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Effect of boron oxide and zinc oxide additions on sintering yttrium-doped barium zirconate solid electrolytes

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Boron oxide and zinc oxide were added to BaZr(0.8)Y(0.2)O(3-d) compounds prepared by heat treating a mixture of barium carbonate, zirconium oxide and yttrium oxide with intermediate grindings. Thermogravimetric and dilatometric analyses were carried out in the RT-1550°C. The structural phases were analyzed by X-ray diffraction. Pressed powders were sintered at 1550°C with intermediate dwellings at 500°C for melting and at 1500°C for sublimation of boron oxide. The density of the specimens, evaluated by the Archimedes method using kerozene as liquid medium, did not improve with boron oxide addition, but improved with zinc oxide addition. Structural phases other than the Y-doped barium zirconate phase were detected in the sintered pellets with boron as well as with zinc oxide addition. Impedance spectroscopy measurements from 400 to 600°C in the 40 Hz - 110 MHz frequency range show that the best total electrical conductivity values were achieved for BaZr(0.8)Y(0.2)O(3-d) with 1% ZnO addition (26.2×10^{-6} S/cm) and with 2% B₂O₃ addition (32.2×10^{-6} S/cm). (CNEN, CNPq, FAPESP)