Conductivity study of dense BaCex Zr(0.9-x)Y0.1O(3−δ) prepared by solid state reactive sintering at 1500 deg. C

A cost and time effective process was used to prepare the solid solutions BaCexZr(0.9−x)Y0.1O(3−δ) (0 ≤ x ≤ 0.4). 98% dense samples were obtained by solid state reactive sintering at 1500 °C for 4 h, with the addition of 1 wt% of NiO to the quantity of synthesized/sintered compound. Scanning electron micrographs reveal polygonal grains of 1–5 microns, whose size increases from the compound with no cerium (BCZY09) to the samples containing cerium (BCZY18–BCZY45). The conductivity, measured in wet reducing atmosphere (9% H2 in N2, p(H2O) = 0.015 atm) by impedance spectroscopy, increases with the cerium content. Some samples have also been prepared using barium sulfate (BaSO4) as barium precursor (instead of barium carbonate BaCO3) due to its non toxicity. The corresponding samples (prepared at 1575 °C) showed similar properties as the ones prepared with barium carbonate. Furthermore, different geometries (rods, tubes, pellets) could be made.

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