# ANOMALOUS PERPENDICULAR ANISOTROPY AND ANTIFERROMAGNETIC PINNING CENTERS IN EPITAXIAL MAGNETITE THIN FILMS

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Defects in ferrite can change the local magnetic coupling from ferromagnetic to strongly antiferromagnetic. In epitaxial films of magnetite ($Fe_3O_4$), defects with this property, antiphase boundaries (APB), essentially determine magnetic and magnetotransport properties. We prepared epitaxial thin films of slightly odd-stochiometric magnetite: $Fe_{3-\delta}O_4$/MgO (100) , $\delta = 0.03$. Imaged by magnetic force microscopy (MFM), our films exhibit a magnetic stripe domain pattern. We classify the domain structure as branching-type with strong pinning. The domain pattern is indicative of a moderate perpendicular anisotropy. Bulk material properties and strain fail to explain the origins of the perpendicular anisotropy.

**In an external magnetic field, this domain pattern changes into an array of pinned bubble domains. We observed by MFM magnetization reversals of isolated bubbles, and prove that pinning centers enforce antiferromagnetic orientations of adjacent magnetization, i. e. dipolar centers. Magnetization reversal of isolated and interacting groups of dipolar centers is shown. The observed centers are stable up to the maximum value of the applied field**