Observation of a New Domain Nucleation Process in Soft Magnetic Materials

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A critical bowing of 180° Bloch walls during the magnetization reversal process leads to a structural decomposition of these walls into a periodic arrangement of 90° transverse domains. The nucleation process is accompanied by a considerable decrease of the susceptibility and provides a source of irreversibilities in the overall magnetization process even under the influence of external fields which are small compared to the magnetocrystalline anisotropy field. The process is investigated on isolated subdivided 180° Bloch walls in iron whisker samples by means of X-ray topography and magneto-optical observation techniques. The nucleation field distribution and the critical inclination of the walls are deduced from inductive measurements.