

Magnetic domain structures in Fe₃O₄ thin films studied by magnetic force microscopy (MFM)

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Abstract: A magnetic long-range ordered domain structure was found for the first time on magnetite thin films prepared by molecular beam epitaxy (MBE) on MgO (001) substrates. Annealing was performed for 4 minutes in air. The domain structure deviates significantly from early observations [1-3]. The magnetic stripe-like structure indicates a weak perpendicular anisotropy in magnetite thin films. This perpendicular anisotropy is confirmed by magnetization measurements and supposed to arise from the interface strain between the thin film and the substrate. The analysis of magnetic domain structures shows that these results are in a good agreement with micromagnetic fundamentals.