Damage-resistant SrO-doped Ce-TzP/Al₂O₃ composites

R.A. Cutler, J.M. Lindemann, J.H. Ulvøensøen, H.I. Lange
Ceramatec, Inc., 2425 S. 900 W., Salt Lake City, Utah 84119, USA
Elkem Keramer, PO Box 126, N-4602, Kristiansand, Norway 14970
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Abstract
Simultaneous additions of SrO and Al₂O₃ to ZrO₂ (12 mol.% CeO₂) lead to the in-situ formation of SrO·₆Al₂O₃ platelets in the Al₂O₃/Ce-TzP matrix. These composites have superior damage resistance compared to Al₂O₃/Y-TzP ceramics despite their lower strength. The increased damage resistance appears to be primarily related to the higher residual stress as a result of grinding with smaller contributions due to micromechanical toughening. High damage resistance was also obtained by introduction of temperature-induced surface compressive stresses in layered composites. Damage resistance is only obtained at low temperatures (<500°C). The applicability of conventional powder processing (slip casting or spray drying) to these tailored microstructures is demonstrated.

Keywords: Ce-TzP/Al₂O₃ composites; damage resistance; powder processing

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