Influence of the antiphase grain stucture on the domain configuration of Fe3O4 thin films

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A long-range ordered magnetic domain structure was found for the first time in magnetite (Fe_3O_4) thin films prepared by molecular beam epitaxy on MgO (100) substrates. The stripe-like magnetic domain structure arising after suitable postprocessing differs significantly from earlier observations. The field-dependent domain structure was investigated by magnetic force microscopy equipped with an in-situ magnetic field. The results cannot be explained by the standard theory of stripe domains based on mean-field magnetic parameters. The domain structure is determined by immobile pinning centers arising from the magnetite anti-phase grain boundaries.