Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Low Damping Spinel Ferrites for Spin Pumping MATTHEW GRAY, Department of Materials Science and Engineering, Stanford University, Stanford CA, SATORU EMORI, Geballe Laboratory for Advanced Materials, Stanford University, Stanford, CA, BENJAMIN GRAY, Materials and Manufacturing Directorate, Air Force Research Laboratory, Dayton, OH, HYUNG-MIN JEON, Department of Electrical Engineering, Wright State University, Dayton, OH, BRANDON HOWE, Materials and Manufacturing Directorate, Air Force Research Laboratory, Dayton, OH, YURI SUZUKI, Department of Applied Physics, Stanford University, Stanford CA — Spin pumping phenomena at ferromagnet/metal interfaces have extensive applications ranging from electronic control of magnetic orientation to generation and manipulation of pure spin currents. Few spin pumping experiments have utilized spinel ferrites for the magnetic layer due to their typically large damping. Here we report on the spin pumping in low damping spinel ferrite based bilayers. (Ni,Zn)$AlFeO_4$ thin films exhibit a damping factor as low as $3x10^{-3}$. These films also exhibit large negative perpendicular magnetic anisotropy of >1 T, leading to low resonance fields three times smaller at 10 GHz than the prototypical spin pumping ferrimagnet $Y_3Fe_5O_{12}$ (YIG). Upon addition of only 1.5 nm of a Pt film, Gilbert damping more than doubles, and we observe significant in-plane DC voltage during ferromagnetic resonance. These two effects indicate a large amount of spin pumping from the ferrite to Pt with an estimated effective spin mixing conductance of $3x10^{18}$ m^{-2}, comparable to that reported for YIG/Pt. This system demonstrates the promise of spin pumping phenomena in the spinel ferrite family of materials.

Matthew Gray
Stanford University, Stanford CA

Date submitted: 20 Nov 2016 Electronic form version 1.4