

Since the discovery of high-temperature superconductivity in copper-based oxides (cuprates), there has been a sustained effort to understand its origin and to discover new superconductors based on similar building principles. Recently, the discovery of superconductivity in bulk $\text{La}_3\text{Ni}_2\text{O}_7$ under high hydrostatic pressure and biaxial compression in epitaxial thin films has ignited significant interest in understanding the interplay between atomic and electronic structure in these compounds.

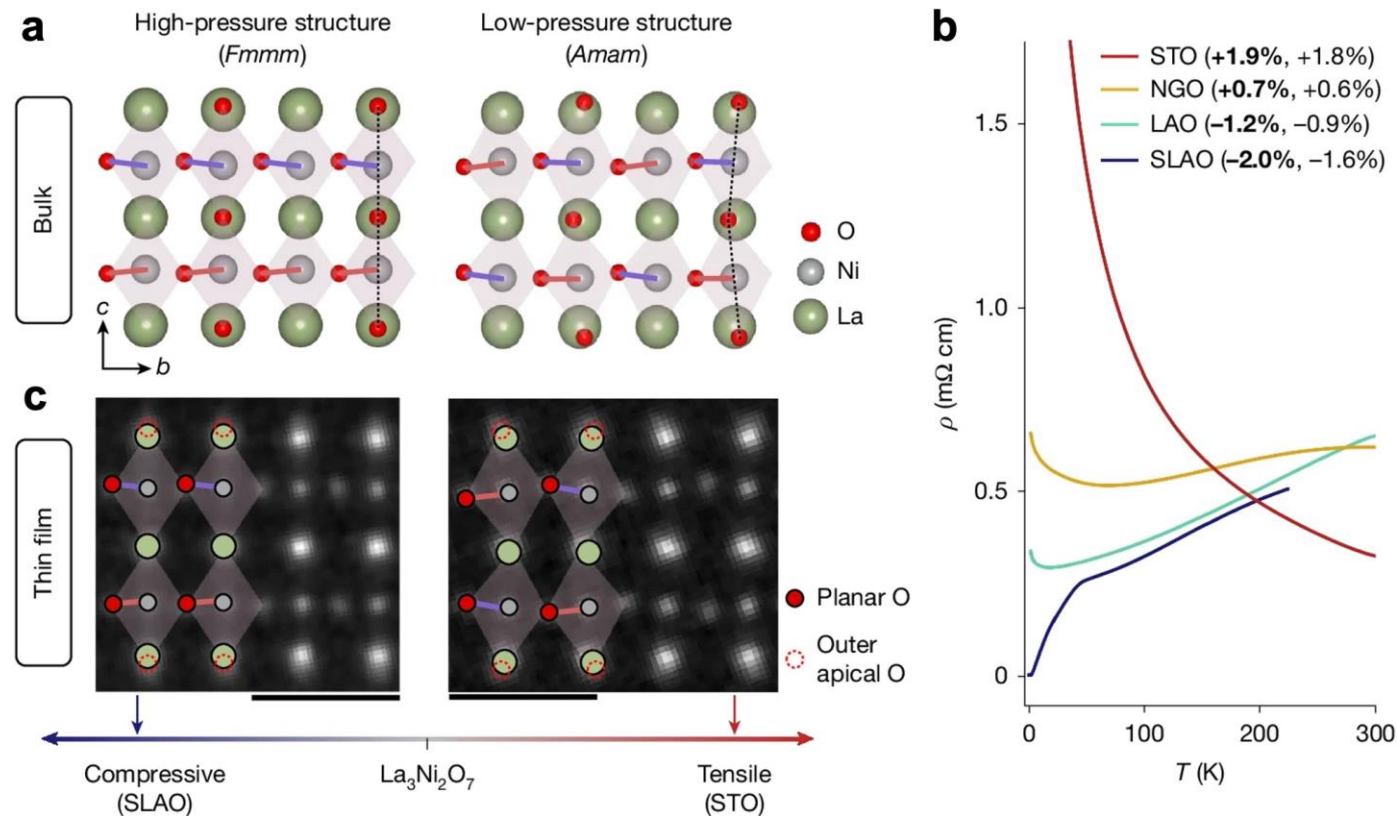
Through PARADIM, multiple external and local users joined forces with members of the In-House Research Team to identify key structural characteristics responsible for the electronic changes observed for $\text{La}_3\text{Ni}_2\text{O}_7$ thin films. Advanced electron ptychography developed in the PARADIM EM facility provides the first detailed measurements of subtle atomic distortions across a range of compressive and tensile strain.

Future thin film synthesis efforts to achieve even larger compressive strains or chemical pressures combined with low-temperature characterization will further facilitate the quest for understanding structural and electronic interplay in high-temperature superconductors.

L. Bhatt, *et al.* [*Nature* **653**, 76–82 \(2026\)](#).

Data DOI: [10.5281/zenodo.18917987](https://doi.org/10.5281/zenodo.18917987)

Berit H. Goodge (Cornell, MPI Dresden), David A. Muller (Cornell), Antia S. Botana (Arizona State University), Harold Y. Hwang (Stanford), and Julia A. Mundy (Harvard)



Structural and electrical changes in thin films under compressive and tensile strain. **a)** High-pressure and low-pressure bulk structures of one bilayer. **b)** Resistivity $\rho(T)$ of $\text{La}_3\text{Ni}_2\text{O}_7$ thin films epitaxially strained on various substrates SLAO (blue), LAO (cyan), NGO (yellow), and ST0 (red); chemical formulas are given in the text. The film on SLAO shows a superconducting onset near 42 K. **c)** Atomic structures of $\text{La}_3\text{Ni}_2\text{O}_7$ thin films under compressive (left) and tensile (right) strain measured experimentally by multislice electron ptychography.