Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Aging and *in-situ* annealing reduction of magnetite (Fe_3O_4) thin films grown on the polar MgO(111) surface[1] PRASENJIT DEY, MICHAEL WEINERT, MARIJA GAJDARDZISKA-JOSIFOVSKA, University of Wisconsin-Milwaukee — Previous transmission electron microscopy and diffraction studies of Fe_3O_4(111)/MgO(111) polar oxide interfaces found [2] the formation of (110)-oriented metallic Fe nano-crystals at the interface and within the magnetite film under oxidizing conditions that result in pure magnetite growth on the neutral MgO(001) surface. The question arises whether these iron nano-crystals oxidize with prolonged aging in air. We find, instead, that they not only persist but grow in average thickness within the magnetite film. We have also explored whether reduction can be achieved by *in-situ* annealing in vacuum starting from pure phase Fe_3O_4(111)/MgO(111) samples. We find a phase transformation from Fe_3O_4 to FeO at 720°C and a second phase transformation at 800°C from FeO into Fe nanoparticles that tend to nucleate along the surface.

[1]Supported by DOE DE-FG-02-06ER46328
[2]V. K. Lazarov, et al., Phys. Rev. Lett. **90**, 216108 (2003).

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Date submitted: 21 Nov 2008 Electronic form version 1.4