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

Supplementary information for

Energy efficiency of ionic transport through proton conducting ceramics electrolytes for energy conversion applications

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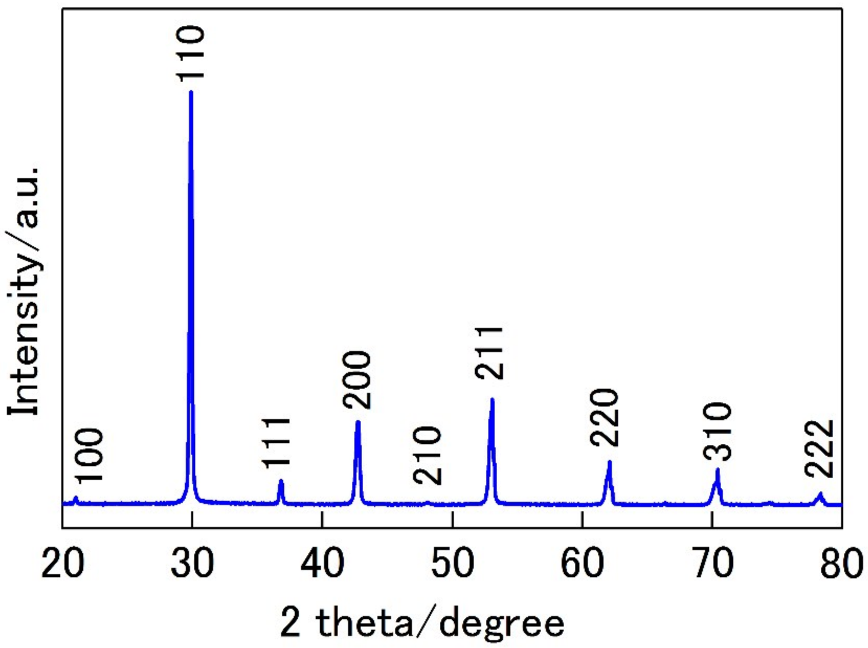

Figure S1. XRD patterns of $BaZr_{0.8}Y_{0.2}O_{3-\delta}$.

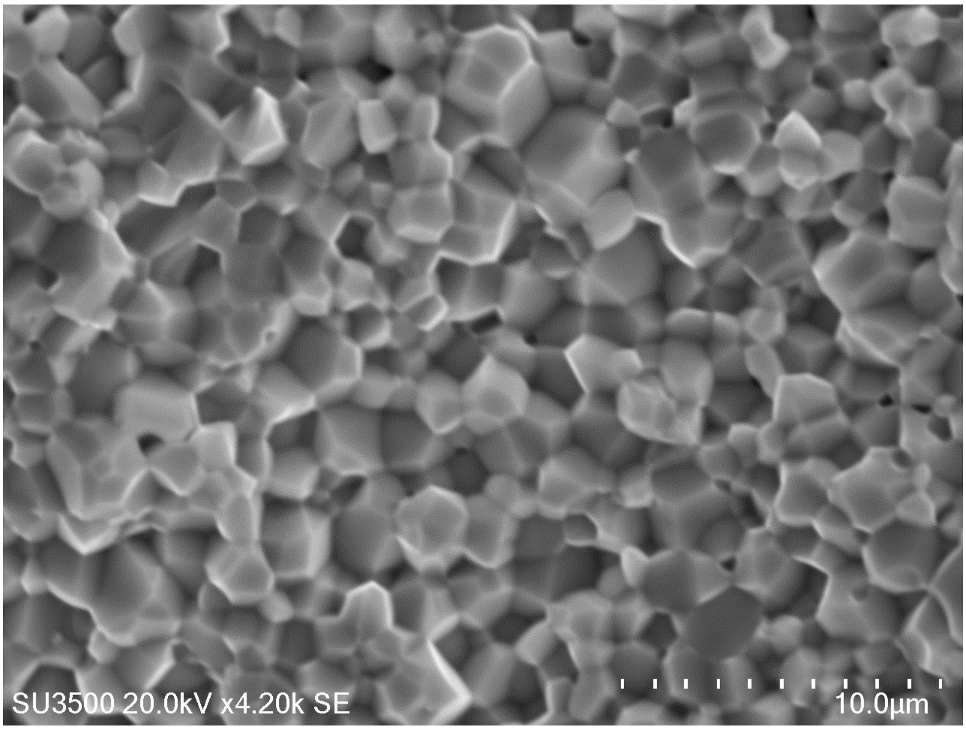

Figure S2. SEM image of the cross section of the dense $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ specimen.

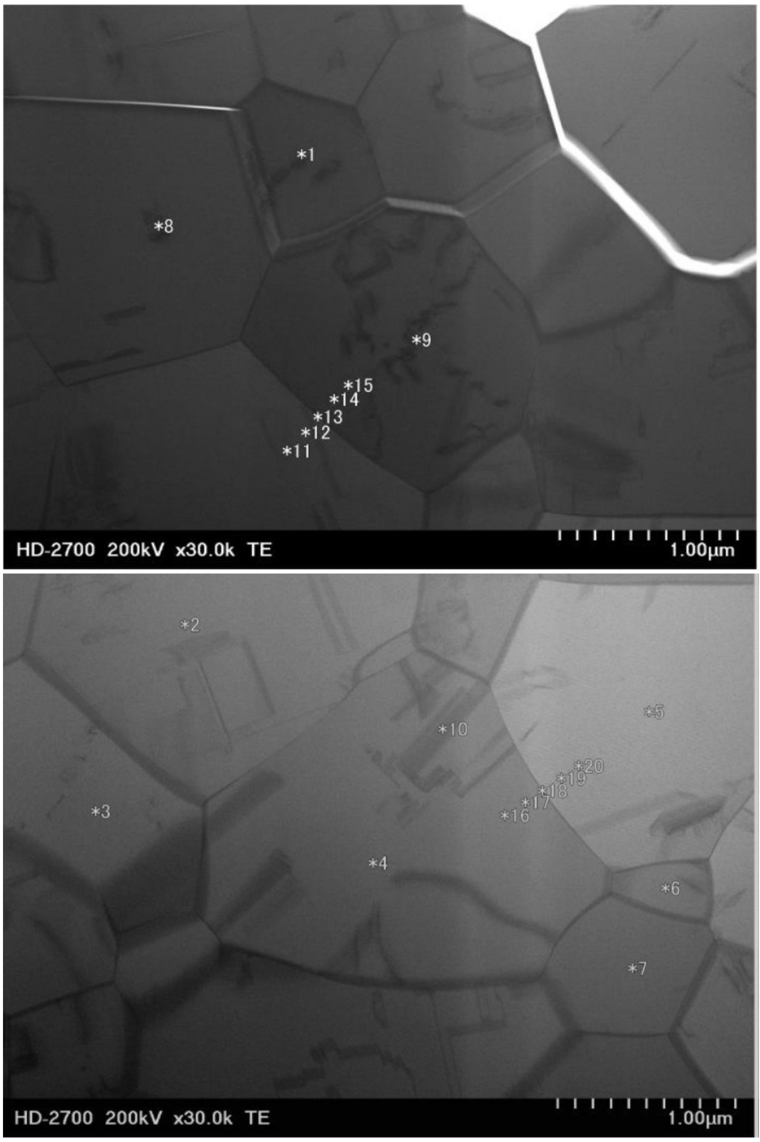

Figure S3. TEM images of the dense $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ specimen and the points of EDX analysis.

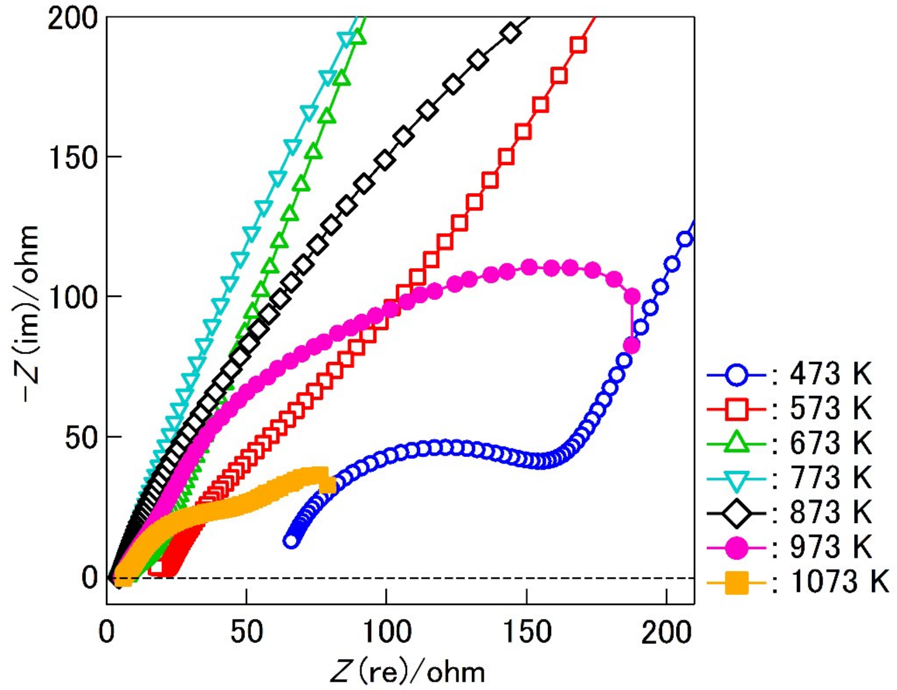

Figure S4. Typical impedance spectra of $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ electrolyte measured in 1.9%H_2O-1%H_2-Ar at 473 to 1073 K.

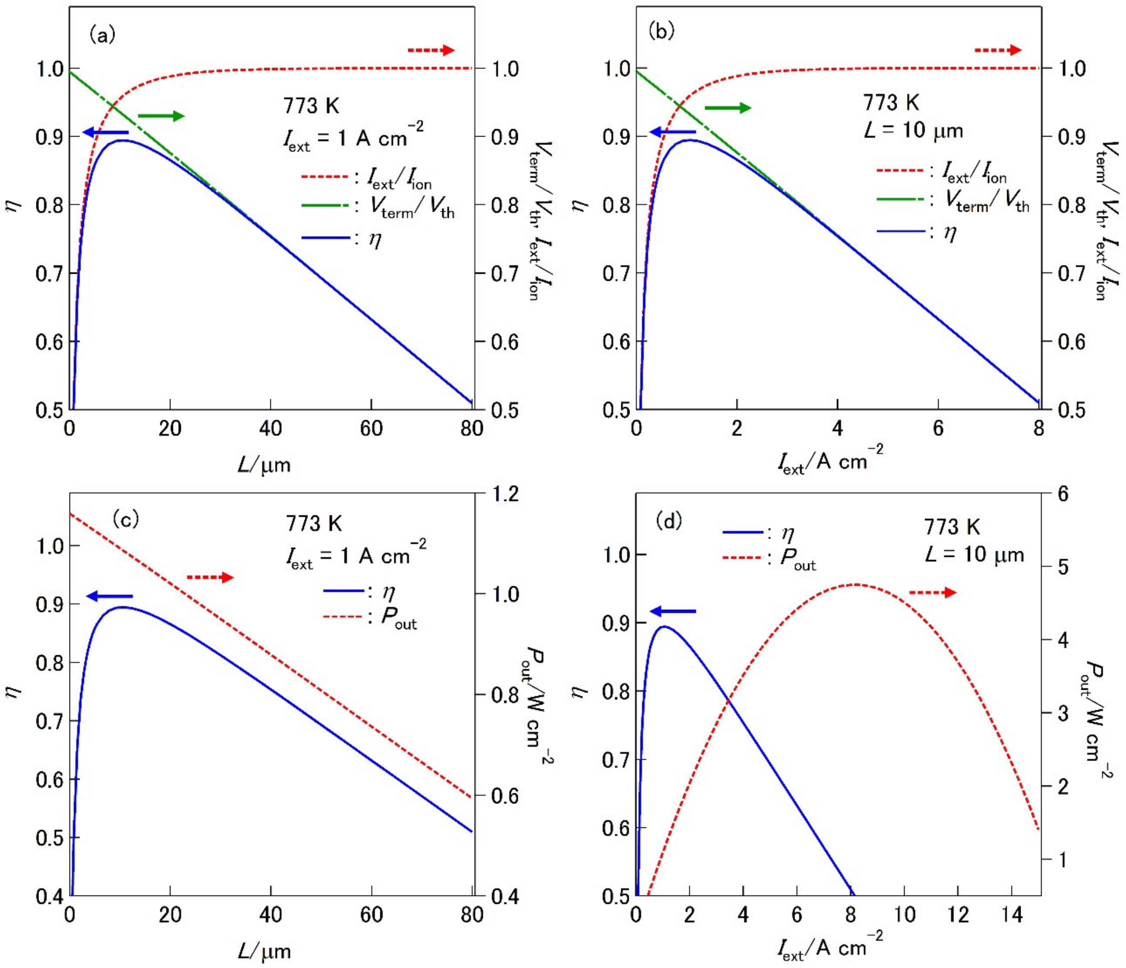

Figure S5. Energy efficiency, current ratio, and voltage ratio of the proton transport through a $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ electrolyte, (a) the electrolyte thickness dependence and (b) the external current dependence. Energy efficiency and power output of the proton transport through a $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ electrolyte, (c) the electrolyte thickness dependence and (d) the external current dependence. Anode: 4.2%H_2O-H_2, cathode: 4.2%H_2O-O_2, temperature: 773 K.

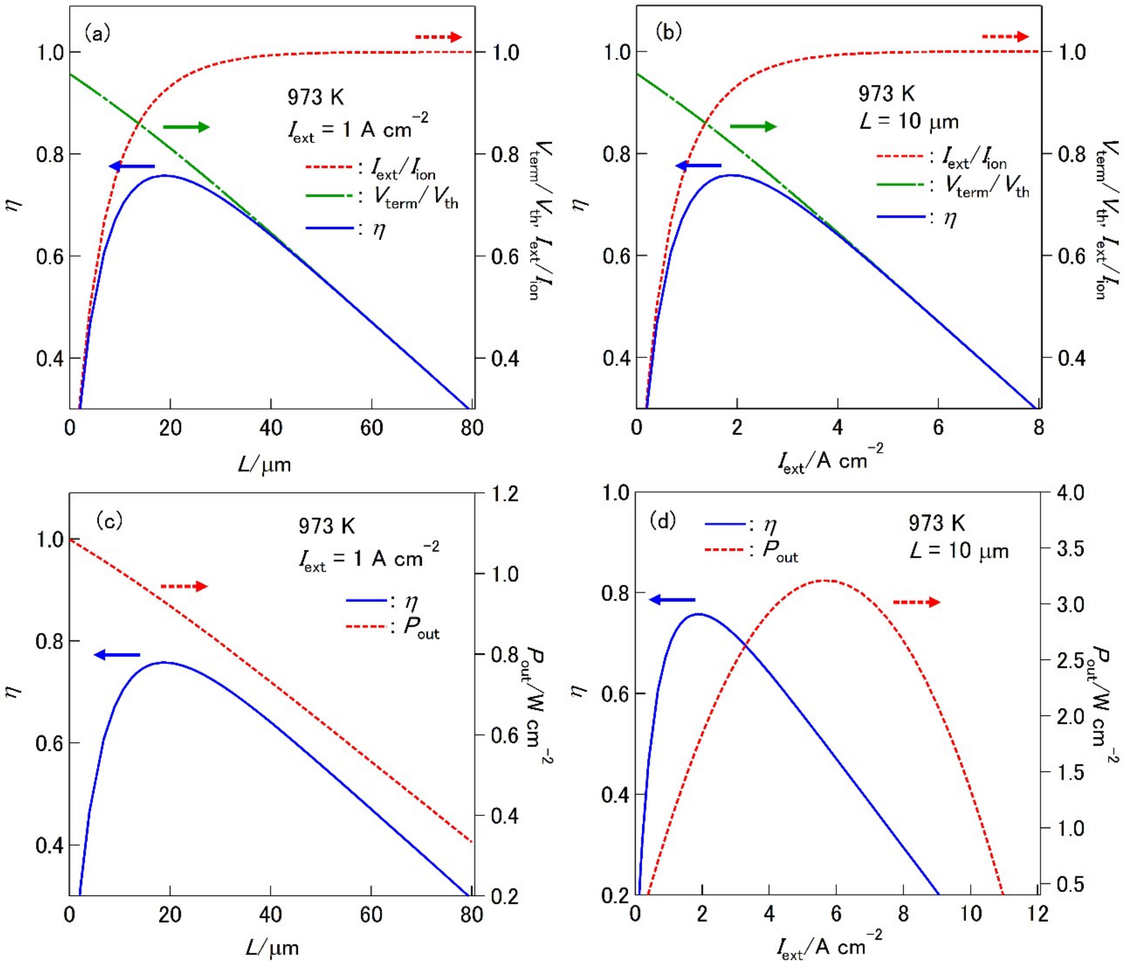

Figure S6. Energy efficiency, current ratio, and voltage ratio of the proton transport through a $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ electrolyte, (a) the electrolyte thickness dependence and (b) the external current dependence. Energy efficiency and power output of the proton transport through a $BaZr_{0.8}Y_{0.2}O_{3-\delta}$ electrolyte, (c) the electrolyte thickness dependence and (d) the external current dependence. Anode: 4.2%H_2O-H_2, cathode: 4.2%H_2O-O_2, temperature: 973 K.

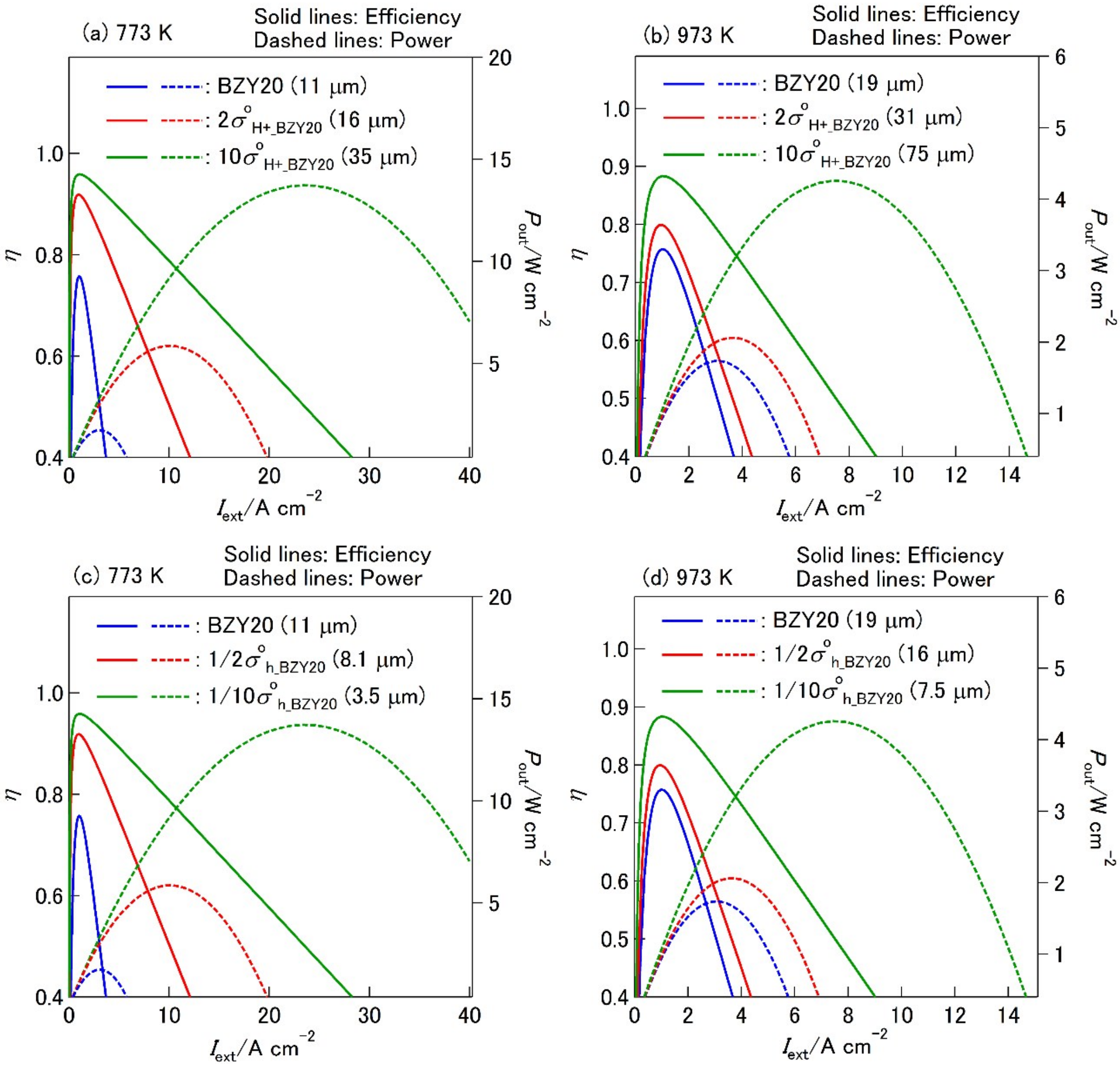

Figure S7. Influence of the partial conductivity variation on the energy efficiencies, the increase of $\sigma^{\circ}_{H^+}$ at (a) 773 K and (b) 973 K, and the decrease of σ^{o}_{h} at (c) 773 K and (d) 973 K.