

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Band gap and wavelength dependent refractive indices of pulsed laser deposited LaGdO₃ high-k dielectric films on quartz substrates SHOJAN PAVUNNY, REJI THOMAS, RAM KATIYAR, Department of Physics and Institute for Functional Nanomaterials, University of Puerto Rico, San Juan, P.O. Box 23343, PR 00931, USA. — Inter-lanthanide oxide, LaGdO₃ (LGO) has been considered for the high-k gate oxide application. However, its optical properties like, band gap (E_g), refractive index (n) and extinction coefficients (k) are not studied so far. Highly oriented LGO thin films were deposited on quartz (0001) substrates by pulsed laser deposition and evaluated its optical properties by employing UV-visible transmission spectroscopy (190-800nm). The structure, morphology, composition and valency-state were studied using XRD, AFM, EDX and XPS respectively. The thickness, E_g , n , and k of the film were extracted from the transmission spectra. The optical band gap for the film was calculated by considering a direct transition between valence and conduction bands, and found to be 5.44 eV, satisfying the band-offset requirement with Si for the gate-oxide application. The variation of n and k with wavelength and thickness will also be discussed.

Shojan Pavunny
Department of Physics and Institute for Functional Nanomaterials,
University of Puerto Rico, San Juan, P.O. Box 23343, PR 00931, USA.

Date submitted: 28 Nov 2009

Electronic form version 1.4