

**High conductivity and chemical stability of $\text{BaCe}_{1-x-y}\text{Zr}_x\text{Y}_y\text{O}_{3-\delta}$
proton conductors prepared by sol-gel method**

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Table S1. Summary of the microprobe analyses: the mean atomic % with standard deviations are reported.^(*)

Sample	T sint. (°C)	Ce at%	Zr at%	Y at%	Ba/(Zr+Y+Ce) at%
BCZ20Y15	1400	0.656 ± 0.006	0.197 ± 0.004	0.147 ± 0.004	1.034 ± 0.017
BCZ20Y20	1400	0.601 ± 0.003	0.200 ± 0.004	0.199 ± 0.004	1.017 ± 0.007
BCZ30Y15	1450	0.553 ± 0.005	0.298 ± 0.004	0.148 ± 0.004	1.021 ± 0.015
BCZ30Y20	1450	0.496 ± 0.010	0.300 ± 0.008	0.204 ± 0.014	0.971 ± 0.029
BCZ40Y15	1450	0.450 ± 0.006	0.399 ± 0.009	0.151 ± 0.005	1.030 ± 0.015

^(*) The data for BCZ10Y were not included because the procedure of the sample preparation induced the degradation of the pellets due to water, leading to data with high divergence.

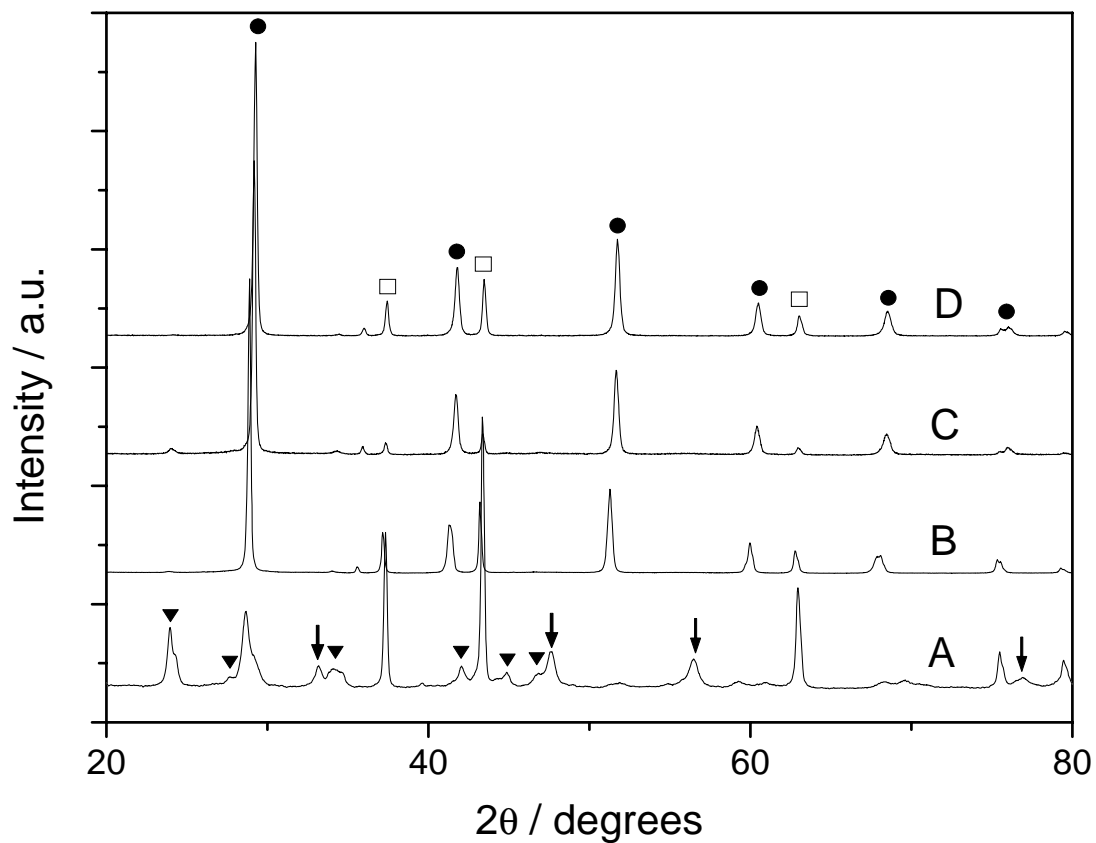


Figure S1. XRD patterns for BCZY15 (A: $Zr=0.1$, B: $Zr=0.2$; C: $Zr=0.3$) after the test in boiling water compared to BCZ30Y15 before the test (D). NiO was introduced as internal reference. The reference peak positions are reported for orthorhombic BCY (●), NiO (□), CeO_2 (arrow) and $BaCO_3$ (▼).

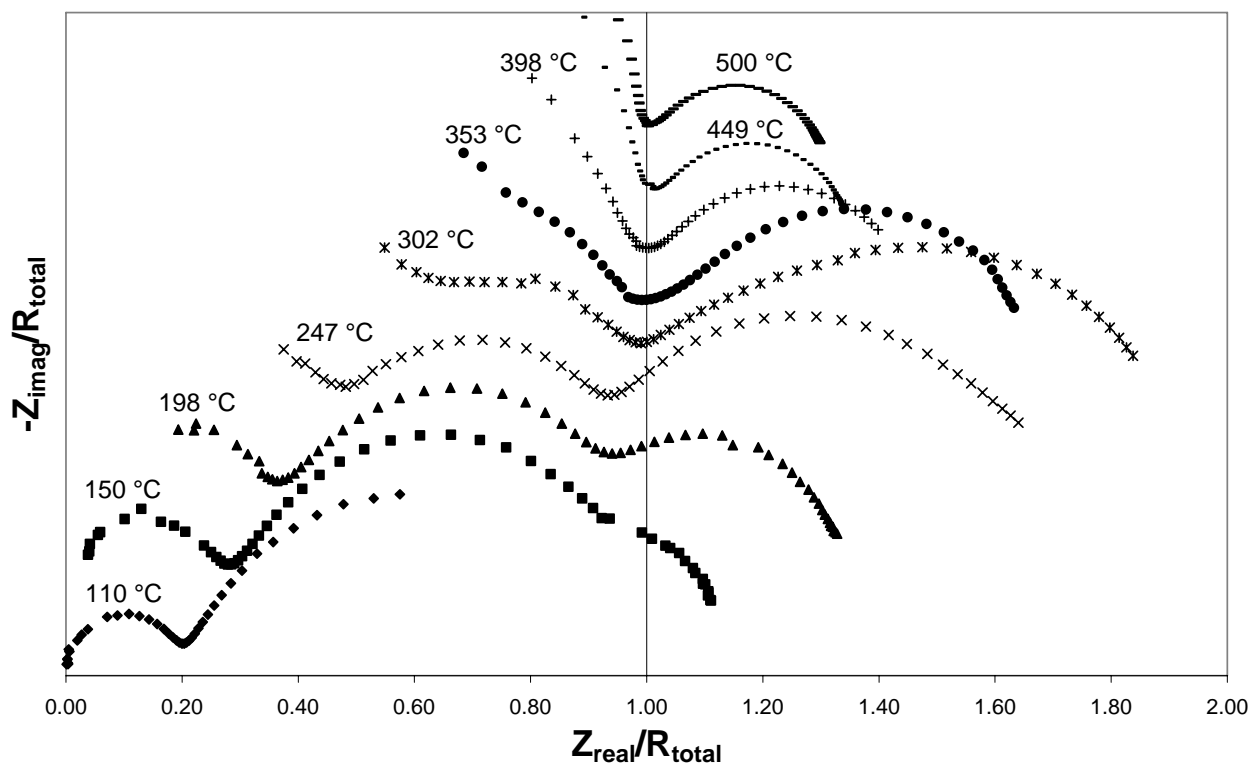


Figure S2. BCZ20Y15 impedance spectra normalized for the total resistance (arbitrary units) and recorded from 1 Hz to 1 MHz at different temperatures in humidified 5% H_2 /Ar ($P_{H_2O} = 0.5$ bar). The impedance arc for $Z_{real}/R_{total} > 1$ is attributed to the electrode.