and reflection at the tunnel oxide-ferromagnet interface. Here, we describe a different approach where, in addition to barrier dependent phenomena, an inelastic spin-flip scattering is included at the interface. We show that such scattering events may have significant influence on the device behavior, specifically on the magnitude of TMR and on the efficiency of spin torque. We shall show that recent experiments provide evidence for this prediction. Our transport model is based on Non Equilibrium Green's Function (NEGF) formulation where the scattering is included through a self energy matrix. We also discuss[1] how the spin flip scattering may help to reduce the switching current necessary to flip the magnetization in penta-layer spin torque devices, a phenomenon demonstrated in recent experiments[2].

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2. G. D. Fuchs et. al., Appl. Phys. Lett. 86, 152509, 2005;M. Huai et. al., Appl. Phys. Lett., 87, 222510, 2005 ;H. Meng et. al., Appl. Phys. Lett. 88, 082504, 2006.

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