

Ta|CoFe|MgO における電流誘起実効磁場**Current-induced effective field vector in Ta | CoFeB | MgO**

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Recently current-induced effective field is attracting significant interest for alternative way of manipulating magnetization with electric current. Two effects, the Rashba effect and/or the spin Hall effect (SHE) are regarded as origin of the effective field [1, 2]. We carried out measurements on the effective field in Ta | CoFeB | MgO films with perpendicular magnetic anisotropy [3]. Films stacks, d_{Ta} Ta | d_{CoFeB} CoFeB | 2 MgO | 1 Ta (unit: nm), are deposited on Si substrate with various Ta and CoFeB layer thickness from 0 to 2 nm. Hall bars are patterned with photolithography and Ar ion etching. The magnetization response was measured via extraordinary Hall effect (EHE) measurements. We studied the effective field with low current AC lock-in technique with sweeping external field directed parallel or transverse to current direction.

The transverse effective field is independent on the magnetization direction whereas the longitudinal effective field changes its sign for opposite magnetization direction. The magnitude of the effective field is found to be proportional to the current density and its proportionality factor is strongly affected by the Ta layer thickness. In particular, the effective field changes its direction depending on the Ta layer thickness.

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[1] I. M. Miron *et al.*, Nature **476**, 189 (2011). [2] L. Liu *et al.*, Science **336**, 555 (2012). [3] J. Kim *et al.*, Nature Matter., nmat3522 (2012).