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Supplementary Information

Hydrocarbon-fueled solid oxide fuel cells with surface-modified, hydroxylated Sn/Ni-Ce_{0.8}Gd_{0.2}O_{1.9} heterogeneous catalyst anode

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Supplementary Figures



Fig. S1 Cross-section micrographs of an anode-supported single cell assembled with surfacemodified Sn/Ni-GDC anode, GDC electrolyte, and LSCF cathode. The thicknesses of the anode substrate, electrolyte layer, and cathode layer are, respectively, $\sim 1 \text{ mm}$, $\sim 5 \mu \text{m}$, and $\sim 12 \mu \text{m}$.



Fig. S2 Quantitative and qualitative analysis of each element comprising the modified Sn/Ni-GDC anode, showing the distribution of Sn over the anode.



Fig. S3 SEM micrographs of the modified Ni-GDC and Sn/Ni-GDC anodes obtained after longterm operation with CH₄ fuel, showing the solid-carbon caking over the Ni-GDC anode with no Sn incorporation.