

Abstract Submitted
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Near-surface properties of SrTiO₃ (001) from resonant soft x-ray reflectance¹ JEFFREY KORTRIGHT, MANUEL VALVIDARES, Lawrence Berkeley National Laboratory, MARK HUIJBEN², University of Twente, PU YU, RAMAMOORTHY RAMESH³, University of California, Berkeley — Resonant reflectivity $R(h\nu, q)$ has been measured from several SrTiO₃ (001) single crystals across the Ti $L_{2,3}$ edges: we find that this approach senses the near-surface region differently than other techniques including resonant XAS via total electron yield. Modeling $R(h\nu)$ provides absolute resonant optical properties $n = 1 - \delta - i\beta$ indicating short skin depths (< 10 nm) when tuned to the t_{2g} and e_g peaks. We observe unexpected linear dichroism (LD) at 300 K primarily in the e_g states, consistent with tetragonal symmetry and possible weak ferroelectric polarization. Below the bulk antiferrodistortive transition at 105 K both t_{2g} and e_g states exhibit LD. Resonant $R(q)$ exhibits clear structure indicating a subsurface layer several nm thick having different properties from the bulk, suggesting that the 300 K LD is associated with this layer. We discuss these new results in the context of established studies of the STO surface and their relevance to dielectric and ferroelectric properties of STO surfaces and thin films.

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²formerly affiliated with University of California, Berkeley

³also affiliated with Lawrence Berkeley National Laboratory

Jeffrey Kortright
Lawrence Berkeley National Laboratory

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