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IMPEDANCE STUDIES ON THE SUB-MICRON GRAIN Yb-DOPED $Ba(Ce,Zr)O_3$ CERAMICS AT INTERMEDIATE TEMPERATURES

N. Osman[1,*], I. A. Talib[2] and H. A. Hamid[1]
[1]*Faculty of Applied Sciences, Universiti Teknologi MARA, 02600 Arau, Perlis, Malaysia*
[2] *School of Applied Physics, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia*

ABSTRACT

A ceramic of $Ba(Ce_{0.6}Zr_{0.4})_{0.95}Yb_{0.05}O_{2.975}$ 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 ^oC. At $T \leq 250^oC$, 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^oC, 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^oC, 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 $Ba(Ce_{0.6}Zr_{0.4})_{0.95}Yb_{0.05}O_{2.975}$ are also presented.

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