Electronic Supplementary Material (ESI) for RSC Advances

Supporting Information

A promising cathode for intermediate temperature protonic ceramic fuel cells: $BaCo_{0.4}Fe_{0.4}Zr_{0.2}O_{3-\delta}$

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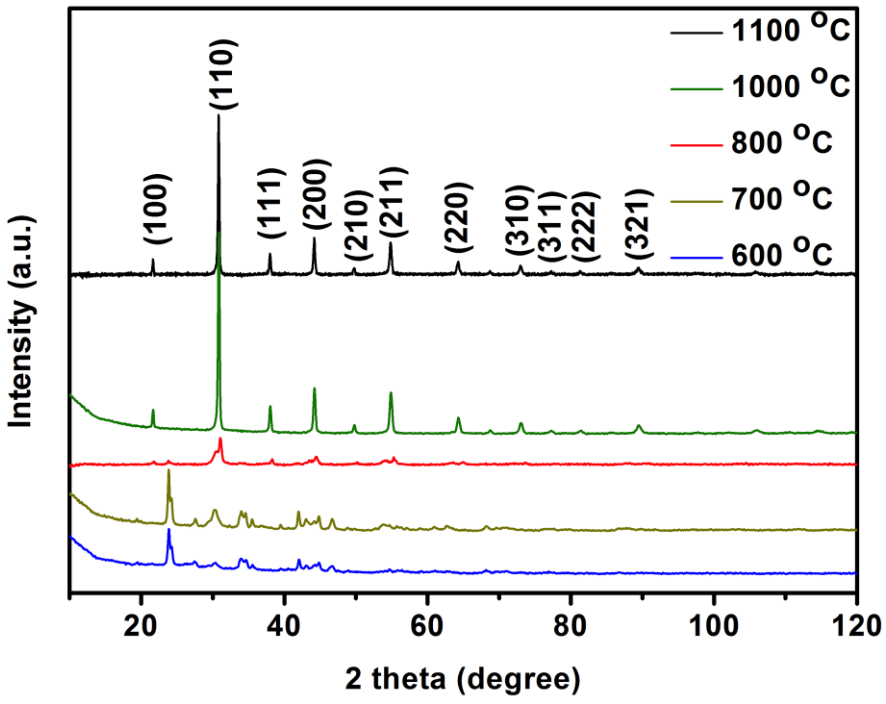

Figure S1. XRD patterns of BCFZ cathode calcined at 600°C, 700°C, 800°C, 1000°C, and 1100°C.

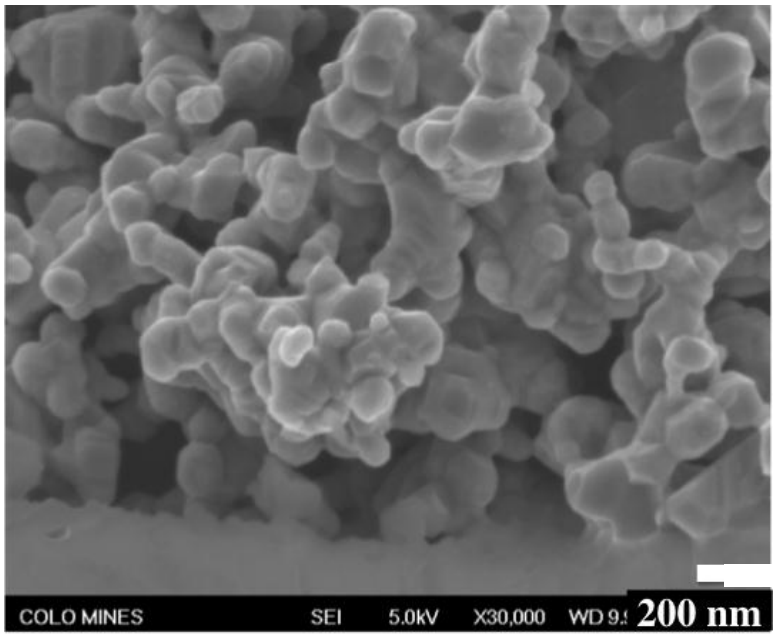

Figure S2. Cross-section SEM micrograph of the LSCF cathode.

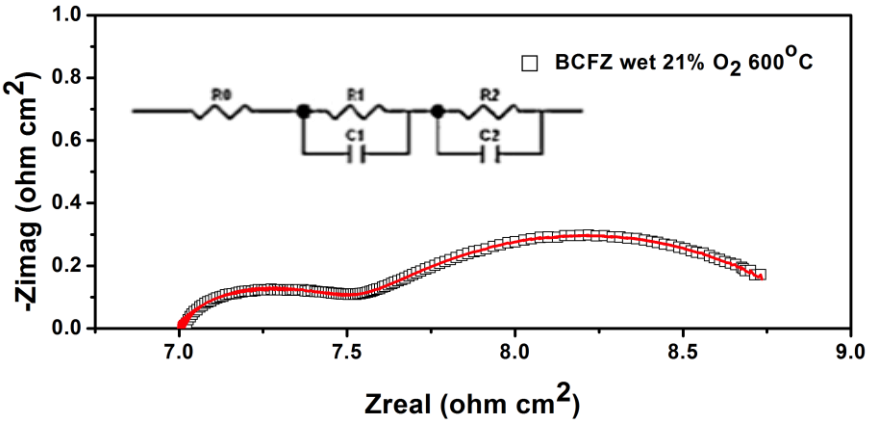

Figure S3. Typical impedance spectrum (T = 873 K) of a symmetrical cell with BCFZ cathode sintered at 1373K.

The impedance spectra consist of two arcs, indicating that at least two polarization processes are involved. In order to identify the polarization resistance of individual processes, the equivalent circuit shown in Fig. S3 is applied to fit the impedance spectra. In the equivalent circuit, Ro is the ohmic resistance; R_1 and R_2 in parallel with C_1 and C_2, represent the high frequency arc and low frequency electrode polarization arcs, respectively.

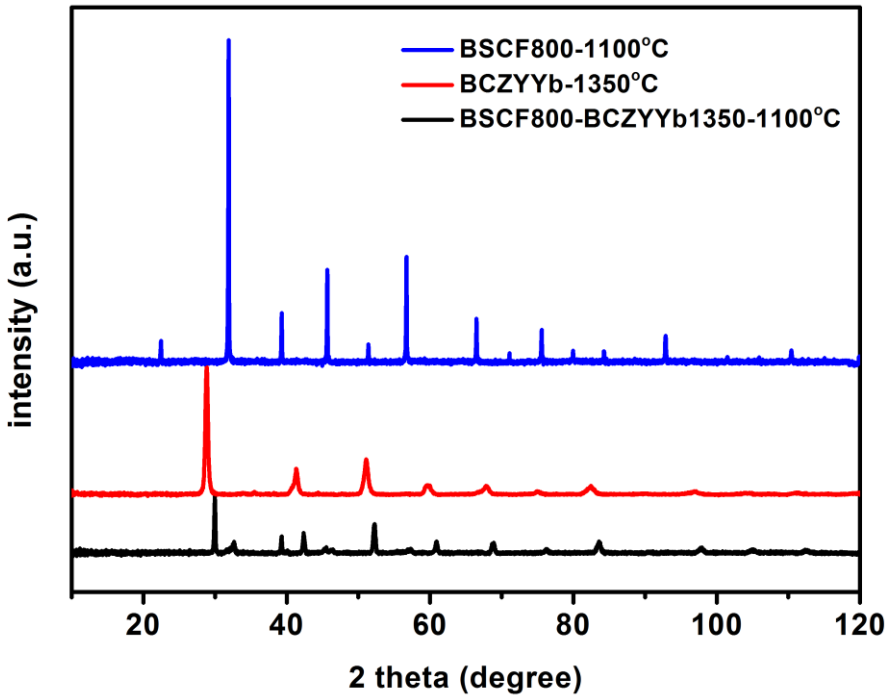

Figure S4. The XRD patterns of pure BSCF, pure BCZYYb, and composite of BSCF/BCZYYb calcined at 1100°C.

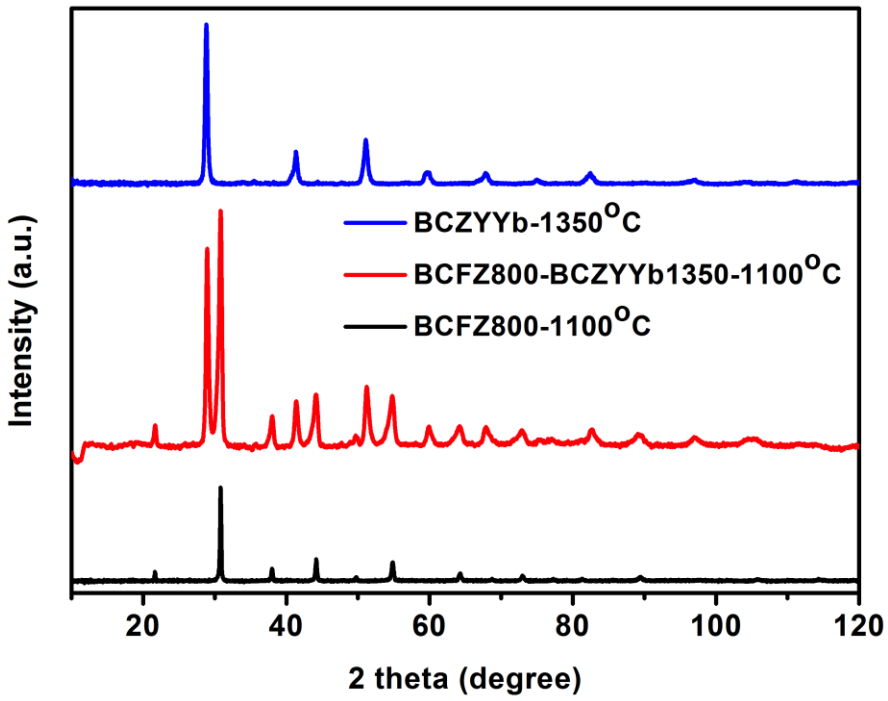

Figure S5. The XRD patterns of pure BCFZ, pure BCZYYb, and composite of BCFZ/BCZYYb calcined at 1100°C.

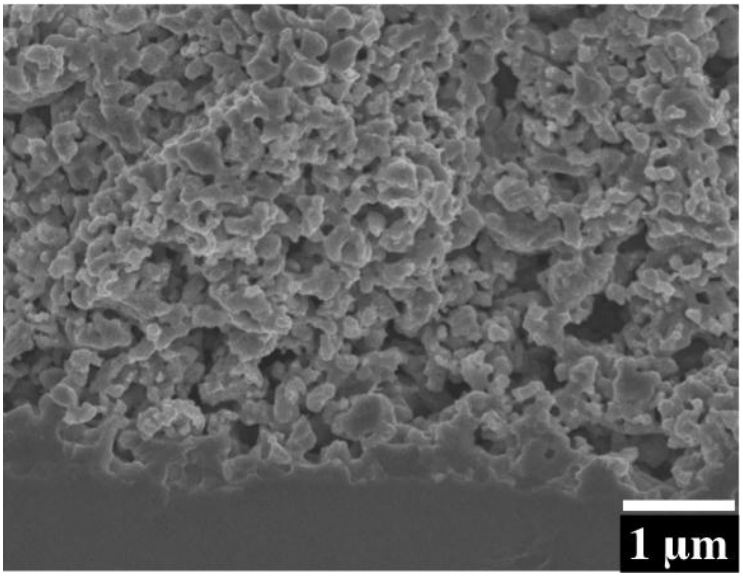

Figure S6. Cross-section SEM micrograph of the BCFZ cathode after electrochemical testing.

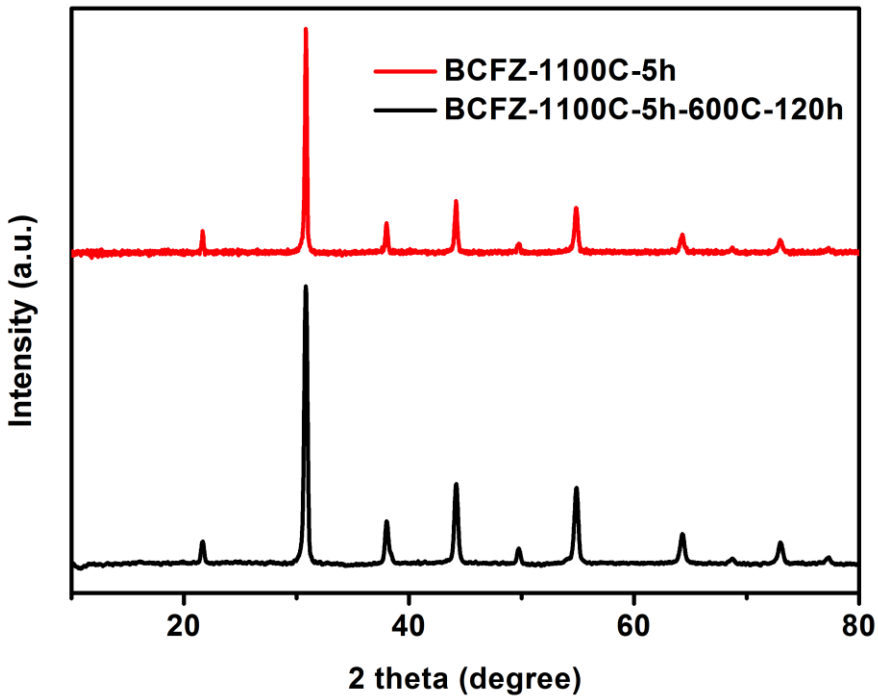

Figure S7. XRD patterns of BCFZ and BCFZ calcined at 600°C for 120 h.

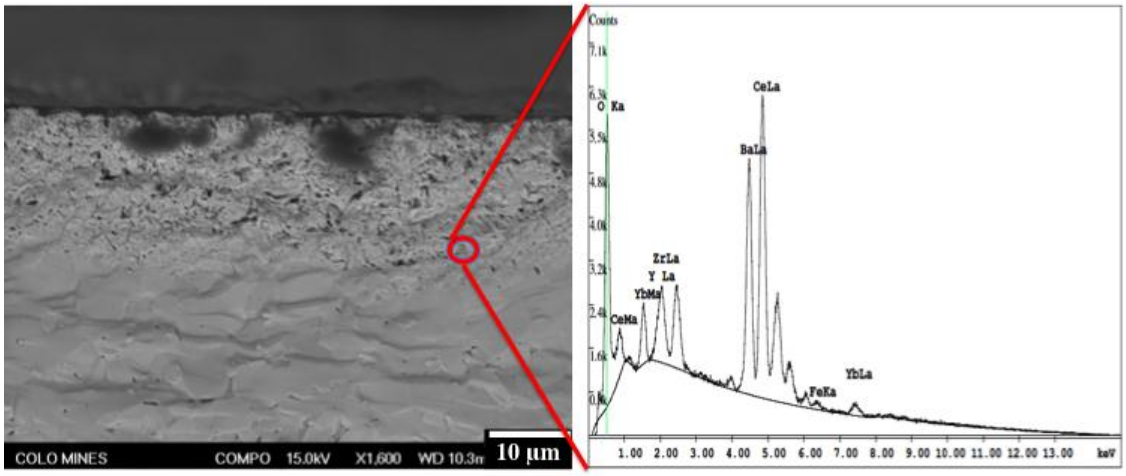

Figure S8. SEM cross-sectional view of the Ni-BZCYYb | BZCYYb | LSCF cell after operation and an EDS point spectrum in the reacted zone between the cathode and electrolyte.