Voltage induced magnetic anisotropy change in FePt

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Voltage induced magnetic anisotropy change has attracted a great deal of attention as a magnetization direction control methods because of its ultralow energy consumption properties. Investigation of the voltage effect in $L1_0$-orderd ferromagnets, FePt [1,2] and FePd [1] for instance, are important for magnetic devices because of its high thermal stabilities due to the bulk anisotropy. In this study, we have prepared FePt/MgO junctions by molecular beam epitaxy (MBE) methods and evaluated the voltage effect as a function of the FePt thickness.

MgO(100)substrate/MgO(3 nm)/Cr(30 nm)/Pd(30 nm)/ **[Fe(1.4Å)/Pt(2.0Å)]$_n$/[Fe(1.4Å)]$_m$ [n=2,4,6,8, m=0,1]** /MgO(5 nm) multilayer was fabricated by MBE (Fig. 1). The FePt layer was prepared by alternating deposition of the pure Fe and Pt. After the breaking the vacuum, polyimide (1500 nm) layer was coated. Figure 2 shows typical magnetization curves measured by magneto-optical Kerr effect measurement. Clear coercivity field change under the voltage application of ±200 V was observed. The perpendicular magnetic anisotropy increases under negative voltage, which is same polarity as the Fe, FeCoB and FePt[1] but opposite to the FePt in ref. 2. The magnitude of the voltage effect was strongly influenced by the Fe termination. This work was funded by ImPACT Program of Council for Science, Technology and Innovation (Cabinet Office, Government of Japan)

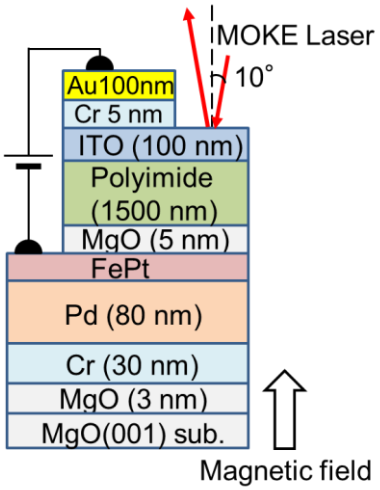

Fig.1 Sample structure

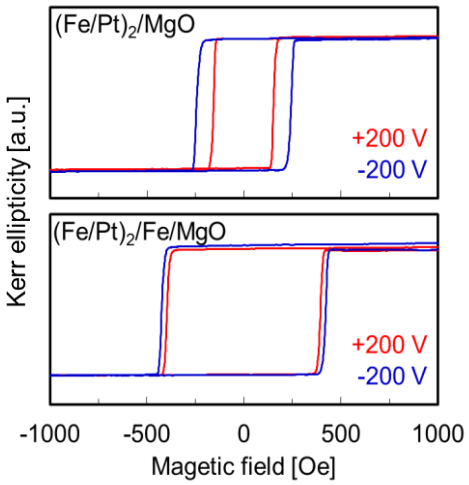

Fig.2 Magnetization curves in FePt

[1]M. Weisheit *et al.*, Science **315**, 349 (2007) [2]T. Seki *et al.*, APL **98**, 212505 (2011)