Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Systematic effect of contaminations on IT-SOFCs cathode stability: A quantifiable correlation versus cathode side poisoning and protection

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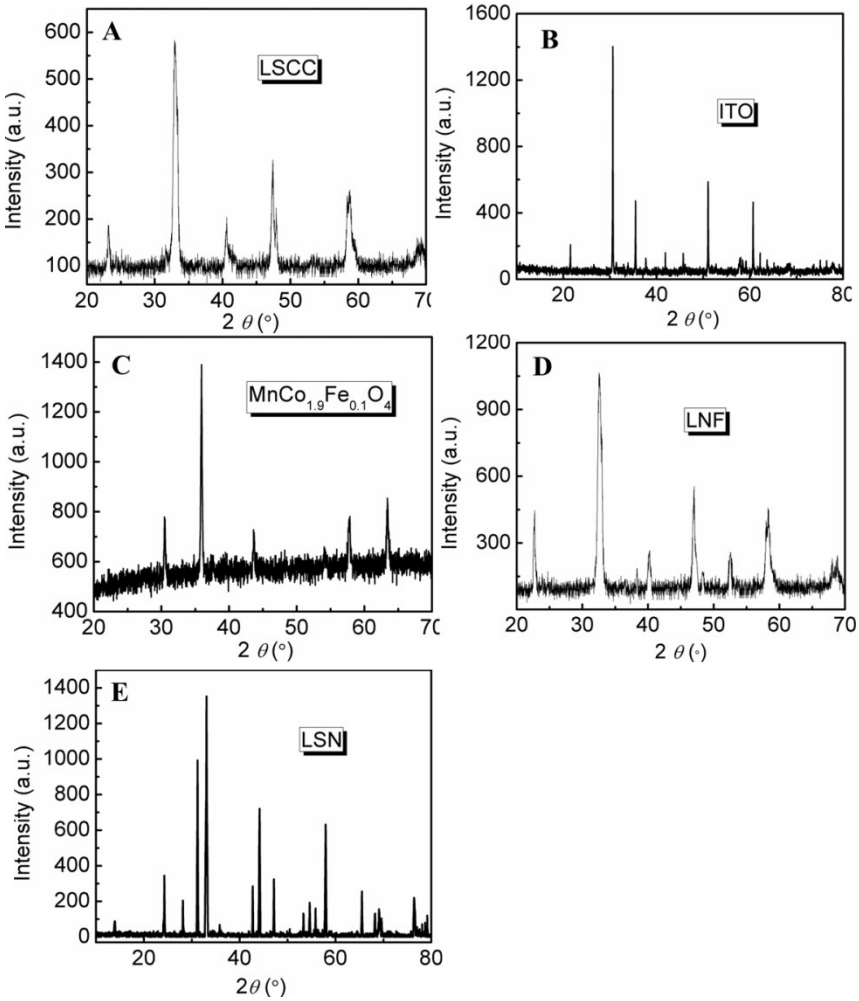
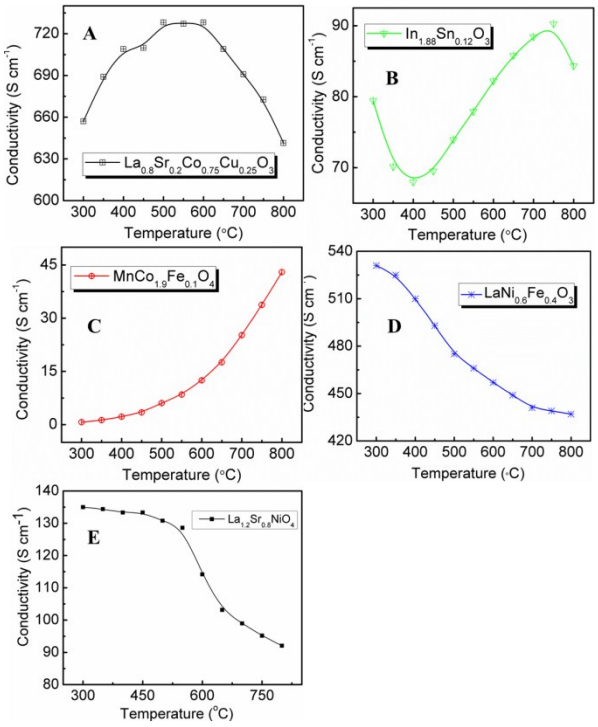


Figure S1. XRD patterns of the CCMs: (A) perovskite-based $La_{0.8}Sr_{0.2}Co_{0.75}Cu_{0.25}O_3$ (LSCC); (B) high conductivity indium tin oxide (ITO) with anIn:Sn atomic ratio of 0.88:0.12; (C) spinel-basedMn$Co_{1.9}Fe_{0.1}O_4$ (MCF); (D) perovskite-based $LaNi_{0.6}Fe_{0.4}O_3$ (LNF); and (E)layered perovskite-based $La_{1.5}Sr_{0.5}NiO_4$ (LSN).

DC electronic conductivity method was used for measuring the total conductivity testing of the five CCM candidates. Dense bar shapes with dimensions of about 4 mm × 4 mm × 15 mm were used for conductivity testing. LSCC and MCF were pressed and then sintered at 1,000 °C

for 2 h. LSN and LNF were sintered at 1,100 °C for 2 h. ITO was sintered at 1,300 °C for 2 h to achieve dense bar structure. As shown in Figure S2, LSCC showed the highest conductivity, and all the other samples also showed good conductivity under the testing temperature (from 300 to 800 °C).



FigureS2. Temperature-dependence of the electronic conductivity for CCM candidates: (A) LSCC; (B) ITO; (C) MCF; (D) LNF; and (E) LSN.

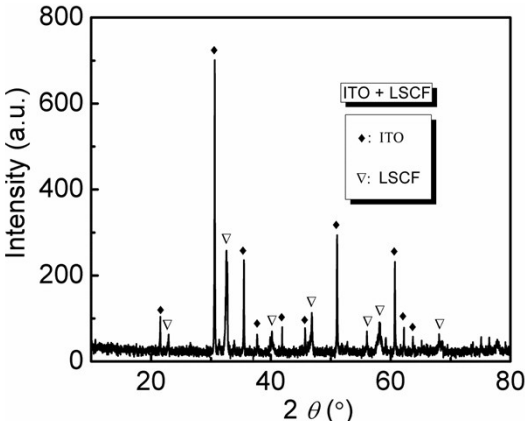
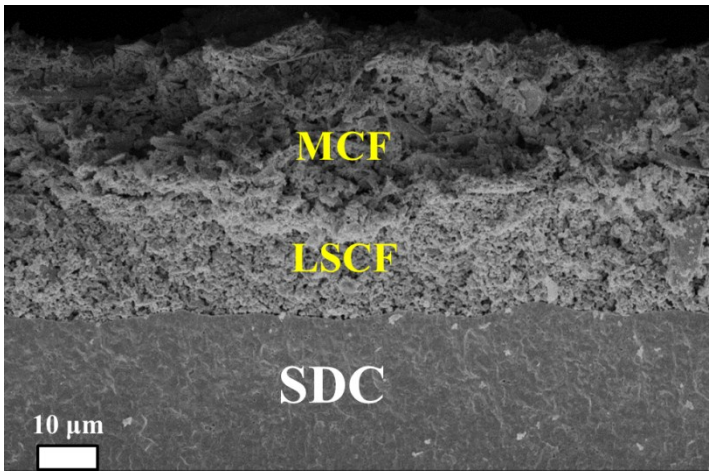


Figure S3. XRD pattern of ITO and LSCF mixture after being sintered at 1100 °C for 2 h in air, and no apparent impurity indicating no chemical interaction was detected.



FigureS4. SEM image of the fracture cross-section for the MCF/LSCF/SDC structure after 1,000 h of continuous testing with Crofer22APU steel as the interconnect (no interconnect is shown in this SEM image).

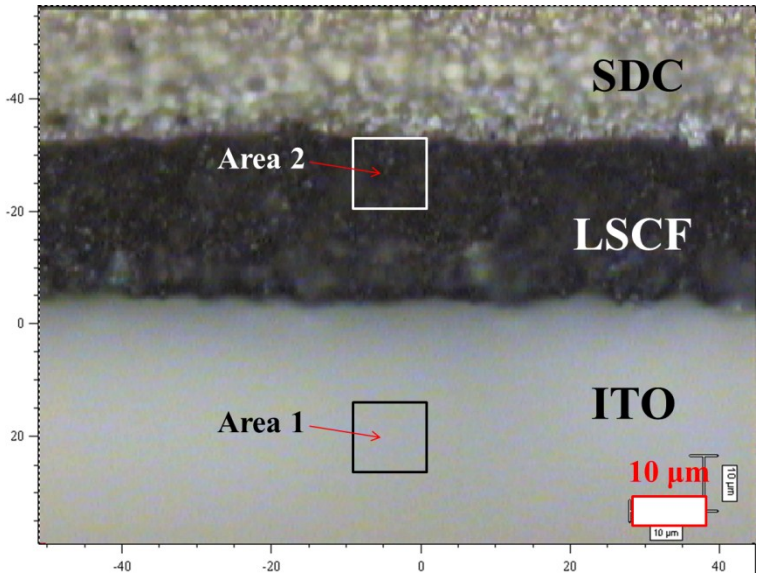


Figure S5. An optical image of the ITO/LSCF/SDC fracture section. The representative Area 1 and 2 were analyzed by Raman spectroscopy. Area 1 is the central zone of the ITO cross-section, about 20 µm situated from the LSCF/ITO interface. Area 2 is the area of the LSCF cathode close to SDC electrolyte.