Laser Crystallization of CoFeB

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Abstract

Recently, researchers have shown a tremendous interest in exploiting the micro annealing properties of laser irradiation [1, 2]. Since the induction of heat occurs in a few nanoseconds laser annealing gives access to crystallizing ultra-thin metal films without causing an adverse effect to the underlying layers. It is well known that for tunnel magnetoresistive devices the crystalline CoFe(B) electrode plays a crucial role in the coherent tunneling of electrons across the tunnel barrier [3, 4]. In this study, we present the first evidence of the laser-induced crystallization of CoFe(B) thin films using X-ray diffractometry (XRD) with synchrotron radiation. For benchmarking purposes similar samples were annealed using conventional means in a vacuum oven with various annealing temperatures and times. In the case of laser annealing, different laser intensities and scanning speeds across the samples were investigated. The experimental work has been supplemented by computational modeling to yield a detailed understanding of thermal energy propagation induced by laser irradiation. The results obtained from this study were recently published in ref.5.

References:

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