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【505】Direct determination of the electron-phonon interaction in CaTiO3 thin films

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In Fermi liquids, electron-boson coupling is (EBI) quantified through the Eliashberg function $\alpha^2F(\omega, \mathbf{k})$, which modifies their self-energy $\Sigma(\varepsilon, \mathbf{k})$ obtainable from ARPES. We present a combined ARPES, density-functional theory, and high-resolution electron energy-loss spectroscopy (HREELS) study on the EBI in $CaTiO_3$ (CTO) thin films. CTO hosts a 2-dimensional electron liquid (2DEL) analogous to that in $SrTiO_3$-based surfaces, making both materials technologically appealing for oxide electronics. Our results show that the presence of localized in-gap states changes the dielectric response of the CTO film, red-shifting high-energy phonon modes, thereby indicating their strong coupling to the 2DEL states. Combining ARPES with HREELS is a powerful approach to study quantum materials with strong EBI.

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