

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Interplay between the spin transfer and spin orbit torques on domain walls at the 5d/3d-alloy interfaces¹ ALAN KALITSOV, SERGEY OKATOV, PAVEL ZARZHITSKY, MINT Center, University of Alabama, Tuscaloosa, AL, AL 35487-0209, USA, MAIRBEK CHSHIEV, SPINTEC, UMR (8191) CEA/CNRS/UJF/Grenoble INP, INAC, 17 rue des Martyrs, 38054 Grenoble Cedex, France, JULIAN VELEV, Department of Physics, Institute for Functional Nanomaterials, University of Puerto Rico, San Juan, Puerto Rico 00931, USA, WILLIAM BUTLER, OLEG MRYASOV, MINT Center, University of Alabama, Tuscaloosa, AL, AL 35487-0209, USA — The manipulations of domain wall (DW) in thin ferromagnetic layers by current and the spin-orbit coupling (SOC) have attracted significant interest [1]. We report two band model calculations of the spin torque (ST) and the spin current (SC) at 5d/3d interfaces with head-to-head, Bloch and Neel DWs. These calculations are based on the non-equilibrium Green Function formalism and the tight binding Hamiltonian including the s-d exchange interactions and the Rashba SOC parameterized on the basis of ab-initio calculations for Fe/W, FeCo/Ta and Co/Pt interfaces. We find that SOC significantly modifies the ST and violates relations between the spin transfer torque and the divergence of the spin current [2].

[1] I. M. Miron *et al.*, Nature **476**, 189 (2011).

[2] A. Kalitsov *et al.*, Phys. Rev. B **79**, 174416 (2009).

¹This work was supported in part by a Semiconductor Research Corporation program, sponsored by MARCO and DARPA.

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Date submitted: 15 Nov 2013

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