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Structural properties of SrTiO3 thin films on Semiconductors NUWANJULA SAMARASINGHA, JAIME MOYA, STEFAN ZOLLNER, New Mexico State University, SUDESHNA CHATTOPADHYAY, Indian Institute of Technology Indore, PATRICK PONATH, ALEX DEMKOV, University of Texas-Austin, INDIAN INSTITUTE OF TECHNOLOGY INDORE COLLABORATION, UNIVERSITY OF TEXAS-AUSTIN COLLABORATION — SrTiO3 (STO) films were grown epitaxially on different semiconductor substrates (Si, Ge) with the unit cell rotated by 45 degrees with respect to the underlying substrate lattice. X-ray diffraction (XRD) and X-ray reflectivity (XRR) were utilized to characterize STO on Si, Ge and STO. Structural properties (lattice constant and strain) were obtained using high resolution X-ray diffraction with two types of scans (ω and ω-2θ). Most technological applications require thin films of definite thickness with a known density/depth profile. Hence, determination of film thickness and corresponding density profile is very crucial for these technologies. Using a simulation (theoretical model based on Parratt formalism) of the X-ray reflectivity pattern, a highly accurate measurement of thickness, roughness and electron density profile can be obtained. X-ray reflectivity data indicate that the SrTiO3 thin film on Si thickness is approximately 17 nm with 2.9 nm SiO2 layer with a constant electron density. Also, the SrTiO3 thin film on Ge thickness is approximately 19 nm with 1.5 nm GeO2 layer with a varying electron density. We will compare our XRR results with ellipsometry data taken on the same layers.

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