

Thickness Dependent Energy Product and Coercivity Field of Exchange Spring Magnet FeCo/FePt Multilayers

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Using the full potential linearized augmented plane wave (FLAPW) method, we have investigated the magnetic properties of the rare earth free exchange spring magnet FeCo/FePt(001) multilayers. In this study, we have increased the thickness of FeCo layers from 3 to 9 monolayer (ML). Also, coverage of FePt layers are considered as 5 and 7 ML. The average magnetization and estimated maximum energy product increase with FeCo thickness. Besides, we find a giant perpendicular magnetocrystalline anisotropy (MCA) energy for all multilayer systems. We have also estimated the FeCo thickness dependent maximum coercivity field based on MCA energy. In particular, the suppression of coercivity field with FeCo thickness is very weak, while the energy product is rapidly increasing. From energy product and coercivity field calculation, we may imply that the FeCo/FePt multilayer systems can be utilized for potential rare earth free exchange spring magnet materials.