Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Effect of post-deposition annealing on the structure and physical properties of strained epitaxial $Ni_{1-x}Ti_{1-y}O_3$ thin films[1] TAMAS VARGA, TIMOTHY DROUBAY, LIBOR KOVARIK, SCOTT CHAMBERS, Pacific Northwest National Laboratory — Ferroelectrically induced weak ferromagnetism had been predicted in compounds $MTiO_3$ (M=Fe,Mn,Ni) with the $LiNbO_3$-type structure. In order to stabilize this metastable structure by oxide heteroepitaxy, we attempted to grow epitaxial $NiTiO_3$ films on Al_2O_3, and Fe_2O_3/Al_2O_3 substrates by pulsed laser deposition. Given the structural imperfections of the as-deposited films arising from the large lattice mismatch, which resulted in weak ferroic ordering, we investigated the effect of post-synthesis annealing on the films' properties. Our structural data from x-ray diffraction and electron microscopy suggest that the crystalline quality of the $Ni_{1-x}Ti_{1-y}O_3$ films was greatly improved by annealing the films at 1000 °C for 8 hours. Our physical property characterization indicates increased ferromagnetism in the films. The specific changes in film structure and magnetic as well as polar properties will be discussed. These results suggest that the ferroic domain properties of the films can be favorably altered by post-synthesis heat treatment.

[1]This work was performed in the Environmental Molecular Sciences Laboratory, a national scientific user facility sponsored by the Department of Energy's Office of Biological and Environmental Research and located at Pacific Northwest National Laboratory.

Tamas Varga
Pacific Northwest National Laboratory

Date submitted: 14 Nov 2014 Electronic form version 1.4