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Spectroscopic ellipsometry study of optical anisotropy in Gd₅Si₂Ge₂ and comparison with reflectance difference spectra S.J. LEE , Materials and Engineering Physics Program, Ames Lab, J.M. PARK, Department of Physics and Astronomy, J.E. SNYDER, D.C. JILES, T.A. LOGRASSO, D.L. SCHLAGEL, A.O. PECHARSKY, Materials and Engineering Physics Program, Ames Lab, D.W. LYNCH, Department of Physics and Astronomy, ISU, Ames, IA 50011 — Recently, Gd₅Si₂Ge₂ has been extensively studied due to its giant magnetocaloric effect, colossal magnetostriction, and giant magnetoresistance in the region of an unusual first-order magnetic-structural phase transformation. In this presentation, we report the complex dielectric functions of single crystals of Gd₅Si₂Ge₂ obtained using spectroscopic ellipsometry (SE) in the photon energy range 1.5 to 5.0 eV. Reflectance difference (RD) spectra for Gd₅Si₂Ge₂ single crystals have been measured by reflectance difference spectroscopy (RDS). Reflectance difference spectra for the $a - b$ and $b - c$ planes of single crystals of Gd₅Si₂Ge₂ were derived from the complex dielectric functions obtained from SE measurements and compared with those obtained from RDS measurements at near normal incidence. The measured spectra agreed well. The in-plane optical anisotropy of the sample is mainly due to intrinsic bulk properties because it has large values (4×10^{-2}) compared to surface induced optical anisotropies, with values of only of about 10^{-3} for a typical cubic material.

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