

# High speed spin dynamics in CoFeB/Ta/CoFeB investigated by optical pump-probe technique

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Perpendicularly magnetized CoFeB/MgO films have been investigated as the recording cell in the magnetic tunnel junction devices. [1,2] However, it is hard to realize the high thermal stability in the CoFeB single layer since the thickness of the CoFeB should be small (< 2 nm) due to the magnitude of the interfacial magnetic anisotropy energy in the CoFeB/MgO. MgO/CoFeB/Ta(0.4 nm)/CoFeB/MgO multilayer is known to act as a single magnetic layer, and to possess high thermal stability than that of the CoFeB/MgO. [3,4] However, high speed spin dynamics in the CoFeB/Ta/CoFeB has not been investigated in detail. In the present study, high speed dynamics in CoFeB/Ta/CoFeB has been investigated using optical pump-probe technique.

MgO (4.0)/CoFeB (1.6)/Ta (0, 0.2, 0.4, 0.6)/CoFeB (1.0)/MgO (4.0)/Ta (1.0)(nm unit) were prepared on thermally oxidized Si substrate using magnetron sputtering. (Fig. 1) This multilayers were annealed under vacuum at 300 deg. (1 hr). Figure 2 shows the results of the time-resolved magneto optical polar Kerr effect (TR-pMOKE) measurements. The magnetic field of 20 kOe was applied 40 deg. tilted from the film normal. The laser intensity was 0.11 mJ/cm<sup>2</sup>. As a results, the signal intensity decreases as the Ta thickness increases. But clear oscillation signal was still measureable when the Ta thickness is 0.4 nm. In the presentation, we will discuss dependences on the Ta thickness as well as the laser intensity in detail. This work was supported by NEDO.

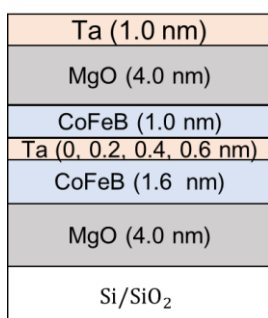


Fig. 1 Sample structure

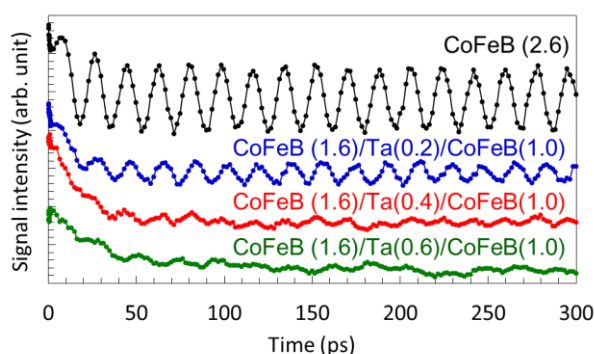


Fig. 2 TR-MOKE results of CoFeB/Ta/CoFeB

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[2] S. Ikeda *et al.*, Nat. Mater. **9**, 721 (2010).

[3] H. Sato *et al.*, APL **101**, 022414 (2012).

[4] H. Sato *et al.*, APL **105**, 062403 (2014).