

Supplementary Information

Characterization of high Zr/Ce ratio Ba(Zr, Ce, Y)O_{3-δ} proton conductors: investigating the impact of Y on materials properties

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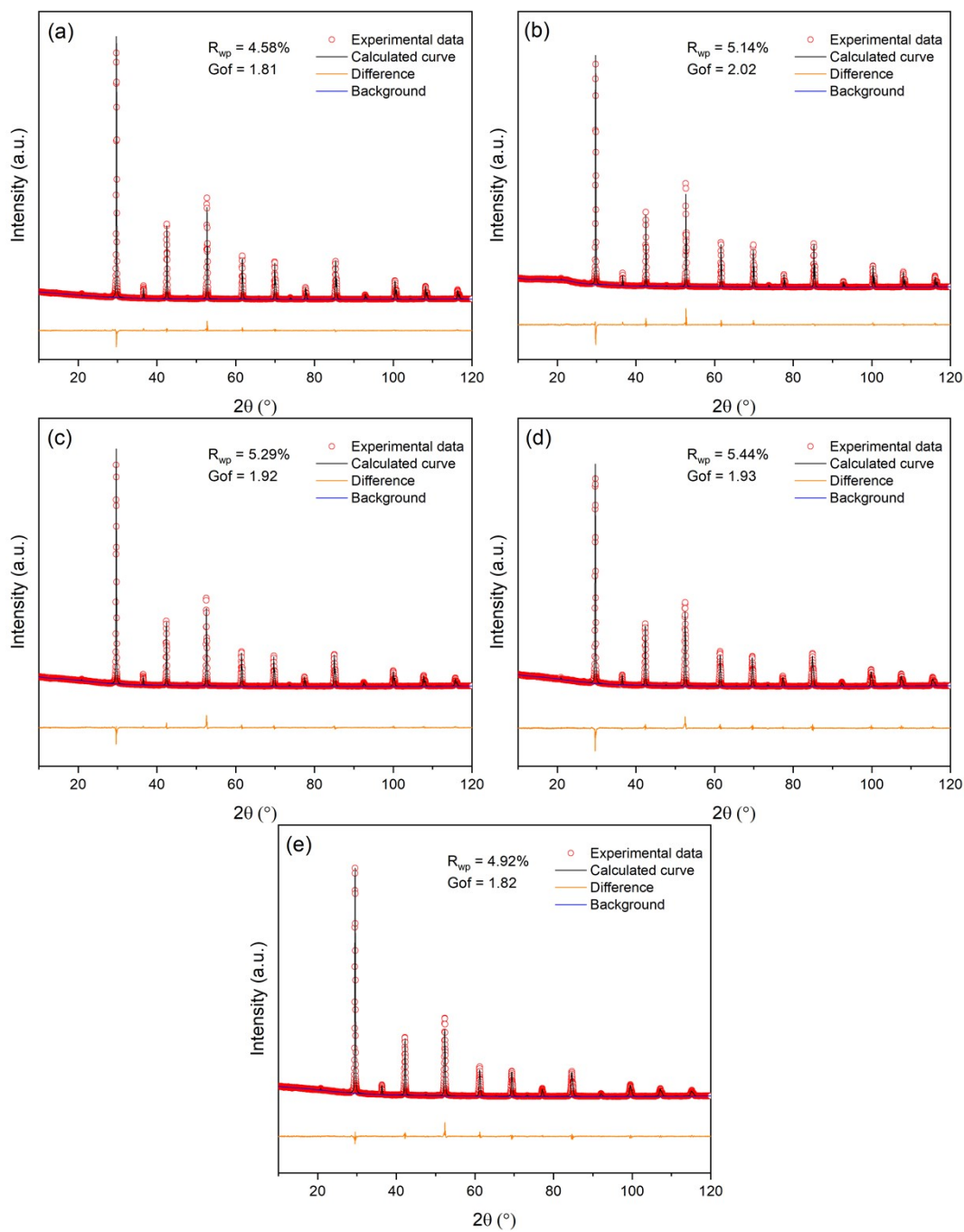


Figure S1. XRD patterns of the BaZr_{0.8-x}Ce_{0.2}Y_xO_{3-δ} ceramics with refined data based on Rietveld method. (a) BZCY – Y10, (b) BZCY – Y15, (c) BZCY – Y20, (d) BZCY – Y25, (e) BZCY – Y30.

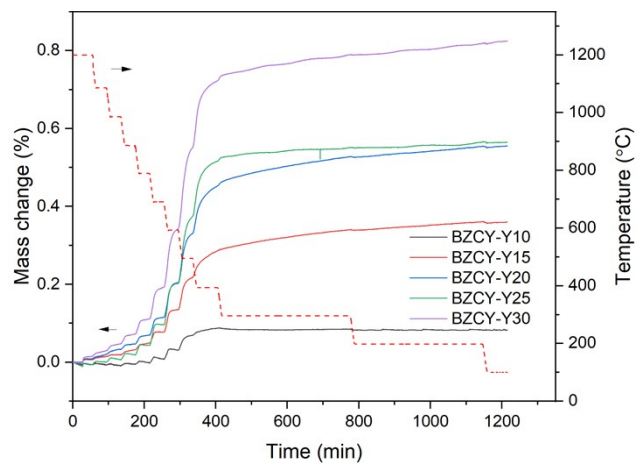


Figure S2 Mass change recorded versus time and temperature for materials in the $\text{BaZr}_{0.8-x}\text{Ce}_{0.2}\text{Y}_x\text{O}_{3-\delta}$ series.

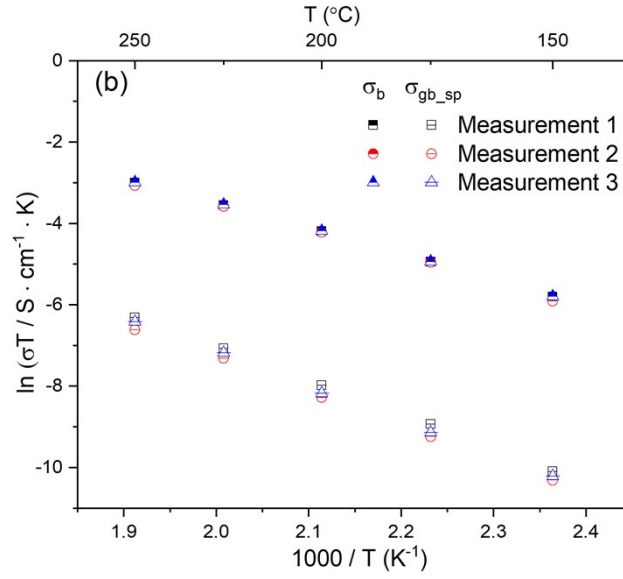


Figure S3. (a) Arrhenius plots of bulk and specific grain boundary conductivities of three different BZCY-Y10 samples in the temperature range 150-250 °C.

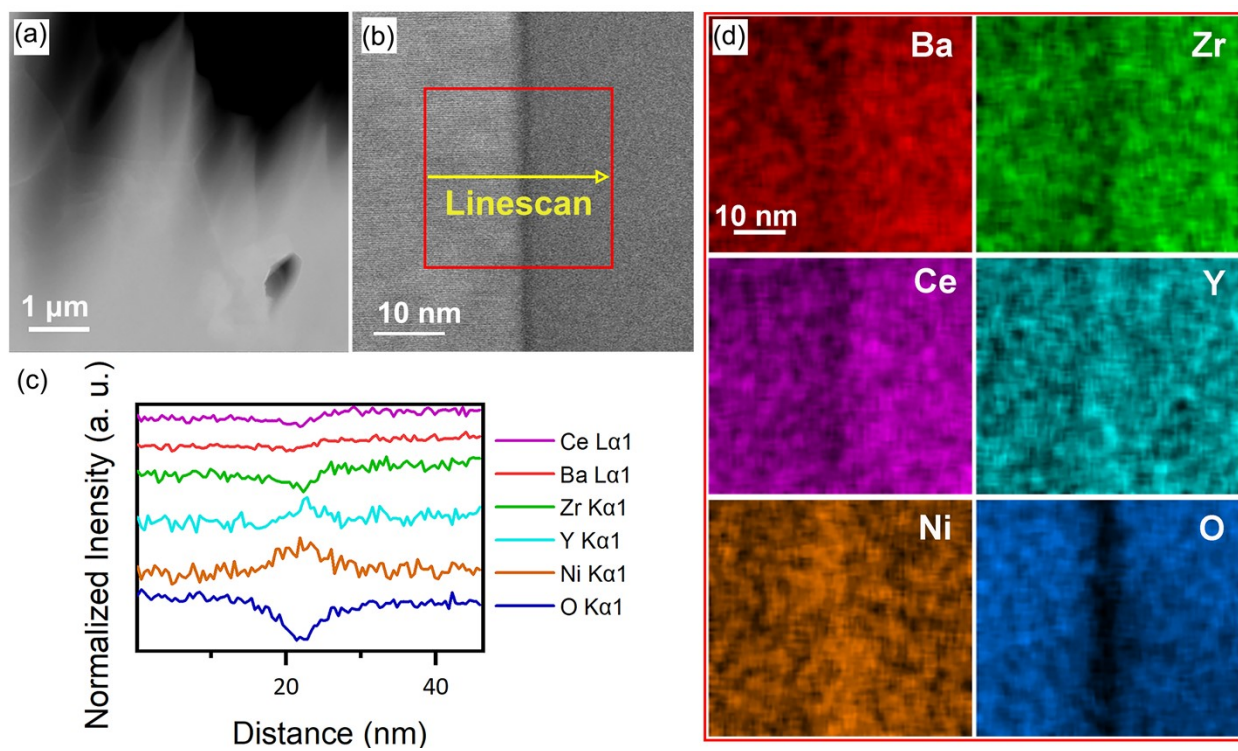


Figure S4. (a, b) High-angle annular dark-field images (HAADF) of the BZCY-Y30 microstructure and an edge-on grain boundary (the electron beam is parallel to the grain boundary). (c) Integrated linescan derived from the EDS element mapping in (d).

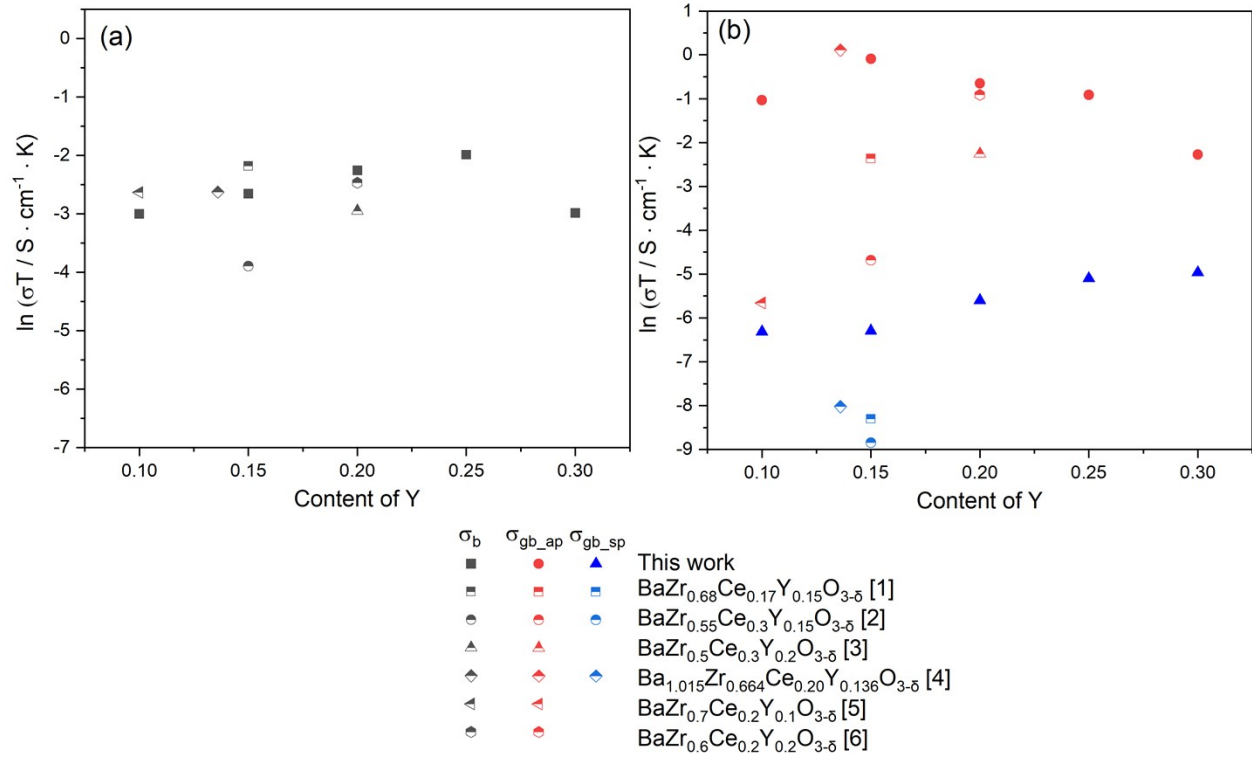


Figure S5. (a) Bulk, (b) apparent and specific grain boundary conductivities as a function of Y content at 250 °C, including a comparison of the results from this work with those from the literature.

Reference

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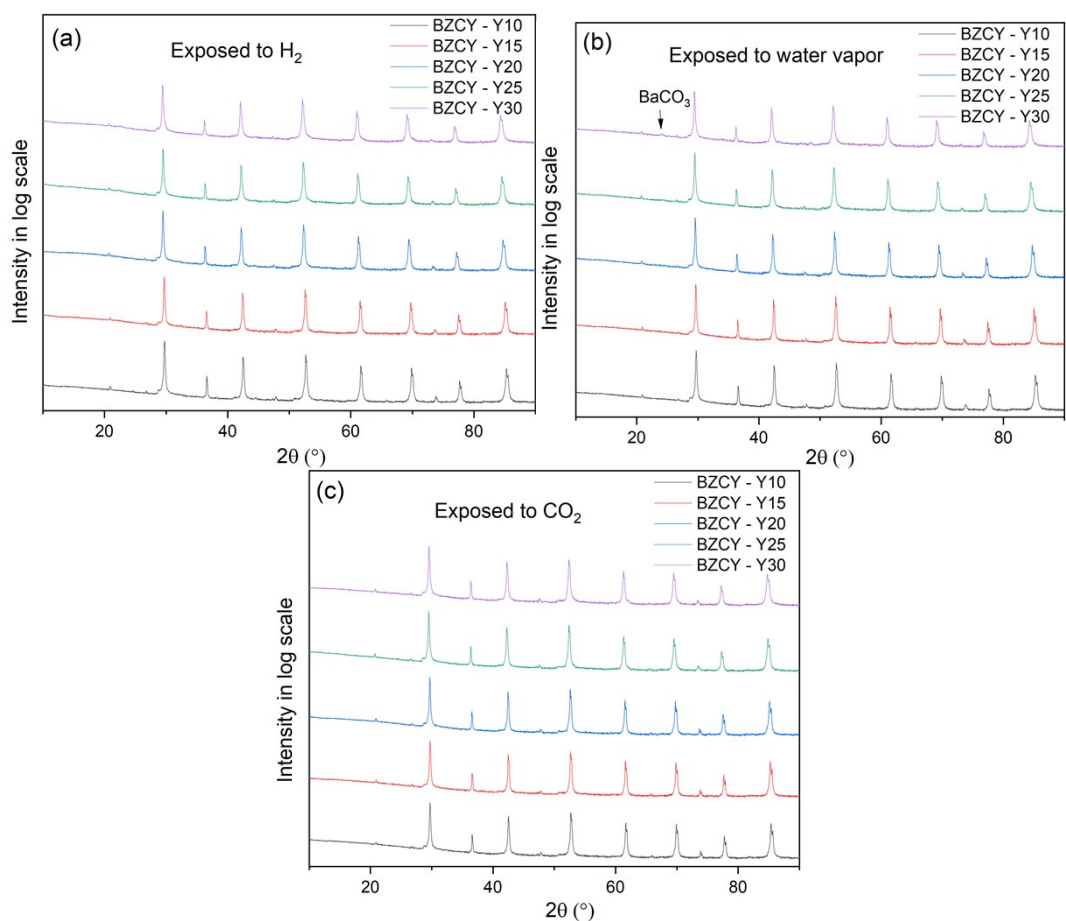


Figure S6. XRD patterns of materials from $\text{BaZr}_{0.8-x}\text{Ce}_{0.2}\text{Y}_x\text{O}_{3-\delta}$ series after exposure to (a) Ar / 4 vol.% H_2 , Ar / 50 vol.% H_2O and Ar / 50 vol.% CO_2 at 700 °C. Peak intensity is amplified by log scale.