

Supporting information

Why the solid oxide cells can be reversibly operated under solid oxide electrolysis cell and fuel cell modes?

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Results

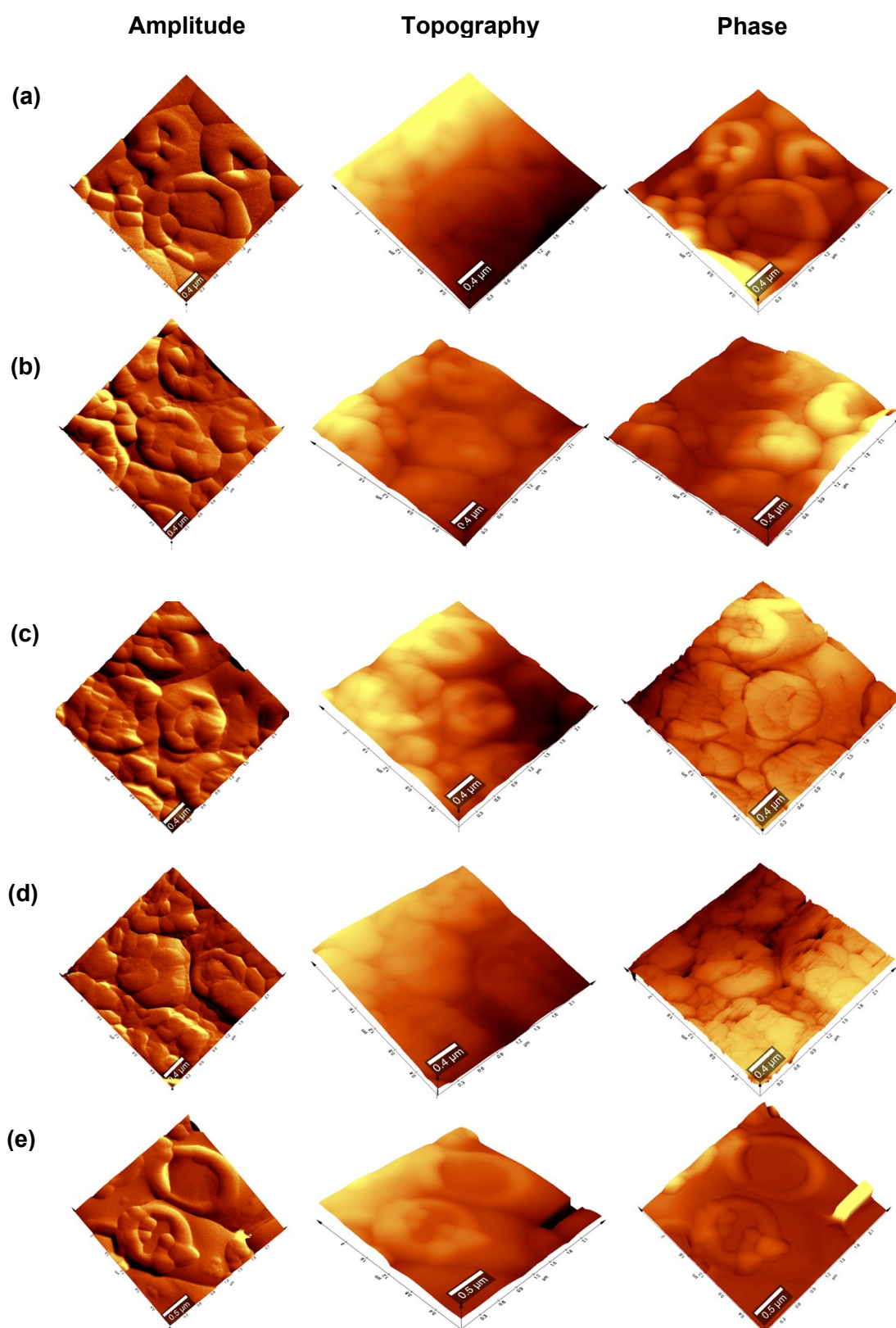


Figure S1 AFM amplitudes, topographies and phases of electrolyte surface in contact with pre-sintered LSM electrodes after the polarization at 500 mA cm^{-2} and $800 \text{ }^\circ\text{C}$: continuous anodic polarization for 36 h (a) and 100 h (b), after 1 cycle (c) and 4 cycles (d) of 36 h-anodic/12 h-cathodic polarizations. The electrolyte surface in contact with as-prepared electrode is shown in (e).

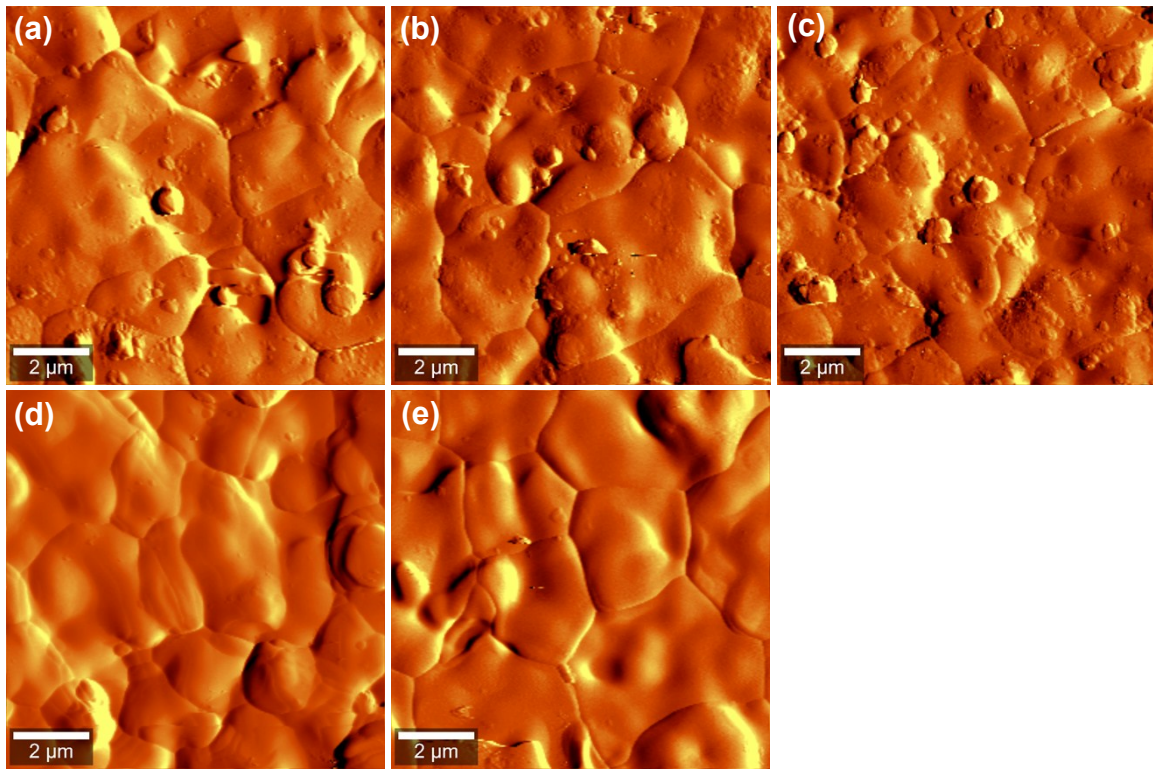


Figure S2 AFM amplitudes of electrolyte surface in contact with the *in situ* assembled LSM electrodes after the cathodic polarization at 800°C: (a) 200 mA cm⁻² for 12 h, (b) 500 mA cm⁻² for 12 h, (c) 1000 mA cm⁻² for 4 h, and (d) after the anodic polarization at 500 mA cm⁻² for 12 h. The YSZ electrolyte without the cathodic polarization is shown in (e). The LSM electrodes were removed by HCl treatment.

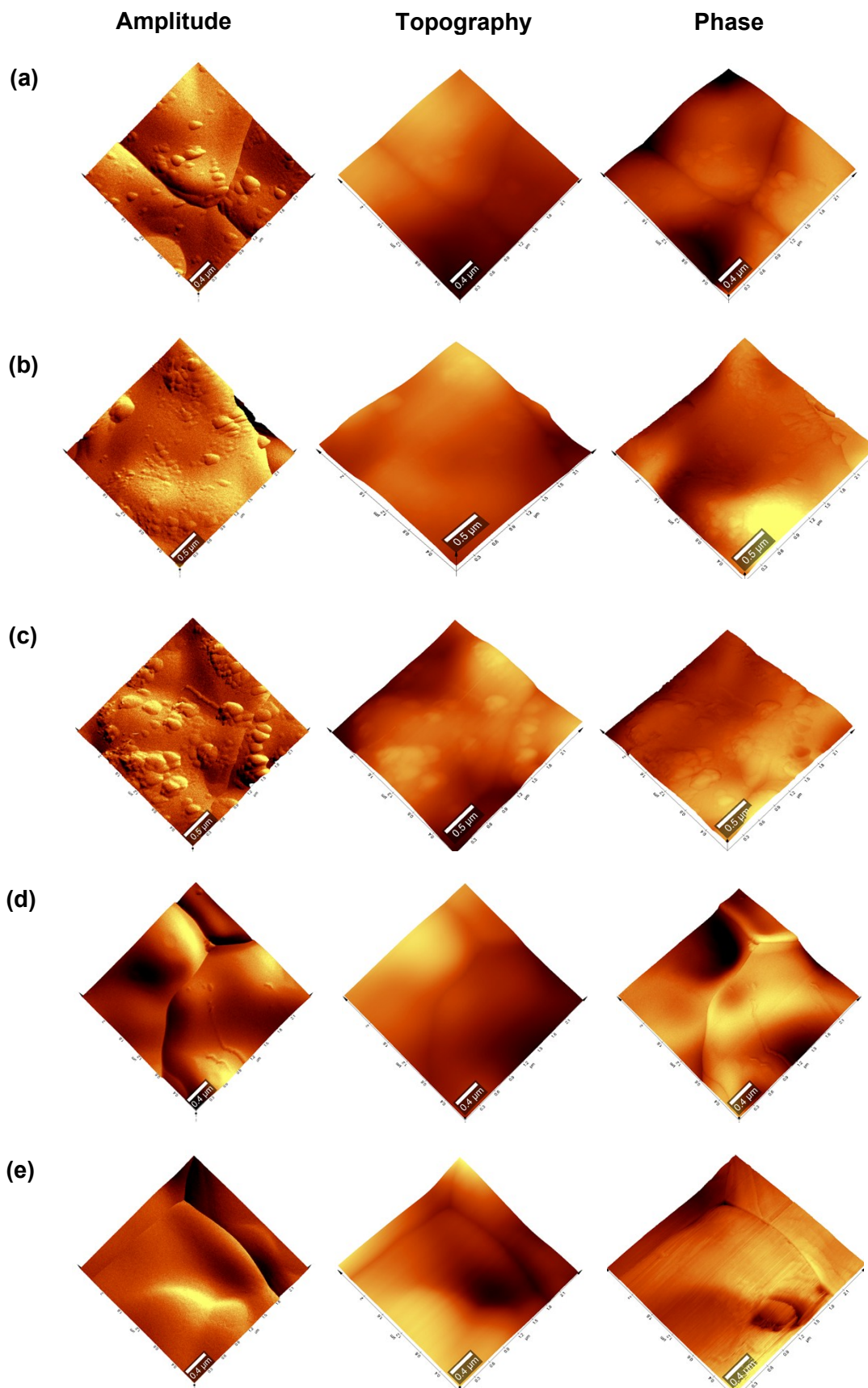


Figure S3 AFM amplitudes, topographies and phases of electrolyte surface in contact with the *in situ* assembled LSM electrodes after the cathodic polarization at 800°C: (a) 200 mA cm⁻² for 12 h, (b) 500 mA cm⁻² for 12 h, (c) 1000 mA cm⁻² for 4 h, and (d) after the anodic polarization at 500 mA cm⁻² for 12 h. The YSZ electrolyte without the cathodic polarization is shown in (e).

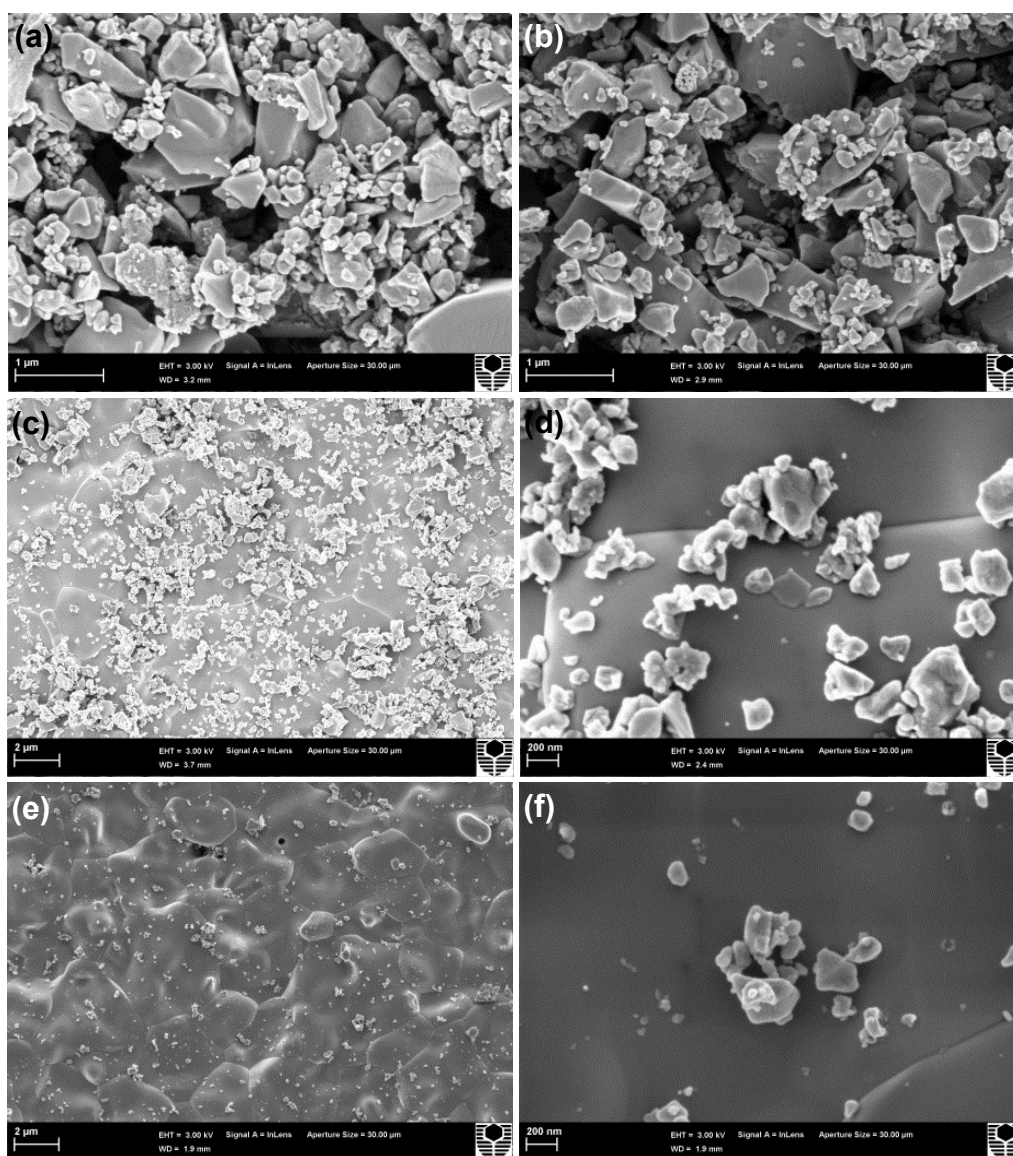


Figure S4 SEM micrographs of LSM electrode outer surface after the cathodic polarization (a) and anodic polarization (b), and electrolyte surface in contact with the *in situ* assembled LSM electrodes after the cathodic (c,d) and anodic (e,f) polarization at 500 mA cm^{-2} and 800°C for 12 h.