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Correlations of Ferroic Orders in Multiferroic TbMnO3 and TbMn2O5Thin Films

Multiferroics are a class of materials exhibiting correlations in their ferroic orders (ferroelasticity, ferromagnetism, ferroelectricity, and ferrotorodicity). Light interaction with lattice vibrations is a powerful method to study the elastic properties of solids using surface Brillouin scattering (SBS). SBS is based on the inelastic scattering of photons by acoustic modes (phonons) to determine the elasticity of materials. In this work, ferroelastic, magnetic, and magnetoelctric properties of multiferroic rare-earth complex oxides TbMnO3 and TbMn2O5 are investigated in thin film format. The phonon velocities were measured at room temperature using a diode pumped solid-state laser (λ=532 nm) at an incidence angle of 60 degrees. The measured data was optimized and fitted with data simulated using surface elastodynamic Green's function for discrete phonon dispersion in the k||d range of 0–10. By the least-squares fitting approach, we obtain the uncertainties of measurement from Taylor series expansion of the phonon phase velocity dependence on the primary elastic constants (C11 and C44). On the other hand, the magnetic properties of the films have been studied by vibrating sample magnetometry (VSM), and magnetoelectric coupling using precision multiferroic tester.

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

Yes

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

PhD

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