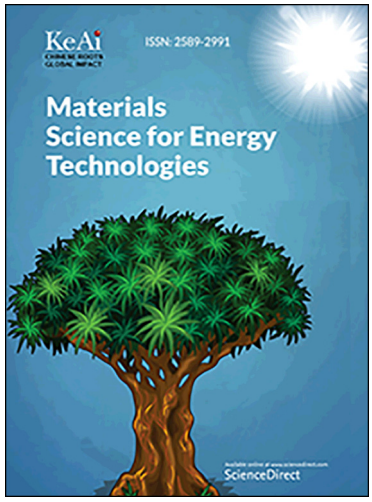

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Physico-chemical properties of nanocrystalline YSZ powders as a function of doping level and electrical properties after sintering

C. Suciu[1], E. Dorolti[2] and A. C. Hoffmann[3]
[1]CMR-Prototech, Fantoftveien 38, 5892, Bergen, Norway
[2]Faculty of Physics, Babes-Bolyai University, 400084, Cluj–Napoca, Romania
[3]Department of Physics and Technology, University of Bergen, Allégaten 55, 5007 Bergen, Norway

Abstract

Analyses of a series of xYSZ materials, where x varies from 1–15%, have been carried out both in powder form and after sintering to functional materials, namely ion-conducting ceramics for use in SOFC fuel cells. XRD analyses showed that the particles were in the cubic structure confirming the stabilization of this crystal structure in nanocrystals. The analyses further showed that all the interatomic distances in the materials increased with increasing doping. The relative densities of the sintered materials showed a minimum at around 8% doping. In spite of this, EIS analyses showed that both the grain interior and grain boundary contributions to the material resistivity were minimal at around 8% doping.

Keywords: Grain boundaries; Sintering; Ionic conductivity; Fuel cells; YSZ.

1 Introduction

The ionic conductivity of yttria-doped zirconia (YSZ) is interesting due to their use in solid oxide fuel cells (SOFCs), mainly as electrolyte materials, but also