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IMPEDANCE STUDIES ON THE SUB-MICRON GRAIN Yb-DOPED Ba(Ce,Zr)O₃ CERAMICS AT INTERMEDIATE TEMPERATURES

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ABSTRACT

A ceramic of Ba(Ce₀.6Zr₀.4)₀.95Yb₀.05O₂.₉₇₅ was prepared by the Pechini method. Morphology of the fractured surface of sintered pellet was observed using a scanning electron microscope. The sample formed clear and compact grains with submicron sizes. Impedance data were collected using a high frequency response analyzer under wet hydrogen in the temperature range from 200 to 800 °C. At T ≤ 250 °C, the high frequency arc corresponding to grain response, the mid-frequency arc due to the grain boundary response, and low frequency arc attributed to the electrode/electrolyte interface were observed. Above 300 °C, the grain resistance was obtained from the intercept of the grain boundary arc with the real axis at high frequency. It was also noticed that above 300 °C, the Z-imaginary data at high frequencies changed its sign to positive values. All the responses were resolved by the fitting procedure using an equivalent circuit representing the brick-layer model. Arrhenius plot of proton conductivity and capacitances associated with the grain and grain boundary of Ba(Ce₀.6Zr₀.4)₀.95Yb₀.05O₂.₉₇₅ are also presented.


REFERENCES