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Field dependency of return point memory in exchange bias films

BRIAN WILCKEN, KARINE CHESNEL, BYU, ERIC FULLERTON, UCSD, STEVE KEVAN, U Oregon — A better understanding of the domain morphology of magnetic thin films is necessary to improvements in the realm of perpendicular magnetic recording technology in computer hard disk drives. The technique of Coherent X-Ray Resonant Magnetic Scattering (XRMS) was used in order to probe the magnetic domain morphologies in CoPt/ IrMn exchange bias thin films. When illuminated by coherent light, the material produces specific speckles patterns, that contain information about the local domain configuration. A cross-correlation approach is used in order to detect statistical variations on domain configuration. A Matlab program was developed for the purpose of analyzing XRMS speckle patterns. A custom built cross-correlation routine handled the comparison between speckle patterns at different levels of magnetization. A comparison between coefficients of correlation and degree of coherence was analyzed for different levels of sample magnetization and at different temperatures. Preliminary results indicate that, at low temperature, the sample shows significant magnetic memory characteristics, when an external magnetic field is applied. In particular, the system exhibits a strong return point memory (RPM), after a complete magnetization cycle. The dependency of this RPM as a function of field will be shown.

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