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Infrared study of metallicity in vacuum annealed strontium titanate PENG XU, T.J. HUFFMAN, M.M. QAZILBASH, Department of Physics, College of William and Mary, IN HAE KWAK, AMLAN BISWAS, Department of Physics, University of Florida — Widely employed as a substrate and as a dielectric layer in heterostructures, strontium titanate (STO) has been thoroughly studied. Metallicity in Nb-doped SrTiO_3 and at the interface of $\text{SrTiO}_3/\text{LaAlO}_3$ superlattices is also well known. In this work, we focus on the charge dynamics of vacuum annealed $\text{SrTiO}_{3-\delta}$ crystals which have metallic and atomically smooth surfaces. Far-field and near-field infrared measurements supported by spectroscopic ellipsometry have been carried out to provide insight into the emergence of metallicity due to oxygen deficiency in this insulator. Infrared reflectance and near-field optical microscopy are employed to obtain the dielectric function of $\text{SrTiO}_{3-\delta}$. This information is analyzed to extract the characteristics of the electron gas in the metallic layer.

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