Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Resonant damping in Fe_3O_4/Ag below the Verwey Transition[1]
MICHAEL SINKO, DANIEL STANLEY, MICHAEL PECHAN, Department of Physics, Miami University, P.B. JAYATHILAKA, CASEY MILLER, Department of Physics, University of South Florida — The temperature dependence of damping in epitaxial Fe_3O_4/Ag bilayers grown on [001] MgO substrates was investigated as a function of Ag thickness. The Fe_3O_4 layers were fixed at 350 nm thick, while the Ag thicknesses ranged from 0 to 500 nm. The epitaxial nature of the films was verified by in plane XRD of the Fe_3O_4 (311) and (220) directions. Ferromagnetic resonance (FMR) measurements at 9.2 GHz were carried out with the sample film normal to the applied magnetic field and at temperatures ranging from 30 to 295 K. All samples exhibited easy-plane anisotropy consistent with thin-film shape effects and a sample magnetization of approximately 400 emu/cm^3. Room temperature resonance line-widths were largely independent of Ag layer thickness and remained fairly constant with decreasing temperature until the Verwey transition ($T_V \simeq 110K$), below which damping increases dramatically for all samples. Of particular note is the influence of the Ag layer thickness on the low temperature damping, wherein a peak in magnitude is observed at approximately 50 nm of Ag. This unexpected damping resonance will be discussed in terms of spin pumping into the Ag in conjunction with the changing Fe_3O_4magnetodynamics associated with the Verwey transition.

[1]This work was supported by US Dept. of Energy BES ECMP at MU and NSF-ECCS at USF.

Michael Pechan
Department of Physics, Miami University

Date submitted: 14 Nov 2013 Electronic form version 1.4