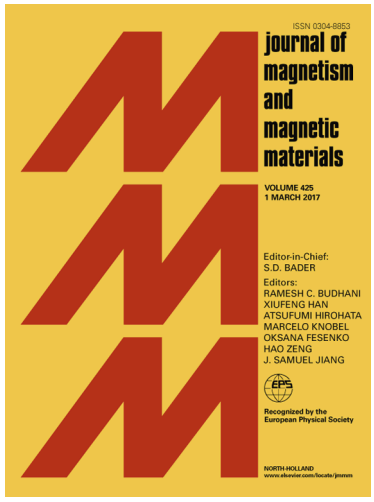

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Effect of Heavy Metal Interface on the Magnetic Behaviour and Thermal Stability of CoFeB Film

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Abstract: Evolution of the structure and magnetic properties of an amorphous CoFeB layer in a heterostructure consisting of HM/ CoFeB/ HM (HM=Hf, W), with thermal annealing has been studied using magneto-optical Kerr effect (MOKE) and synchrotron based Grazing incidence x-ray diffraction (GIXRD) measurements. It is found that the interface with HM can significantly affect the thermal stability as well as magnetic properties of CoFeB layer. Crystallization temperature of CoFeB layer interfaced with Hf is about 50°C lower than that of CoFeB interfaced with W. Further, while in Hf/CoFeB/Hf, the as-deposited film possesses a well-defined uniaxial magnetic anisotropy, in W/CoFeB/W the magnetization is almost isotropic in the film plane. Long range stresses in as-deposited film and possible bond orientational order are expected to cause the observed anisotropy. With onset of crystallization, random stresses and compositional inhomogenities are generated in CoFeB film, resulting in a large increase in magnetic coercivity, and disappearance of magnetic anisotropy.

Keywords: *Amorphous thin film, Capping/buffer layer, Magneto optical Kerr effect, Magnetic anisotropy, X-ray diffraction.*

1. INTRODUCTION

Heterostructures consisting of Heavy Metal (HM)/CoFeB/MgO are important in view of the possibility of having magnetic tunnel junctions with voltage induced switching of