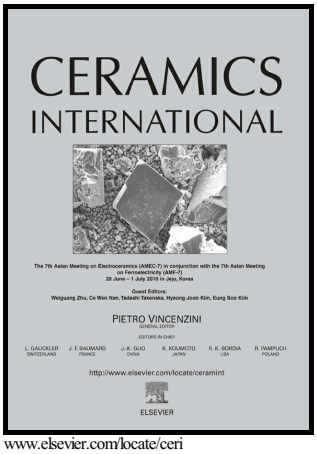

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Effect of Fe_2O_3 doping on colour and mechanical properties of Y-TZP ceramics

L.Holz,[a], J. Macias,[b*], N. Vitorino,[b], A.J.S. Fernandes,[c], F.M. Costa,[c], M.M. Almeida[a]

[a] CICECO – Aveiro Institute of Materials, Department of Materials and Ceramic Engineering,University of Aveiro, 3810-193 Aveiro, Portugal

[b] Innovnano, iParque, 3040-540 Coimbra, Portugal

[c] I3N, Physics Department, University of Aveiro, 3810-193 Aveiro, Portugal

Abstract

Yttria-stabilized zirconia (Y-TZP) samples with different Fe concentrations were prepared aiming to study the effects of Fe_2O_3 doping on colour and mechanical properties. Since colour is an important optical property for jewellery and watchmaking, the investigation of colour in zirconia ceramics has a great scientific and technological interest. An investigation of the mechanical and optical properties, specifically the colour, was developed starting from commercial partially yttria-stabilized zirconia (Y-TZP) powders produced by Emulsion Detonation Synthesis (EDS). Within the strategies to get colours, the use of colouring oxides such as iron oxide (Fe_2O_3) was the chosen approach. The addition of specific ions into the ZrO_2 matrix can be used to tune zirconia colour without compromising its outstanding mechanical properties. Doping with iron oxide has proved to be a suitable, reproducible and irreversible colouring mechanism, allowing the development of a chromatically beige stable material with respect to its use in different processing conditions such as different atmospheres and temperature ranges. XRD results suggested that iron ions dissolved into tetragonal zirconia phase are at interstitial positions since the unit-cell volume of the tetragonal zirconia increases with increasing