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Thermal spin current control of magnetic damping in Py/Ag/CoFe2O4/Pt multilayers CHRIS SAFRANSKI, ILYA KRIVOROTOV, University of California Irvine, CHING-TZU CHEN, JONATHAN SUN, IBM T. J. Watson Research Center — With the development of devices based on spin transport such as magnetic tunnel junctions and spin torque oscillators, there is the ever increasing need for a more efficient way to generate high spin current densities. The spin Seebeck effect has been of interest recently since it converts thermal gradient from ohmic heating to spin current. In this talk, we investigate generation of spin current via a temperature gradient applied across an insulating ferromagnetic film of cobalt ferrite ($CoFe_2O_4$). In our experiment, a direct charge current applied to a Py/Ag/$CoFe_2O_4$/Pt multilayer stack creates a temperature gradient across the $CoFe_2O_4$ layer thickness via ohmic heating of the adjacent metallic layers. We report that a thermal spin current is then injected from the $CoFe_2O_4$ layer into the Py layer as confirmed by (i) spin torque ferromagnetic resonance (ST-FMR) measurements and (ii) direct inverse spin Hall voltage detection. ST-FMR measurements reveal that the thermal current applies an anti-damping torque to the Py layer and thereby reduces its FMR spectral linewidth. The presence of the thermal spin current is also confirmed via measurements of the inverse spin Hall voltage produced by this current in the multilayer stack.

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