

貼り付けられる薄型ポリイミドフィルム上 スピンオービットトルクデバイス

Attachable spin orbit torque device on thin polyimide sheet

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[Introduction]

Magnetic thin film is one of candidates for flexible memory because a magnetic material has a sufficient resistance against bending [1]. Although various plastic sheets can be used as substrate for a magnetic device, the substrate should have sufficient heat resistance because magnetic thin film for the memory device needs annealing process. In this study, we fabricated magnetic thin film patterns on the polyimide (PI) sheet, which have sufficient heat resistance, and observed magnetization switching by spin orbit torque (SOT) induced by electric current. Additionally, we bonded PI sheet and polydimethylsiloxane (PDMS), and observed magnetization switching by SOT.

[Experiment]

10 μm -thick PI sheets was fabricated by spin coating method using PI varnish on Si substrate. The Ta(5)/CoFeB(1)/MgO(2) (units are nm) multilayered films were deposited on the flexible PI sheet on Si substrate using a DC magnetron sputtering method. The 10 μm -width Hall cross and electrode patterns were obtained by using a photolithography. The magnetic properties of the samples were measured by vibrating sample magnetometer (VSM). The magnetization switching was measured by applying electric current under in-plane magnetic field H_x .

[Results]

Magnetization curves showed the CoFeB film on PI sheet has perpendicular magnetic anisotropy. The SOT-induced magnetization switching in the CoFeB wire on PI sheet was successfully obtained by applying current. We bonded PI sheet and PDMS, shown in Fig. 1. The SOT-induced magnetization switching in the CoFeB wire on PI sheet with PDMS was also successfully obtained by applying current.

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[1] S. Ota et. al, Appl. Phys. Express 9, 043004 (2016).

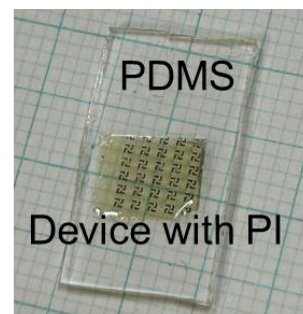


Fig. 1 Photograph of device with PI sheet bonded on PDMS.