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Mueller matrix ellipsometry studies of the optical phonons and crystal field excitations in multiferroic orthoferrites RFeO3 (R=Tb,Dy)¹ V.A. MARTINEZ, T.N. STANISLAVCHUK, A.A. SIRENKO, Department of Physics, New Jersey Institute of Technology, Newark, New Jersey 07102, USA, A.P. LITVINCHUK, Texas Center for Superconductivity and Department of Physics, University of Houston, Houston, Texas 77204, USA, YAZHONG WANG, S.W. CHEONG, Rutgers Center for Emergent Materials and Department of Physics and Astronomy, Rutgers University, Piscataway, New Jersey 08854, USA — Optical properties of multiferroic orthoferrites RFeO3 (R=Tb,Dy) bulk crystals have been studied in the far-infrared range from 50 to 1000 cm-1 and temperatures from 7 K to 300 K. Mueller matrix and rotating analyzer ellipsometry measurements were carried out at the U4IR beamline of the National Synchrotron Light Source at Brookhaven National Lab. Optical phonon spectra and crystal field excitations were measured for all three orthorhombic axes of RFeO3. In the experimental temperature dependencies of the phonon frequencies we found non-Grneisen behavior caused by the electron-phonon and spin-phonon interactions. We determined the symmetries and selection rules for the crystal field transitions in Tb3+ and Dy3+ ions. Magnetic field dependencies of the optical spectra allowed us to determine anisotropy of the crystal field g-factors for Tb3+ and Dy3+ ions.

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