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# Damage-resistant SrO-doped Ce-TZP/ $\text{Al}_2\text{O}_3$ composites

R.A. Cutler, J.M. Lindemann, J.H. Ulvensøen, H.I. Lange

Ceramtec, Inc., 2425 S. 900 W., Salt Lake City, Utah 84119, USA

Elkem Keramer, PO Box 126, N-4602, Kristiansand, Norway 14970

Department of Trondheim, Department of Metallurgy, N-7034, Trondheim, Norway

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### Abstract

Simultaneous additions of SrO and  $\text{Al}_2\text{O}_3$  to  $\text{ZrO}_2$  (12 mol.%  $\text{CeO}_2$ ) lead to the *in-situ* formation of  $\text{SrO}\cdot 6\text{Al}_2\text{O}_3$  platelets in the  $\text{Al}_2\text{O}_3/\text{Ce-TZP}$  matrix. These composites have superior damage resistance compared to  $\text{Al}_2\text{O}_3/\text{Y-TZP}$  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/ $\text{Al}_2\text{O}_3$  composites; damage resistance; powder processing