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Strain Screening by Mobile Oxygen Vacancies in Strontium Titanate[1] YONGSAM KIM, TIMUR BABAKOL, ANKIT DISA, JOEL BROCK, Cornell University, BROCK RESEARCH GROUP TEAM — Small variations in the concentrations of oxygen vacancies in complex-oxide materials such as $SrTiO_3$ produce tremendous changes in physical properties such as the carrier density. Consequently, characterizing and controlling the oxygen vacancy concentration has become of interest both technologically and fundamentally. Recently, Freedman et al [1] calculated the elastic dipole tensor for several types of point defects in $SrTiO_3$ and showed that the appropriately averaged tensor for an oxygen vacancy is nearly traceless, providing a mechanism whereby highly mobile oxygen vacancies screen the elastic strain field. Here, we report detailed diffuse x-ray scattering measurements of bulk $SrTiO_3$ crystals prepared with controlled oxygen vacancy distributions under varying uniaxial stress states, demonstrating the traceless nature of the elastic dipole tensor, correlations between vacancies, and elastic strain screening.

[1] D.A. Freeman, et al, Phys. Rev. B **80**, 064108 (2009)

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