عنوان مقاله:

The Effects of Contact Paste Type and Electric Field on Physical Properties of Zirconia Bodies Made by Flash Sintering Method : Modeling Via Response Surface Methodology

محل انتشار:

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خلاصه مقاله:

Flash sintering of ۸ mol% yttria-stabilized zirconia (۸YSZ) as solid oxide fuel cell (SOFC) electrolyte is studied. The relation between relative density, shrinkage, sample temperature during the flash, and incubation time, with the electric field strength, current density, as well as contact paste, are modeled by response surface methodology (RSM). The electric field strength and current density varied from ۵۰ to ۴۰۰V.cm-۱ and ۵۰ to ۲۰۰mA.mm-۲, respectively. Also, platinum (Pt) and lanthanum strontium manganite (LSM) used as contact paste. Results show that using LSM paste lead to higher density and more shrinkage compare with Pt paste. Contrary, the electric field strength has no significant effect on density and shrinkage. However, a minimum electric field strength equal to ۸۰ V.cm-۱ is necessary for flash onset. As the field increases, the incubation time decreases dramatically. Compare with samples with LSM paste, samples with Pt contact paste reach to a higher temperature during the flash. Flash sintered ۸YSZ shows the mean grain size of ۰.۳µm, which is about half of the conventionally sintered ۸YSZ. Electrochemical Impedance Spectroscopy reveals despite lower mean grain size, the resistivity of flash sintered ۸YSZ is lower than conventionally sintered ۸YSZ.

کلمات کلیدی:

۸YSZ, flash sintering, contact paste, platinum (Pt), lanthanum strontium manganite (LSM), current density, electric field strength, Response Surface

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