SUPPORTING INFORMATION

Demonstration of efficient electrochemical biogas reforming in solid oxide electrolyser with titanate cathode

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Captions

Figure S1: Schematic of the *in-situ* electrochemical electrochemical biogas reforming in an oxide-ion-conducting solid oxide electrolyzer with the configuration $(La_{0.8}Sr_{0.2})_{0.95}MnO_{3-\delta}/YSZ/La_{0.2}Sr_{0.8}TiO_{3+\delta}$.

Figure S2: The conductivity of LSTO: (a) reduced LSTO in 5% H_2/Ar ; (b) in different oxygen partial pressure at 800 °C.

Figure S3: XPS results of La (a) in the oxidized LSTO sample; (b) in the reduced LSTO samples.

Figure S4: The R_p of the symmetric cells with the configuration LSTO-SDC/YSZ/LSM-SDC and iron-loaded LSTO-SDC/YSZ/LSM-SDC tested under different hydrogen partial.

Figure S5: SEM cathode surface of the composite cathode after short-term operation of the electrochemical biogas reforming with LSTO-SDC cathode.

Figure S6: The XRD pattern of Ce_{0.8}Sm_{0.2}O₂₋₈ powder by a heat treatment at 800 °C for 3 h in air.

Figure S7: R_p of the electrolysis cells with cathodes based on LSTO-SDC and iron-loaded LSTO-SDC in 20%CH₄/20%CO₂/60%Ar under different applied potentials at 800 °C.

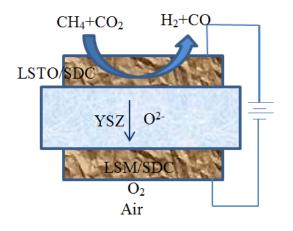
Figure S8: The conversion of CO_2 and CH_4 : (a) based on LSTO and (b2) based on iron-loaded LSTO in the flow of 20% $CH_4/20\%CO_2/60\%$ Ar at 800 °C.

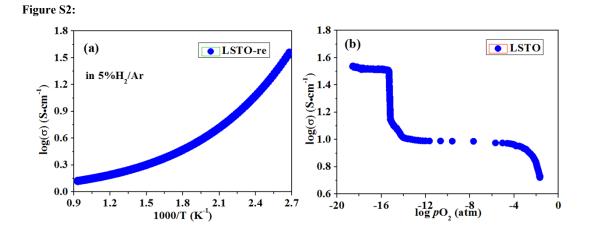
Figure S9: (a) The production of H_2 ; (b) The production of CO with LSTO and iron-loaded LSTO in the flow of 20%CH₄/20%CO₂/60%Ar at 800 °C.

Figure S10: XRD pattern of Fe₂O₃ powder treated at different temperatures from 400-800 °C.

Figure S11: particle size of Fe₂O₃ powder treated at different temperatures from 400-800 °C.

Figure S1:







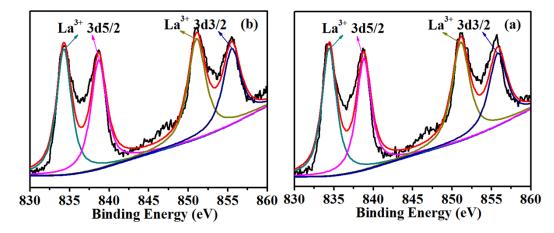


Figure S4:

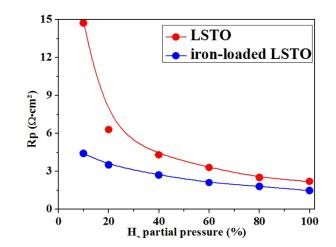


Figure S5:

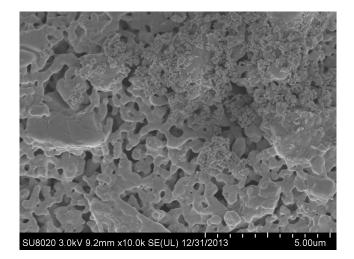


Figure S6:

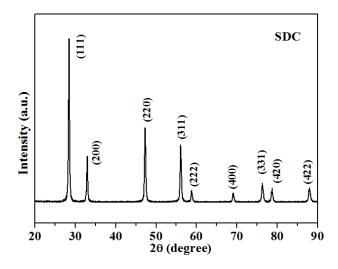
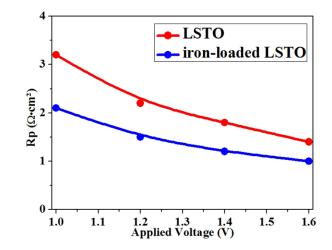
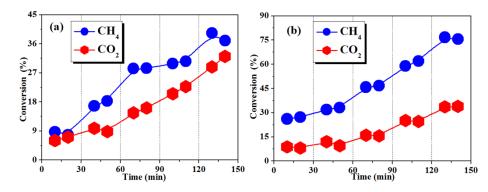


Figure S7:



<u>Figure S8:</u>



<u>Figure S9:</u>

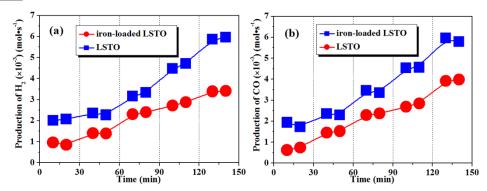


Figure S10:

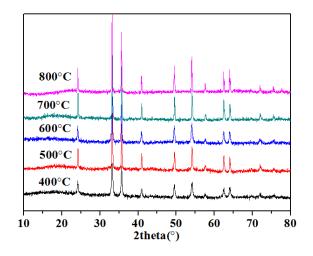


Figure S11:

