Supporting Information

Highly active and stable $Er_{0.4}Bi_{1.6}O_3$ decorated $La_{0.76}Sr_{0.19}MnO_{3+\delta}$ nanostructured oxygen electrodes of reversible solid oxide cells

Na Ai,[a,b] Na Li,[c] Shuai He,[b] Yi Cheng,[b] Martin Saunders,[d] Kongfa Chen,[*,a] Teng Zhang,[*,a] San Ping Jiang[*,b]

[a] College of Materials Science and Engineering, Fuzhou University, Fuzhou, Fujian 350108, China

[b] Fuels and Energy Technology Institute and Department of Chemical Engineering, Curtin University, Perth, WA 6102, Australia

[c] College of Science, Heilongjiang University of Science and Technology, Harbin 150022, China

[d] Centre for Microscopy, Characterisation and Analysis, The University of Western Australia, Perth, WA 6009, Australia

[*] Corresponding author. Tel.: +86 591 22866540; fax: +86 591 22866537.
Email address: kongfa.chen@fzu.edu.cn (K. Chen).
[*] Corresponding author. Tel.: +86 591 22866540; fax: +86 591 22866537.
Email address: Teng_Zhang@fzu.edu.cn (T. Zhang).
[*] Corresponding author. Tel.: +61 8 9266 9804; fax: +61 8 9266 1138.
Email address: S.Jiang@curtin.edu.au (S.P. Jiang).

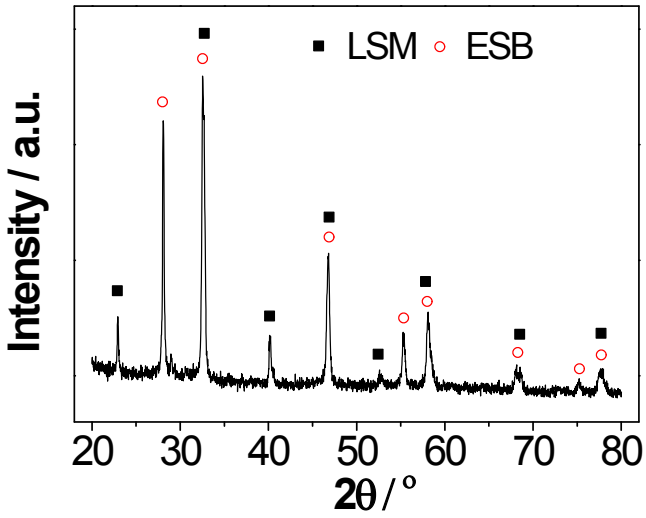

Fig. S1 XRD patterns of ESB decorated LSM electrode after heat-treatment under open circuit at 750 °C for 110 h.

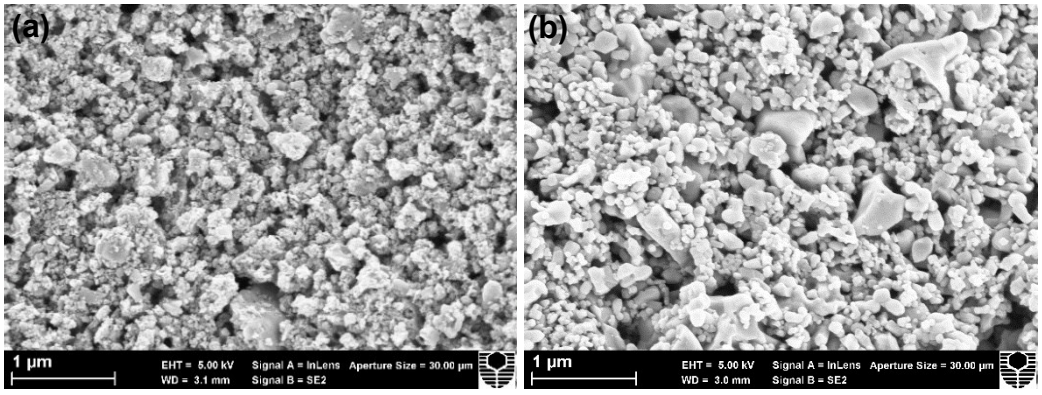

Fig. S2 SEM micrographs of directly assembled (a) decorated ESB-LSM and (b) mixed ESB-LSM composite electrodes.

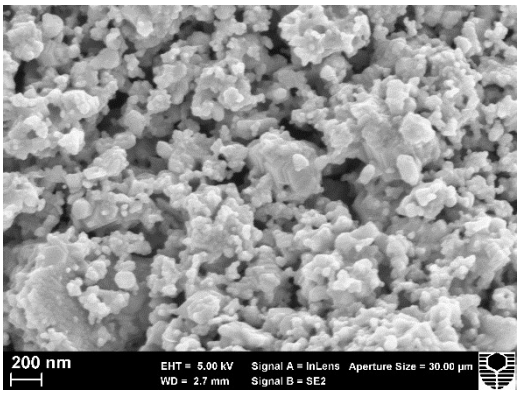

Fig. S3 SEM micrograph of electrode surface of ESB decorated LSM after heat-treatment under open circuit at 750 °C for 110 h.

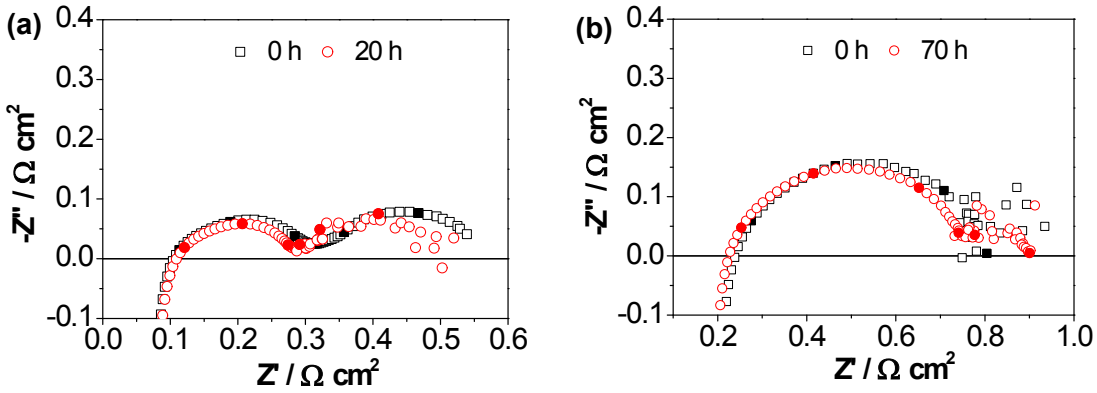

Fig. S4 Cell impedance spectra with a directly assembled ESB decorated LSM composite electrode before and after polarization at 500 mA cm^{-2}: (a) 750 °C and (b) 650 °C.

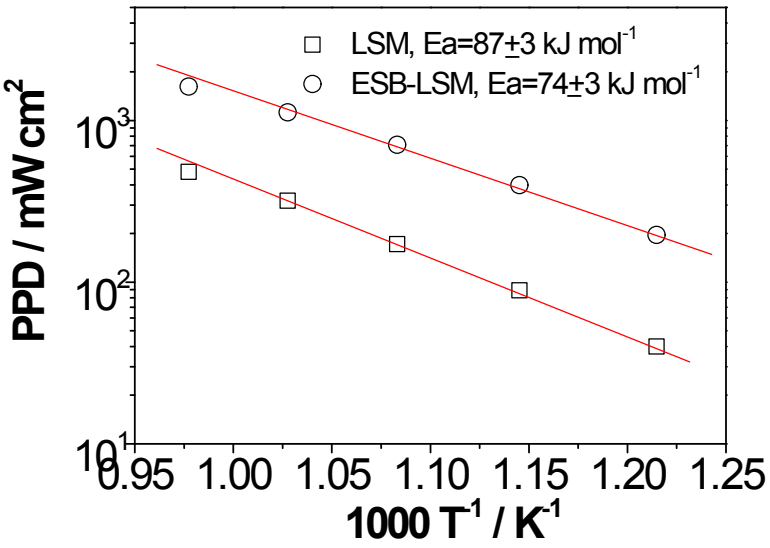

Fig. S5 Arrhenius plot of peak power densities (PPD) of the cells with directly assembled LSM and ESB decorated LSM electrodes.

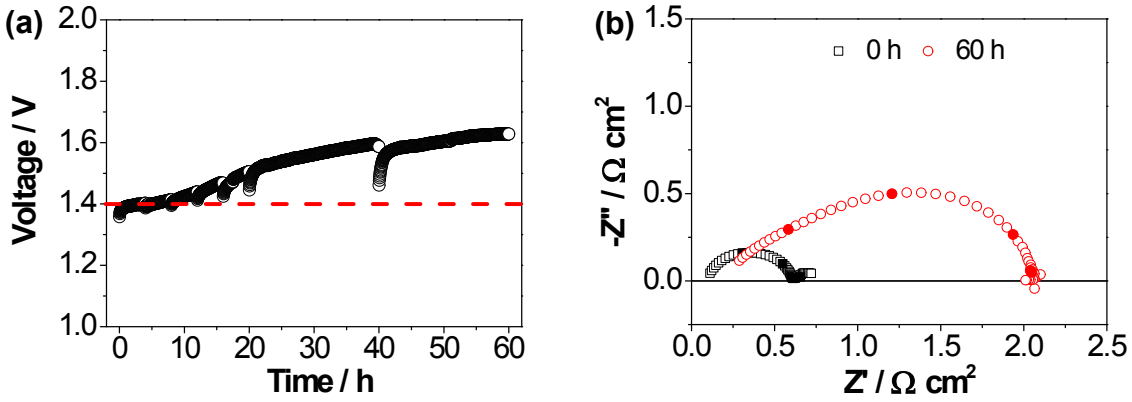

Fig. S6 Time dependent voltage curves (a) and impedance spectra (b) of the cell with a directly assembled LSM-YSZ (6/4, w/w) composite electrode at a constant electrolysis current of 500 mA cm^{-2} and 750 ^{o}C. The hydrogen electrode was provided with 25 ml min^{-1} H_2 + 25 ml min^{-1} CO_2. Prior to the stability test under the electrolysis mode, the cell was polarized under fuel cell mode 500 mA cm^{-2} and 750 ^{o}C for 60 h.

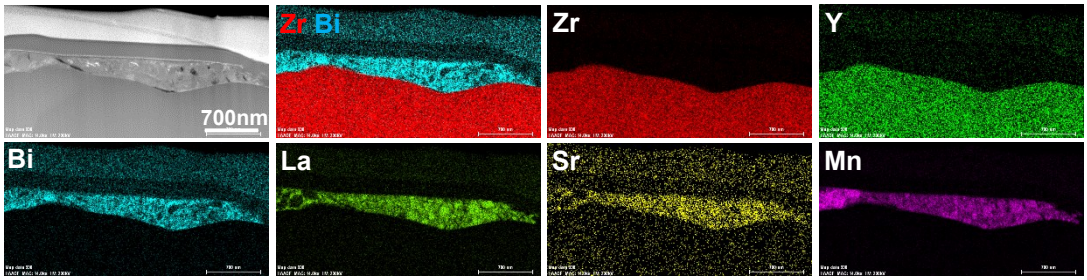

Fig. S7. HAADF micrograph and EDS maps on the electrode/electrolyte interface after the electrochemical stability test. The ESB decorated LSM electrode was peeled off using an adhesive tape approach.