Abstract Submitted
for the TSF17 Meeting of
The American Physical Society

**Investigation of Multilayers for Magnetic Thermometry using Micro-Magnetic Computer Simulations**[1] NICHOLAS TERRANOVA, University of Dallas, S. WOODS COLLABORATION[2], A. FARRAR COLLABORATION[3], C. DENNIS COLLABORATION[4] — No reliable method exists for measuring temperature variations throughout a volume. A possible solution to this problem, bi-magnetic nanoparticles, requires the development of new material systems which have a strong dependence of magnetic behavior on temperature. This study tests the viability of using iron and gadolinium multilayers as sensitive thermometers for monitoring small regions via the simulation of Fe/Gd thin films.The modeling software known as the Object Oriented Micro-Magnetic Framework (OOMMF) was used to simulate the change in magnetization (M) of Fe/Gd multilayers with a change in applied magnetic field (H). We determined the optimal parameters for simulation of the magnetization of 4x4 mm samples of single-layer and multilayer thin films.For the simulated multilayer samples, the negative interfacial exchange interaction between the layers produced secondary features in the M vs. H curves. Spatial variations of magnetization in the simulation results show that the Fe/Gd interface is key to the M vs. H behavior. Simulation results were compared with M vs. H curves measured experimentally.Our study has helped identify promising configurations for fabricating additional thin films and nanoparticles with strongly temperature-dependent magnetization.

[1]National Institute for Standards in Technology, University of Dallas
[2]NIST employee, my advisor
[3]NIST asscociate, experimentalist
[4]NIST employee, Farrar's advisor

Nicholas Terranova
Univ of Dallas

Date submitted: 21 Sep 2017 Electronic form version 1.4