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# Elastic and Magnetic properties of Tb-MnO based Thin Films

*Monday, 26 July 2021 12:00 (15 minutes)*

Multiferroic rare-earth composites in thin-film format have shown promising results towards the attainment of strong coupling of ferroic orders (ferroelasticity, ferromagnetism, ferroelectricity, and ferrotoroidicity) at room temperature, which is a key parameter to the realization of low-energy dissipating devices such as solid-state refrigerators, spintronic memory storage, etc. In this work, we have synthesized Tb-MnO based thin films on (001) Si at ambient temperature using radio frequency magnetron (RF) sputtering at 50 W and investigated their elastic and magnetic properties. The elastic properties of the films have been measured by surface Brillouin scattering (SBS) at ambient temperature, optimized, and fitted with data simulated using surface Elastodynamic Green's function for discrete phonon dispersion in the k//d range of 0–5. By least-squares fitting approach, the measurement uncertainties have been obtained from the Taylor series expansion of the phonon phase velocity dependence on the primary elastic constants (C11 and C44), yielding the optimum values as; C11 = 180 +/- 4.90 GPa and C44 = 43 +/- 0.89 GPa. On the other hand, the magnetic properties of the films have been studied by vibrating sample magnetometry (VSM). The films have been noted to attain ferromagnetic ordering at T<150 K. Spin-glass-like behaviour associated with competing ferromagnetic and antiferromagnetic magnetic ordering has also been observed at T˜50 K.

Keywords: Multiferroics, thin-film, elastic constants, ferromagnetism, spin-glass

## Apply to be considered for a student ; award (Yes / No)?

Yes

## Level for award;(Hons, MSc, PhD, N/A)?

PhD

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