Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Interfacial stability of ultrathin film magnetite (Fe_3O_4) in ozone assisted MBE deposition HAWOONG HONG, JONGJIN KIM, Argonne National Laboratory, XINYUE FANG, University of Illinois at Urbana-Champaign, SEUNGBUM HONG, Argonne National Laboratory, TAI C. CHIANG, University of Illinois at Urbana-Champaign — Iron oxide films were grown on sapphire (0001) surfaces using nominally 100% ozone. Both of monolayer-wise deposition and continuous deposition were tried to find the structures of the films at the start of the film formation. The studies utilized x-ray scattering with synchrotron radiation from the Advanced Photon Source. Consideration of substrate and film structures predicts Fe_2O_3(0001) (hematite) film formation. However, in both of the deposition modes, the initial films formed as magnetite Fe_3O_4(111). As the film growth progresses, hematite (Fe_2O_3(0001)) appears. At the later stage, the magnetite disappears and the whole film turned to hematite. Real time and static x-ray diffraction results show the same result. Possibility of the oxidation limited transformation should be excluded. Other possible cause of this reverse stability will be discussed.

Hawoong Hong
Argonne National Laboratory

Date submitted: 05 Nov 2015 Electronic form version 1.4