

Electronic Supporting Information

Effects of Surface Chemical Potentials on Cation Segregation

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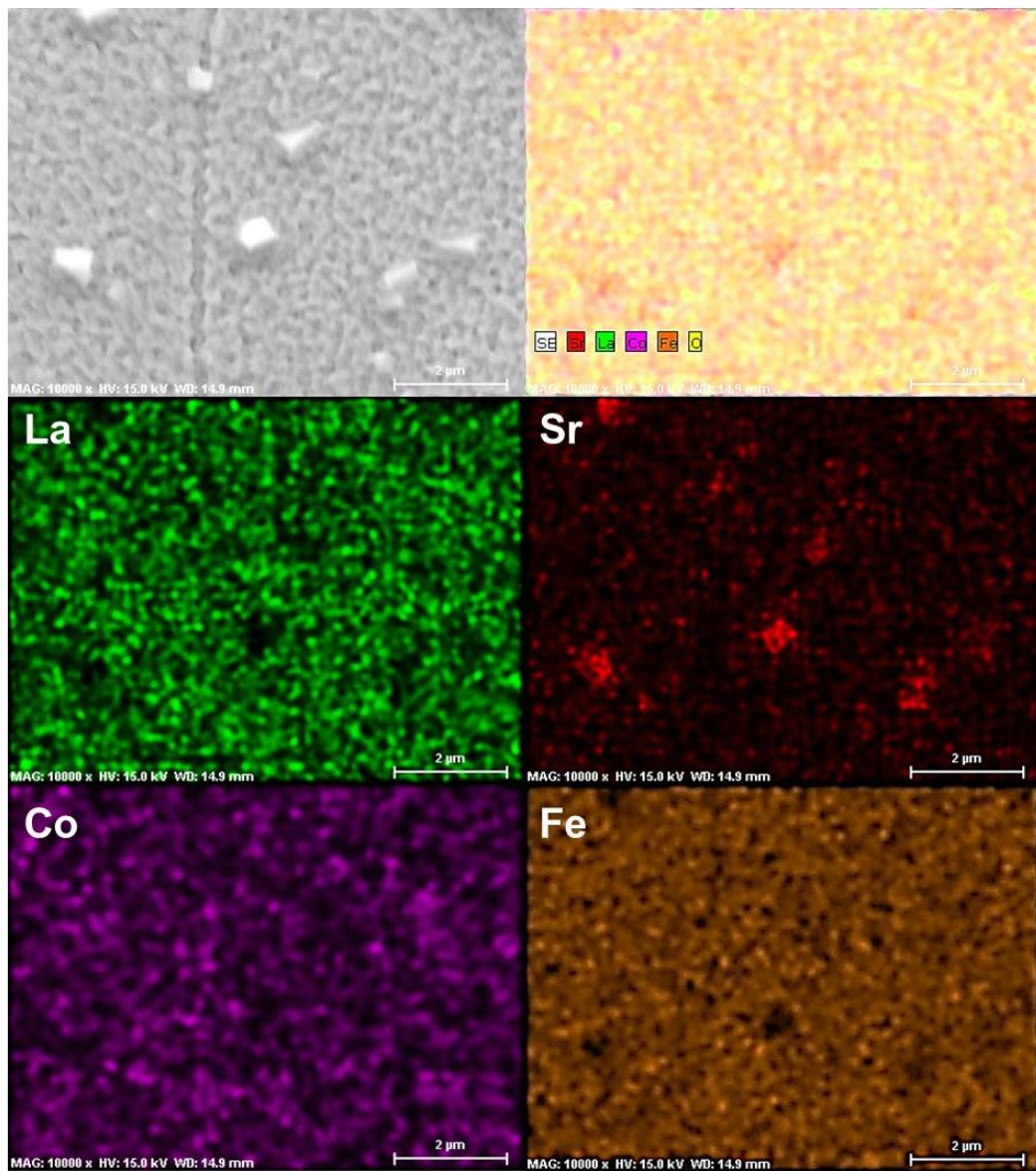


Fig. S1 EDS on LSCF after aging for 25 hours at 850°C in synthetic air, showing that the main composition of segregated particles is strontium.

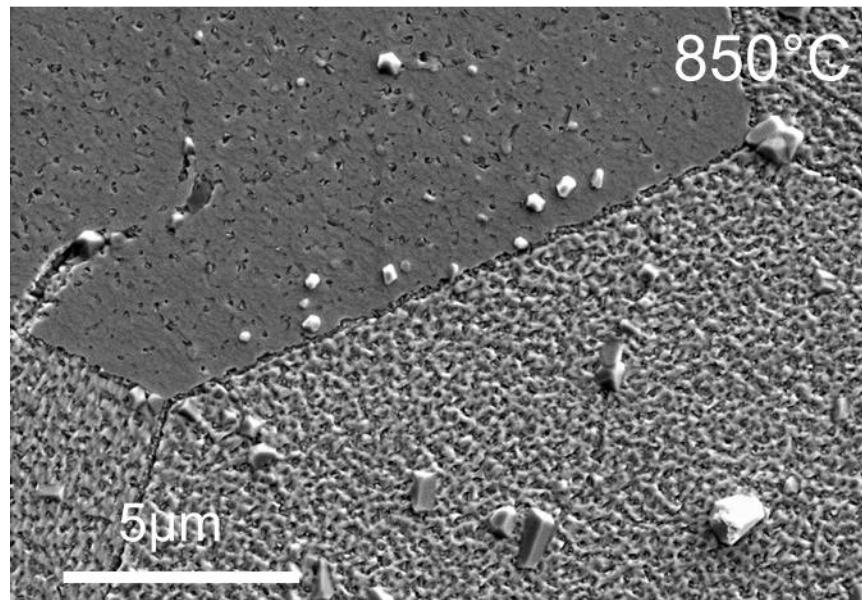


Fig. S2 SEM of LSCF aged for 25 hours at 850°C in synthetic air, showing the high level of surface degradation

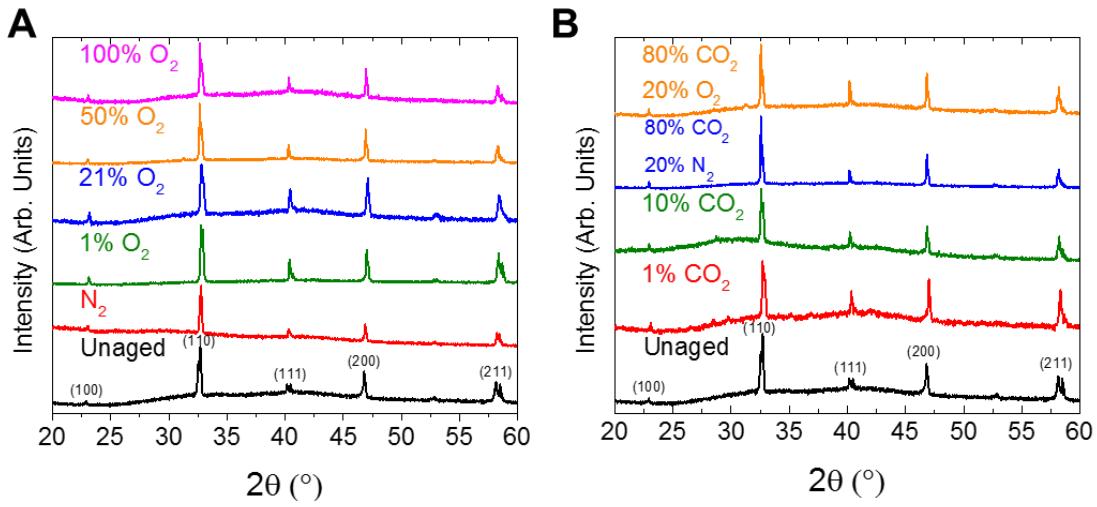


Fig. S3 XRD of pristine LSCF surface and aged at 700°C for 25 hours in each gas environment. (a) Different oxygen partial pressures: 100% O₂, 50% O₂, 21% O₂, 1% O₂, 100% N₂. (b) Different carbon dioxide oxygen partial pressures: 80% CO₂/ 20% O₂, 80% CO₂/ 20% N₂, 10% CO₂/ 20% O₂, 70% N₂, and 1% CO₂/ 20% O₂, 79% N₂.

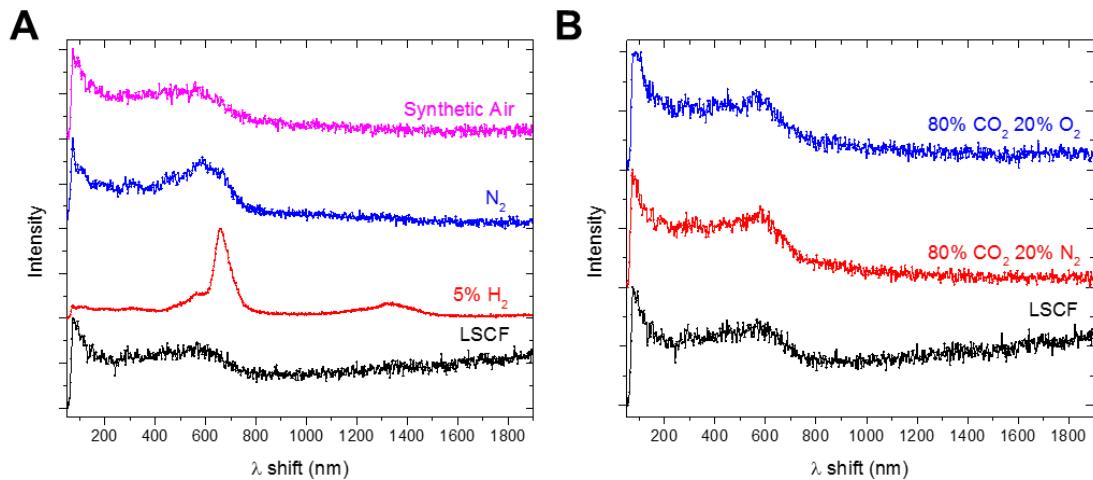


Fig. S4 Raman spectroscopy of pristine LSCF surface and aged for 25 hours at 700°C in each gas environment (a) without CO₂ (b) with CO₂.

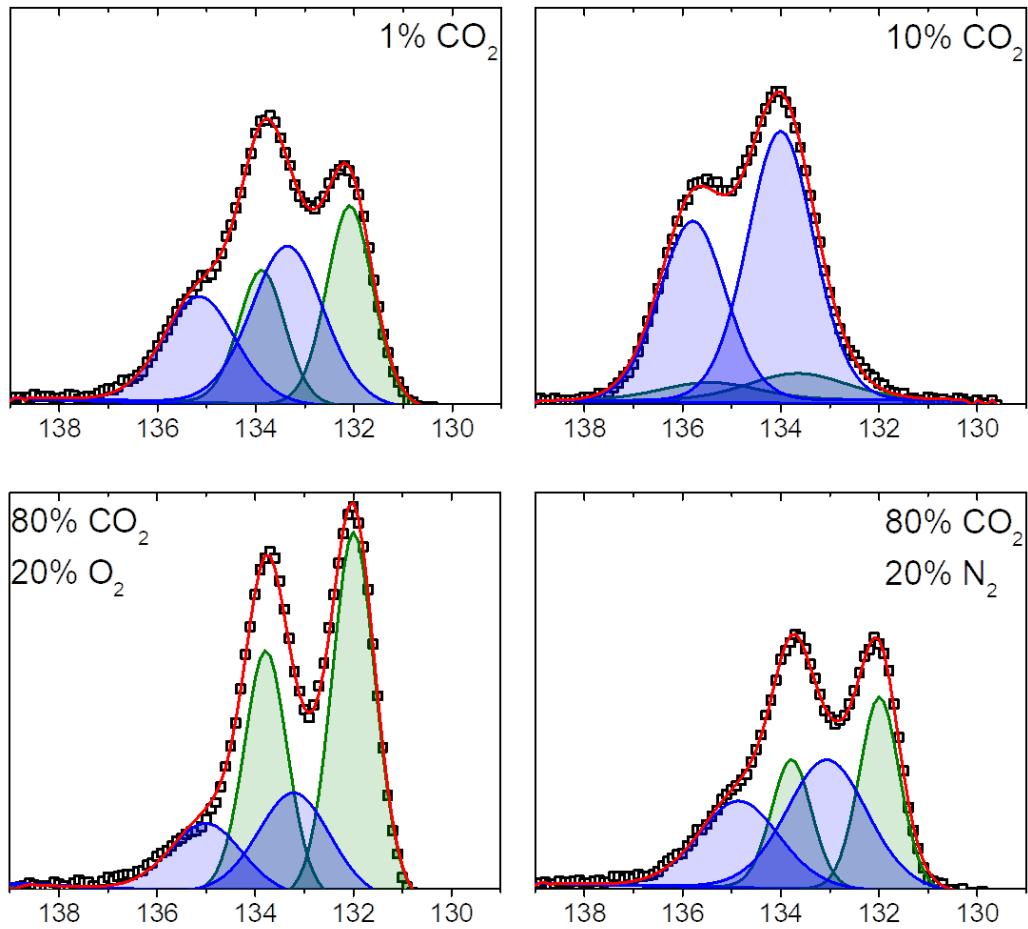


Fig. S5 CO₂ Effects on Surface Chemistry of LSCF. XPS of Sr 3d spectra in different CO₂ environments. LSCF samples were aged at 700°C for 25 hours in the listed environment. LSCF lattice Sr peaks are shown in green and surface segregated Sr peaks are shown in blue.

Peak Class	Unaged	1% O ₂	20% O ₂	50% O ₂	100% O ₂	1% CO ₂	10% CO ₂	80% CO ₂ 20% O ₂	80% CO ₂ 20% N ₂
Sr3d _{5/2} - Surface	1.00	1.33	1.86	1.79	1.03	1.69	2.63	1.12	1.54
Sr3d _{5/2} - Bulk	1.00	1.96	0.66	0.59	1.43	1.36	0.38	2.34	1.15

Fig. S6 Figure S6. Table of XPS spectra values of the area under each curve, normalized to Sr3d_{5/2} – Bulk peak intensity.

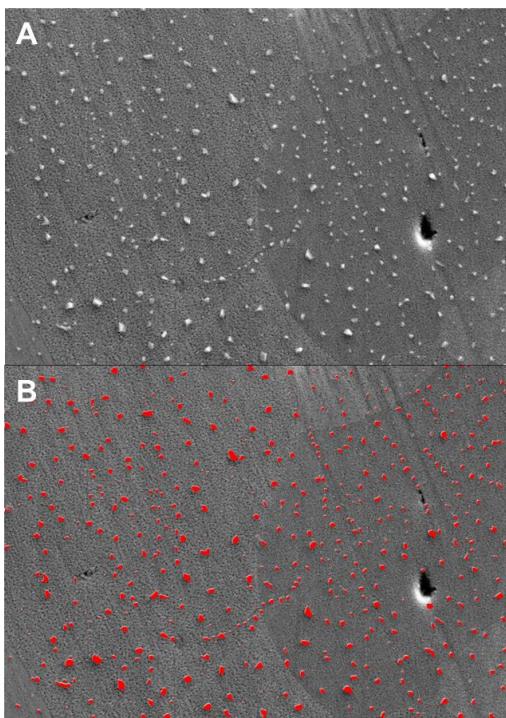


Fig. S7 Overview of procedure for using Trainable WEKA segmentation in ImageJ to determine particle size distribution (a) original image (b) surface particles identified by Trainable WEKA highlighted in original image.