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Fabrication of dense zirconia-toughened alumina ceramics through a

stereolithography-based additive manufacturing

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Abstract

We report a novel approach to fabricate dense zirconia-toughened alumina (ZTA) ceramics with excellent properties via an additive manufacturing process based on stereolithography. The XRD patterns show the ZTA sample consists of α -Al₂O₃ and t-ZrO₂ with the dominance of α -Al₂O₃. The zirconia grain with the average size of 0.35µm is small enough to trigger the toughening behavior of zirconia in the ZTA. The prepared ceramics showed a density, Vickers hardness, bending strength, and fracture toughness of 4.26 g/cm³, 17.76 GPa, 530.25 MPa, and 5.72 MPa·m^{1/2}, respectively. These properties are comparable to those for ceramics obtained through conventional ceramic processing.

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