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LZS/Al₂O₃ GLASS-CERAMIC COMPOSITES SINTERED BY FAST FIRING

Arcaro, S.(1); Nieto, M.(2); Moreno, R.(2); Salvador, M.D.(3); Borrell, A.(3); Moreno, B.(2); Chinarro, E.(2); De Oliveira, A.P.N.(1);

Universidade Federal de Santa Catarina(1); Instituto de cerámica y vidrio(2); Instituto de cerámica y vidrio(3); Universitat Politècnica de València(4); Universitat Politècnica de València(5); Instituto de cerámica y vidrio(6); Instituto de cerámica y vidrio(7); Universidade Federal de Santa Catarina(8);

In this work, nanometric Al₂O₃ (1-5 vol.%) particles (13 nm, 100 m²/g) were added to a 19.58Li₂O•11.10ZrO₂•69.32SiO₂ (mol%) (3.5 μm, 2.5 m²/g) parent glass-ceramic matrix to prepare composites with the purpose of studying the influence of Al₂O₃ on their structure, microstructure, mechanical, thermal and electrical properties when sintered by fast firing. The parent glass-ceramic was prepared by melting and fast cooling (in water) to obtain a glass frit. The resulting glass frit was milled according to a two-step procedure consisting on a dry milling stage followed by a long wet milling step down. Each composition was wet homogenized and then dried at 110 °C for 48h for disaggregation. The obtained powders were uniaxially pressed (100 MPa) and compacts sintered by fast firing (175°C/min) between 800 and 900°C for 30 min. The composites, with relative densities ranging from 89% to 93%, showed zircon and ?-spodumene as main crystalline phases. The hardness and Young's modulus varied from 4.5 to 6.5 GPa, and from 65 to 102 GPa, respectively. The formation of ?-spodumene in the obtained composites leads to reduce the CTEs, whose values ranged from 13 to 7 x10⁻⁶ °C⁻¹.