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Magnetic Characterization and Ultrafast Magnetization Dynamics of Tb/Co Ferrimagnetic Multilayers Modeled by Tilted Uniaxial Anisotropy

Ferrimagnet materials attract significant interest due to their tunable magnetic properties. In particular, ferrimagnetic multilayers with perpendicular magnetic anisotropy (PMA) are essential for the development of advanced spintronic devices.

Despite extensive studies of TbCo multilayers and alloys, in-plane hysteresis is still observed even in systems with strong PMA, and their ultrafast magnetization dynamics differ from those of TbCo alloys and other ferrimagnets.

We present the structural and magnetic characterization of five period Tb/Co multilayers with dominant PMA, varying the Tb thickness on the Co-rich side. A systematic study of the magnetic compensation temperature T_M reveals a linear relation between remanent magnetization and temperature, allowing a simple model to predict T_M [1].

Angular-dependence of magnetization loops show that the multilayers behave as single macrospin under high magnetic fields. A modified Stoner- Wohlfarth model was developed to reproduce the hysteresis loops and indicates that a slight tilt of the easy axis from the film normal is required to explain the in-plane hysteresis [1].

We also present the ultrafast magnetization dynamics of Tb/Co multilayers measured by TR-MOKE and recent progress in developing a TR-MOKE magnetometer at Bariloche Atomic Center.

[1] J. C. Rodriguez E. *et al.* <https://doi.org/10.48550/arXiv.2505.14849> (under revision)

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