Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

**Influence of the antiphase boundaries density on the anomalous magnetic behaviour of epitaxial $Fe_3O_4$ (111) thin films** ALEXANDRE M. BATAILLE, JEAN-BAPTISTE MOUSSY, SUSANA GOTA, MARIE-JO GUITTET, MARTINE GAUTIER-SOYER, DRECAM/SPCSI, CEA Saclay, 91191 Gif-sur-Yvette, France — We report on the link between the structural and magnetic properties of $Fe_3O_4$ (111) thin films systematically studied as a function of the film thickness (ranging from 8 to 50 nm). The films are epitaxially grown onto $\alpha$-AlO3 (0001) single crystals by atomic-oxygen-assisted molecular beam epitaxy. Despite the high structural order, sharp interfaces and low roughness of the films, the magnetic properties deviate from bulk: the magnetization is reduced and the approach to saturation is very slow. Structural analysis, performed using high resolution transmission electron microscopy, reveals the presence of antiphase boundaries (APBs), the density of which decreases when the thickness increases. Using a model of ferromagnetic domains separated by antiferromagnetically sharp interfaces, we show that the anomalous magnetic properties of the films are driven by the APBs density.

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Date submitted: 01 Dec 2004 Electronic form version 1.4