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Perpendicular Magnetic Anisotropy of Tb/Fe and Gd/Fe Multilayers Studied with Torque Magnetometer ATAUR CHOWDHURY, Physics Department, UAF — Perpendicular magnetic anisotropy (PMA) of multilayers critically depend on the magnetic and structural ordering of the interface. To study the effect of interface on PMA, Tb/Fe and Gd/Fe multilayers with varying Fe (0.8-9.0 nm) and Gd (0.5-2.8 nm) or Tb (0.3-6.3 nm) layer thicknesses were fabricated by planar magnetron sputtering. The magnetometer results of spin orientation clearly reveals that samples with Gd or Tb layer thickness of more than 1.2 nm display no PMA, regardless of the Fe layer thickness. Tb/Fe and Gd/Fe multilayers with thin (<1.2 nm) Tb or Gd layers display large PMA, but no PMA is observed when the Fe layer thickness is increased to 4.0 nm and higher. The bulk magnetization and anisotropy energy constant of the samples are found to increase with increasing Fe layer thickness. Torque measurement also reveals that there are two distinctly different axes of spin alignment at different energy. Tb/Fe and Gd/Fe multilayers with similar composition reveal similar magnetic and structural characteristics, and it may imply that single-ion-anisotropy of rare-earth element, which is quite large for Tb ions and very small for Gd ions, may not be the dominating cause of PMA in Td/Fe and Gd/Fe multilayers. A detailed explanation of the results will be provided based on exchange interaction at the interface.

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