

Influence of the interface quality on magnetic properties of $\text{Fe}_{20}\text{Ni}_{80}/\text{Tb-Co}$ films with unidirectional anisotropy

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Mechanism of the exchange coupling between adjacent magnetic layers often remains obscure because of complexity of the magnetic frustrations and compositional gradients in the interface region. In this study we considered effect of annealing on magnetic properties of $\text{Fe}_{20}\text{Ni}_{80}/\text{Tb-Co}$ and $\text{Fe}_{20}\text{Ni}_{80}/\text{Ti}/\text{Tb-Co}$ films with unidirectional anisotropy. Changes in the interface region were evaluated by means of grazing incidence x-ray fluorescent (GIXRF) analysis. This method allowed us to compare interlayer diffusion and interface roughness at different stages of cumulative annealing. In case of $\text{Fe}_{20}\text{Ni}_{80}/\text{Tb-Co}$ sample, annealing at 100 C initiated the interdiffusion process, whereas for $\text{Fe}_{20}\text{Ni}_{80}/\text{Ti}/\text{Tb-Co}$ film even ultrathin (0.7 nm) Ti spacer was enough to prevent active mixing of the layers for temperatures up to 300 C. Hysteresis properties of $\text{Fe}_{20}\text{Ni}_{80}$ layer demonstrated good correlation with the changes observed in GIXRF experiment.

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