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SIMULTANEOUS EVALUATION OF LINEAR SHRINKAGE AND ELECTRICAL BEHAVIOR OF ELECTROCERAMICS DURING SINTERING

Muccillo, R.(1); Muccillo, E.N.S.(1);
(1) IPEN;

Sintering a ceramic green pellet promotes microstructural evolution from packed particles composed of adjoined particles and pores to a consolidated body composed of grains and interfaces. As the impedance spectroscopy technique allows for detecting the main components of a ceramic body by separating in the frequency domain the electrical resistivity of each component, a sample inserted in a dilatometer was connected, via platinum electrodes and leads, to an impedance analyzer. The connection to the impedance analyzer could also be switched to a power supply for flash sintering experiments. In situ electrochemical impedance spectroscopy measurements of yttria-stabilized zirconia and yttrium/zirconium-doped barium cerate were performed during conventional and flash sintering experiments. The analysis of the impedance spectroscopy diagrams under heating (before either conventional or electric field-assisted sintering) and under cooling (after) provides evidence of densification with pore elimination and welding of grains.