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Renormalization of the nickelate phase diagram in strained thin films ANKIT DISA, DIVINE KUMAH, JOSEPH NGAI, FRED WALKER, CHARLES AHN, Center for Research on Interface Structures and Phenomena and Department of Applied Physics, Yale University, ELIOT SPECHT, Materials Science and Technology Division, Oak Ridge National Laboratory, DARIO ARENA, National Synchrotron Light Source, Brookhaven National Laboratory — As a result of strong electron-lattice coupling, the bulk electronic phase diagrams of correlated oxides can be modified in epitaxial thin films using reduced dimensionality and substrate-induced strain. Taking advantage of the unique features of these materials, such as correlation-driven magnetic and metal-insulator transitions, requires a systematic understanding of how the thin film phase diagram differs from the bulk. Here, we explore the phase diagram of thin films of rare-earth nickelates, $R\mathrm{NiO_3}$, which in the bulk exhibit a systematic dependence of the transition temperature, T_{MI}, with R. Studying solid solutions of $\mathrm{NdNiO_3}$ and $\mathrm{LaNiO_3}$ ($\mathrm{Nd}_y\mathrm{La}_{1-y}\mathrm{NiO_3}$ with $0 \leq y \leq 1$) under compressive epitaxial strain, we observe a consistent renormalization of T_{MI} to lower temperatures. By examining the physical and electronic structure of the films using synchrotron x-ray diffraction and absorption spectroscopy, we determine that the renormalization is due to an enhanced Ni-O overlap as a result of coherent compressive strain.

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