ANOMALOUS HYSTERETIC CHARACTERISTICS IN EXCHANGE COUPLED CRYSTALLINE/AMORPHOUS PHASES

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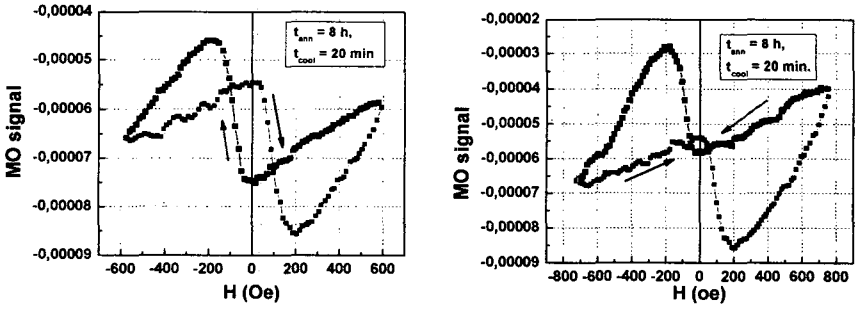
Co-based amorphous materials with surface crystallization developed during annealing, have attracted great interest owing to their sensor applications based on the magnetostatic and dynamic properties of the giant magnetoimpedance (GMI) effect. The exchange coupling between crystalline and amorphous phases causes a unidirectional anisotropy for the inner amorphous phase as well as its uniaxial aniosotropy, which, in turns, reveals asymmetric GMI applicable for ultra-low field sensor [1]. In this work, a systematic study on magnetic properties of heterogeneous crystalline/amorphous phases has been performed for a better understanding of the underlying mechanism of exchange coupling between them. The magnetostatic properties characterized by the surface magneto-optical Kerr effect (SMOKE), reveal the anomalous hysteretic characteristics. That is, when maximum field is less than 600 Oe, the twisted loop with negative coercive force is appeared. As the maximum field reaches to 800 Oe, the loop changes to butterfly shape with small coercive force, and eventually becomes normal loop for larger maximum field over 1500 Oe. In this paper, we will discuss the mechanism of anomalous hysteresis loops based on the antiferromagnetic exchange coupling between crystalline/amorphous.



References

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