Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Efficient room-temperature Spin Hall nano-oscillator ANDREI ZHOLUD, SERGEI URAZHDIN, Emory University —

Spin current injected into a ferromagnet exerts a spin torque on the magnetization, modifying its dynamical damping. Complete compensation of damping by spin current can result in magnetization auto-oscillations, as was demonstrated for in-plane point-contact spin Hall oscillator devices utilizing Pt spin Hall material as a source of spin current and permalloy (Py) as active magnetic layer [1]. Electronic spectroscopy has demonstrated microwave generation by oscillations of magnetization at cryogenic temperatures, but this microwave generation decreases with increasing temperature and disappears at room temperature[2]. We will describe a new device geometry that decouples spin transport from the magnetic configuration by separate patterning of the spin Hall Pt layer and the active Py layer. We demonstrate that this device geometry can operate at smaller driving dc currents for microwave generation that persists up to room temperature. We discuss the physical mechanisms that affect the temperature- and geometry-dependent performance of spin Hall nano-oscillators.

[1] V. Demidov, S. Urazhdin and S.O. Demokritov, Nature Mater. 9, 984 (2010) [2] R.H. Liu, W.L. Lim, and S. Urazhdin, Phys. Rev. Lett. 110, 147601 (2013)

Andrei Zholud
Emory University

Date submitted: 14 Nov 2013 Electronic form version 1.4