Direct Synthesis of Methane from CO₂/H₂O in a Oxygen-ion Conducting Solid Oxide Electrolyser-Supporting Information

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Fig.S1* XRD of Laₐ₀.2Sr₀.₈TiO₃₊₅ prepared by solid-state reaction method

Fig.S2* Bode plots of the electrolyser under different voltages at 650 °C
Mass spectroscopy are shown as follows:
Characteristic peaks for gas analysis in mass spectroscopy: (1) H$_2$, Mass=2; (2) CO, Mass=28;
(3) CH$_4$, Mass=15 and (4) CO$_2$, Mass=44.

Fig.S3* Mass spectroscopy of output gas in electrochemical reduction process

![Mass spectroscopy of output gas in electrochemical reduction process](image1)

Fig.S4* Mass spectroscopy of 10% methane in argon

![Mass spectroscopy of 10% methane in argon](image2)
Fig. S5* Mass spectroscopy of 100% CO

Fig. S6* Mass spectroscopy of 5% hydrogen in argon
Fig.S7* Mass spectroscopy of 100% CO₂