

Supplementary information for

**Phonon-glass and heterogeneous electrical transport in A-site deficient SrTiO<sub>3</sub>**

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**Table S1.** Lattice parameters from Rietveld fits against laboratory X-ray data, pellet densities for the Sr<sub>1-x</sub>La<sub>0.67x</sub>□<sub>0.33x</sub>TiO<sub>3</sub> and Sr<sub>0.2</sub>La<sub>0.53</sub>□<sub>0.27</sub>Ti<sub>1-y</sub>Nb<sub>y</sub>O<sub>3-δ</sub> series and activation energies from Arrhenius fits to the electrical resistivity data (shown in Fig. S5).

x	y	a (Å)	Density (gm/cm <sup>3</sup> )	Density (%)	E <sub>a</sub> (eV)
0	0	3.9058(1)	5.115	95(1)	
0.4	0	3.9003(1)	5.166	92(1)	
0.8	0	3.8849(2)	5.297	92(1)	
0.8	0	3.8904(1)	5.275	91(1)	0.147(3)
0.8	0.05	3.8919(1)	5.332	95(1)	0.092(3)
0.8	0.10	3.8951(1)	5.382	94(1)	0.101(3)
0.8	0.15	3.8974(1)	5.436	93(1)	0.101(2)

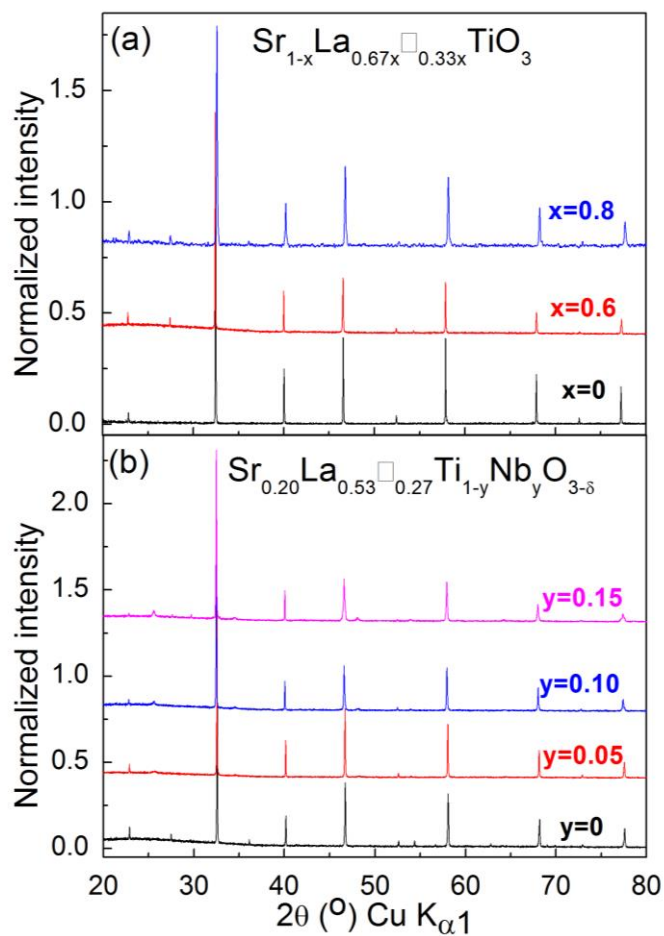
Space group Pm-3m, Sr/La/□ (0, 0, 0), Ti/Nb (1/2, 1/2, 1/2), O (1/2, 1/2, 0).

**Table S2:** Refined lattice and atomic parameters for Sr<sub>0.20</sub>La<sub>0.53</sub>TiO<sub>3</sub>. Data obtained from Rietveld fits against Polaris neutron powder diffraction data.

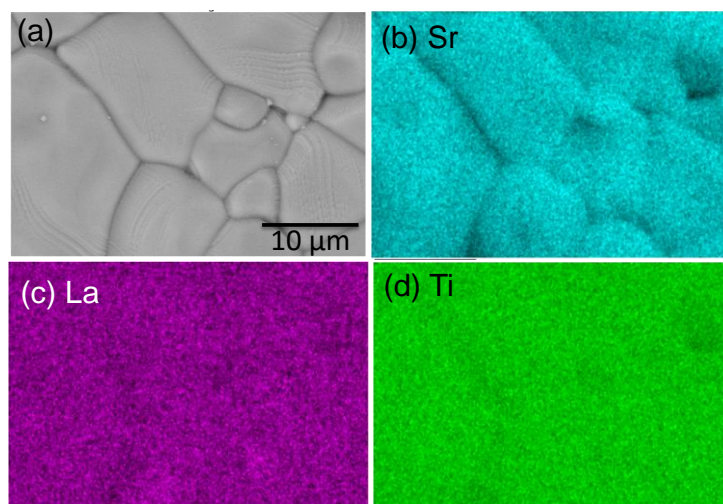
T (K)	a (Å)	c (Å)	100* U <sub>iso</sub> - Sr/La/□ (Å) <sup>2</sup>	100* U <sub>iso</sub> -Ti (Å) <sup>2</sup>	100* U <sub>iso</sub> - O1 (Å) <sup>2</sup>	100* U <sub>iso</sub> -O2 (Å) <sup>2</sup>	O2-x (Å)	χ <sup>2</sup>	wR <sub>p</sub> (%)
I4/mcm									
4	5.48323(5)	7.7595(1)	0.76(3)	1.10(4)	2.17(9)	1.33(3)	0.2302(2)	4.8	5.6
25	5.48331(5)	7.7593(1)	0.77(2)	1.11(3)	2.25(9)	1.31(3)	0.2303(1)	5.0	5.7
50	5.48340(5)	7.7597(1)	0.77(2)	1.11(3)	2.26(9)	1.31(3)	0.2303(1)	4.9	5.6
100	5.48454(5)	7.7603(1)	0.84(2)	1.17 (3)	2.21(8)	1.40(3)	0.2307(2)	4.5	5.4
150	5.48639(6)	7.7615(2)	0.88 (2)	1.15 (3)	2.31(9)	1.42(3)	0.2317(2)	4.3	5.3
200	5.48853(7)	7.7636(2)	0.96(2)	1.19(3)	2.4(1)	1.48(3)	0.2327(2)	3.9	5.1
300	5.49378(6)	7.7712(2)	1.17(2)	1.45(3)	3.0(1)	1.62(3)	0.2352(1)	3.0	3.4
373	5.49724(5)	7.7765(1)	1.21(2)	1.46(3)	3.18(8)	1.62(3)	0.2378(1)	3.3	3.4
473	5.50207(7)	7.7829(2)	1.37(2)	1.60(4)	3.31(9)	1.79(3)	0.2417(2)	3.6	3.6
Pm-3m									
573	3.895480(5)		1.52(2)	1.63(3)	2.43(1)			3.2	3.4
673	3.899617(5)		1.71(2)	1.82(3)	2.63(1)			3.1	3.3
773	3.903714(5)		1.95(2)	1.89(3)	2.83(2)			2.9	3.2
873	3.907877(5)		2.16(2)	2.08(3)	3.09(2)			2.8	3.2
973	3.912061(5)		2.41(3)	2.23(3)	3.33(2)			2.8	3.1
1073	3.916305(5)		2.59(3)	2.37(3)	3.55(2)			2.6	3.0

Space group (4-473 K): I4/mcm, Sr/La/□ (0, 0.5, 0.25), Ti (0, 0, 0), O1 (0, 0, 0.25) O2(x, y, 0)

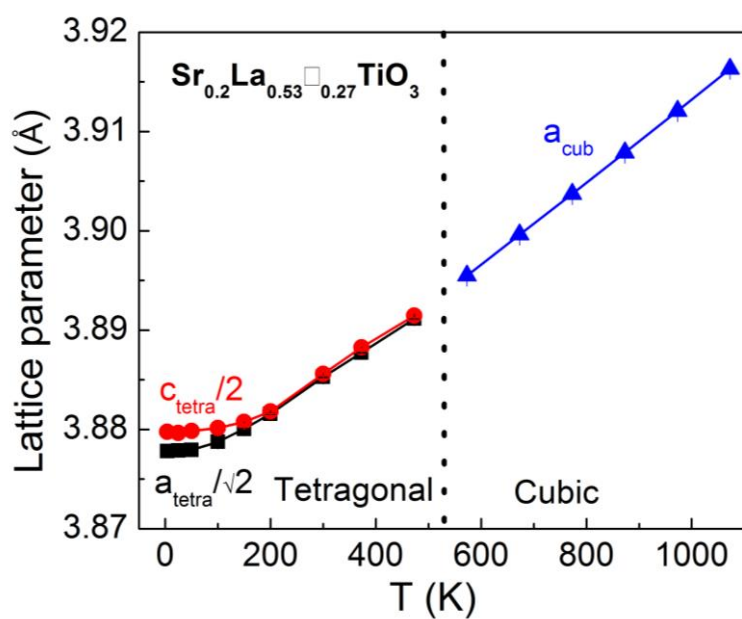
Space group (573-1073 K): Pm-3m, Sr/La/□ (0, 0, 0), Ti (0.5, 0.5, 0.5), O (0.5, 0.5, 0)



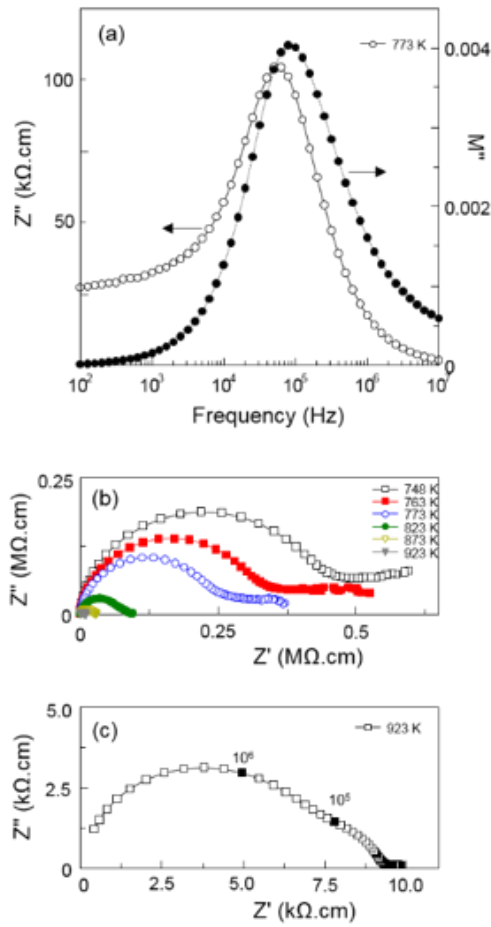
**Figure S1.** Room temperature powder X-ray diffraction patterns for (a)  $\text{Sr}_{1-x}\text{La}_{0.67x}\square_{0.33x}\text{O}_3$  sintered in air and (b)  $\text{Sr}_{0.20}\text{La}_{0.53}\square_{0.27}\text{Ti}_{1-y}\text{Nb}_y\text{O}_{3-\delta}$  sintered in 5%  $\text{H}_2$ .



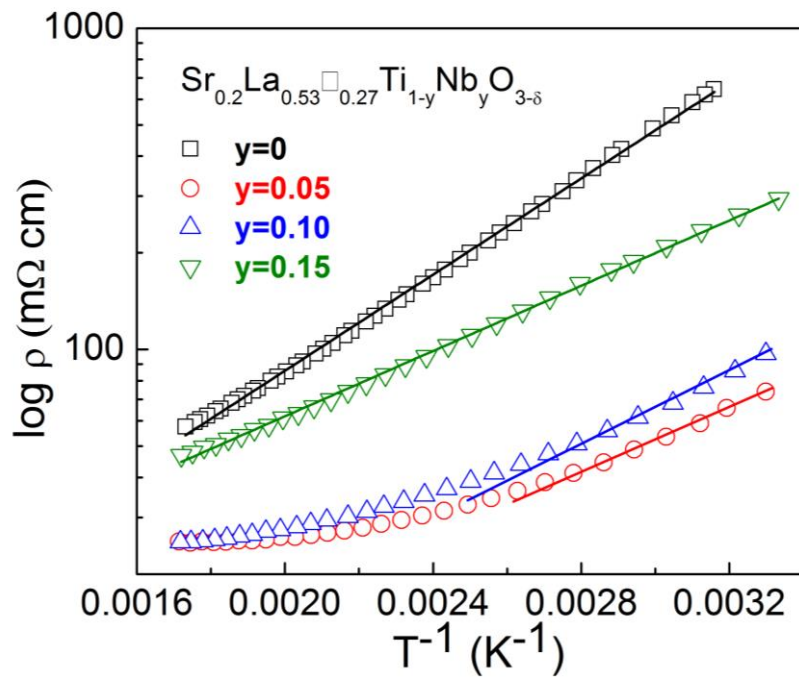
**Figure S2.** (a) SEM micrograph and (b-d) EDX elemental distributions for the  $\text{Sr}_{0.2}\text{La}_{0.53}\square_{0.27}\text{TiO}_3$  sample sintered in air.



**Figure S3.** Temperature dependence of the cell parameters for  $\text{Sr}_{0.2}\text{La}_{0.53}\text{TiO}_3$  sintered in air; from variable temperature neutron powder diffraction.



**Figure S4.** Immittance spectroscopy data as a function of temperature for  $\text{Sr}_{0.2}\text{La}_{0.53}\cdot_{0.27}\text{TiO}_3$  sintered in  $\text{O}_2$ : (a) combined imaginary impedance ( $Z''$ ) and modulus ( $M''$ ) data at 773 K showing presence of a single bulk response; (b, c) complex impedance ( $Z^*$ ) plane plots showing dominance of the bulk response to the total sample resistance but with small contributions of grain boundary and electrode effects at lower frequency.



**Figure S5.** Arrhenius fits to the electrical resistivity data for the  $\text{Sr}_{0.2}\text{La}_{0.53}\text{Ti}_{1-y}\text{Nb}_y\text{O}_{3-\delta}$  samples sintered in 5%  $\text{H}_2$ . Values for the fitted activation energies ( $E_A$ ) are given in Table S1.