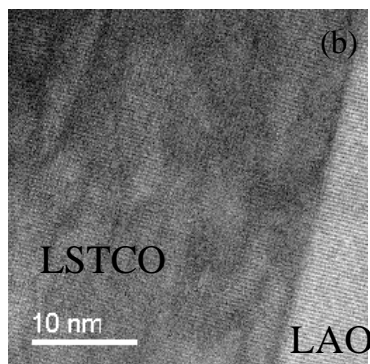
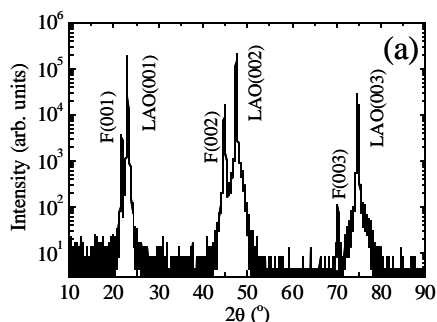


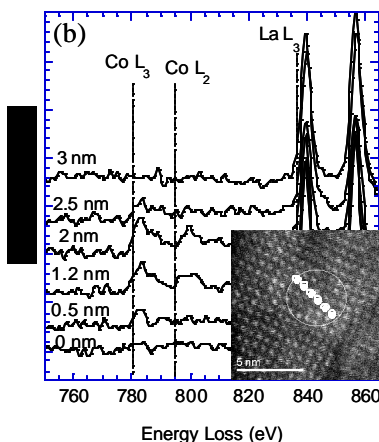
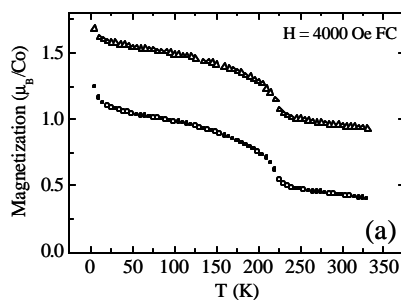
Co-doped $\text{La}_{1-x}\text{Sr}_x\text{TiO}_3$ A diluted magnetic metal with high Curie temperature

We report the discovery of room temperature (and above) ferromagnetism in a pulsed laser deposited epitaxial Co-substituted Ti-based conducting perovskite system ($\text{La}_{1-x}\text{Sr}_x\text{TiO}_3$), with a ferromagnetic transition near 450K. This, to our knowledge, is the first report of ferromagnetic ordering at such high temperature in a diluted magnetic perovskite. We found a degree of Cobalt clustering at higher Co concentrations ($>2\%$) but an intrinsic diluted magnetic metal system at lower concentrations, with no magnetic moment above 450K.



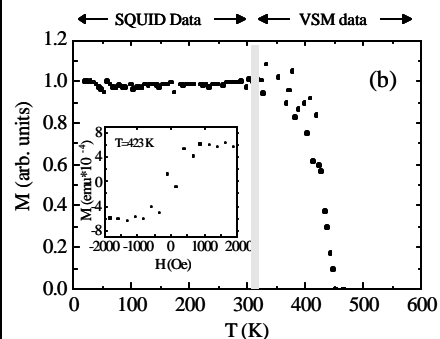
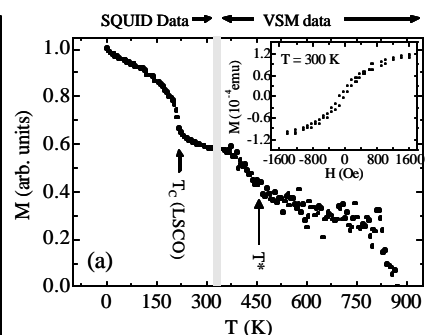
X-ray diffraction pattern and (b) STEM cross-section image of $\text{La}_{0.5}\text{Sr}_{0.5}\text{Ti}_{0.93}\text{Co}_{0.07}\text{O}_3$

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Temperature dependence of magnetization for Co doped $\text{La}_{1-x}\text{Sr}_x\text{Ti}_{0.93}\text{Co}_{0.07}\text{O}_3$ with $x=0.5$ (Δ) and 0.7 (?), (b) EELS spectra across a Co cluster region for $\text{La}_{0.5}\text{Sr}_{0.5}\text{Ti}_{0.93}\text{Co}_{0.07}\text{O}_3$.

Note that the Co signal which is to the right of the dashed bars showing the Co L3 and L2 edges is clearly noticeable only for 1.2 nm and 2 nm cases.



Temperature dependence of magnetization and hysteresis curves for $\text{La}_{0.5}\text{Sr}_{0.5}\text{Ti}_{1-y}\text{Co}_y\text{O}_3$ with (a) $y=0.07$ and (b) $y=0.015$, respectively.

The vertical gray bars separate regions over which the magnetization data were obtained by SQUID (5 K-325 K) and VSM (>300 K), as indicated.

Note that for 1.5% Co concentration (lower panel) a clear T_C of 450 K is obtained.