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Optical Excitation Study of Defects in Strontium Titanate Substrates SHEHNAZ JEDDY, M.E. ZVANUT, University of Alabama at Birmingham, 35294, USA — BiFeO₃ thin films on SrTiO₃ (STO) substrates exhibit great potential for novel applications. Understanding substrate structure is critical in designing and controlling ferroelectric and magnetoresistive responses of the thin films. Hence, defect levels in STO are being studied using 9.4 GHz electron paramagnetic resonance (EPR) at room temperature before and during optical excitation using a 500 W Hg arc lamp. Initial EPR of STO reveal three defects: Cr³⁺, cubic Fe³⁺ and axial Fe³⁺. Photo induced EPR intensity as a function of the photon energy is measured to determine defect levels and charge transfer effects with respect to the band gap. Preliminary investigation in the energy range 0.51eV to 5.06 eV reveal varying responses of defect centers. Data show Cr³⁺ is unaffected upto 1.3 eV, increasing by a factor of 2 with a peak at 2.0 eV. Both cubic and axial Fe³⁺ show no response with our present system. The changes seen in Cr³⁺ may be due to Cr³⁺ being converted to Cr²⁺ or Cr⁴⁺. Further optical study using time dependant photo EPR will be done to enable deeper understanding of defect levels.

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