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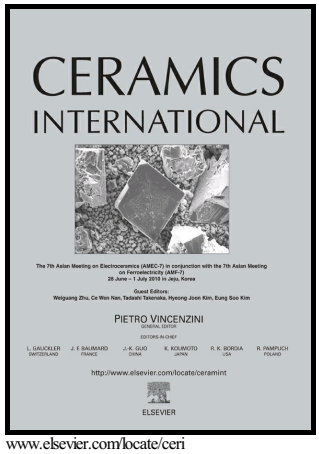

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Superior bending and impact properties of SiC matrix composites infiltrated with an aluminium alloy

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Abstract

A simple process based on melt infiltration was used to modify a silicon carbide (SiC) ceramic and thus improve its mechanical properties. SiC ceramics infiltrated with an Al alloy for 2 h, 4 h, 6 h, and 8 h exhibited outstanding mechanical performance. The three-point bending strength, four-point bending strength, and impact toughness of the SiC ceramics increased by 125-135%, 170-180%, and 140%, respectively, after infiltration with the Al alloy at 900 °C for 4-6 h. The maximum three-point bending strength, four-point bending strength, and impact toughness achieved were 430 MPa, 360 MPa, and 3.5 kJ/m^2, respectively. Analysis of the processing conditions and microstructure demonstrated that the molten Al alloy effectively infiltrated the gaps between the SiC particles, forming a compact structure with the particles, and some of the Al phases reacted with Si to form Al-Si eutectic phases. Moreover, the results showed that a reaction layer is present on the surface of the SiC sample, which