

Thickness dependent Magnetic Properties of Rare-earth free $L1_0$ FePt/Fe₄₅Co₅₅ bilayer

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Using the full potential linearized augmented plane wave (FLAPW) method, we have investigated the thickness dependent energy product and coercive field of the rare-earth free FeCo/FePt bilayer systems. We have considered 2, 5 and 10 monolayer (ML) FeCo at 4 ML FePt ($L1_0$). It is observed that both 2 and 5 ML FeCo displayed close to half metallic features, however in 10 ML system an ordinary metallic feature was obtained. A high value of perpendicular magnetocrystalline anisotropy energy (E_{MCA}) of 45.6 and 23.9 meV/cell was found for 2 and 5ML FeCo system. The coercive field displayed a decreasing tendency with increasing FeCo thickness. Additionally, the estimated energy product was 74.2, 85.1 and 45.5 MGOe for 2, 5 and 10 ML system respectively. Therefore, our results may imply the FeCo/FePt bilayer can be used for potential rare earth free permanent magnet.

This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (No. 2013R1A1A2006071) and by the Supercomputing Center/Korea Institute of Science and Technology Information with supercomputing resources including technical support (KSC-2014-C3-071)