TEM Analysis of Gold-Nanoparticle Incorporated LSTO Films
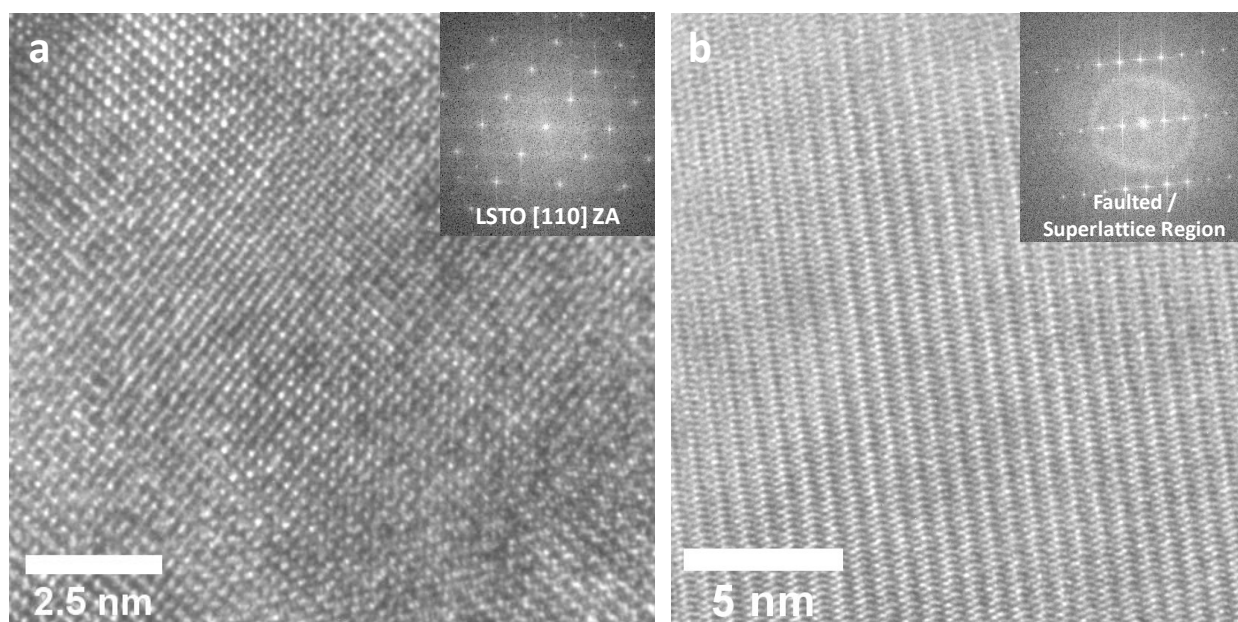

Fig S1. High-resolution TEM image of a) LSTO and b) a faulted / superlattice region that could not be indexed to perovskite LSTO.
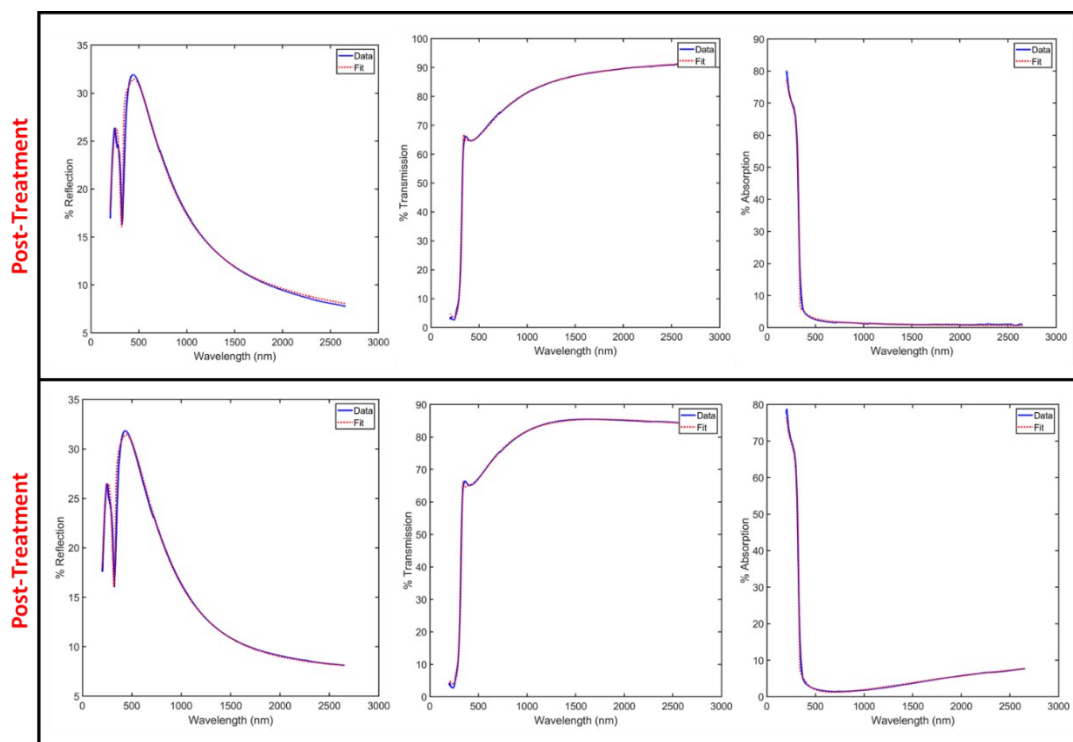
Optical Constant Fitting

Fig S2. Fitting transmission, reflection, and absorption spectra of LSTO films before and after hydrogen treatment (10% H_2, 16 hrs., 800°C).

Fitting Parameter	Pre-Treatment	Post-Treatment
Band Gap (E_g)	3.50 eV	3.50 eV
Oscillator Strength (A)	49.7 eV	43.5 eV
Oscillator Linewidth (C)	2.50 eV	2.64 eV
Oscillator Resonance (E_0)	3.79 eV	3.97 eV
Transition Energy (E_p)	1.05 eV	1.03 eV
High-frequency Diel. Const. (ε_∞)	$2.44\varepsilon_0$	$2.66\varepsilon_0$
Plasma Frequency (ω_p)	2.50×10^{-3} fs^{-1}	1.10 fs^{-1}
Carrier Scattering Rate (τ^{-1})	0.69 fs^{-1}	0.85 fs^{-1}
Urbach Energy (E_u)	1.28 eV	0.89 eV
Urbach Tail Onset (E_t)	3.62 eV	3.64 eV

Table S1. Summary of fitting parameters used in optical fits shown in Fig. S3.

Hydrogen Concentration	Response Time (min)	Post-Treatment
3%	14.9	3.6
5%	16	5.6
10%	10.2	7.8
30%	12.3	9.5
50%	8.1	8.4
70%	7.5	9.8
100%	9.8	14

Table S2. Response and recovery times at 700°C, calculated based on time required to reach 90% of response or baseline, respectively. Time required for gas concentration to reach equilibrium may provide non-negligible contribution to response / recovery time, see discussion in main text for details.