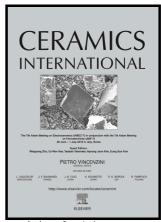
Author's Accepted Manuscript

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www.elsevier.com/locate/ceri

PII: S0272-8842(16)32377-X

DOI: http://dx.doi.org/10.1016/j.ceramint.2016.12.110

Reference: CERI14420

To appear in: Ceramics International

Received date: 12 November 2016 Revised date: 7 December 2016 Accepted date: 21 December 2016

Cite this article as: Wei Wang, Qiang Li, Ruina Ma, Xiaoming Cao, Yaqi Cui, Yongzhe Fan, Tai Yang and Baoxi Liu, Superior bending and impact properties of SiC matrix composites infiltrated with an aluminium alloy, *Ceramic International*, http://dx.doi.org/10.1016/j.ceramint.2016.12.110

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

Wei Wang^a, Qiang Li^a, Ruina Ma^a, Xiaoming Cao^{a*}, Yaqi Cui^a, Yongzhe Fan^a, Tai

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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/m², 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

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