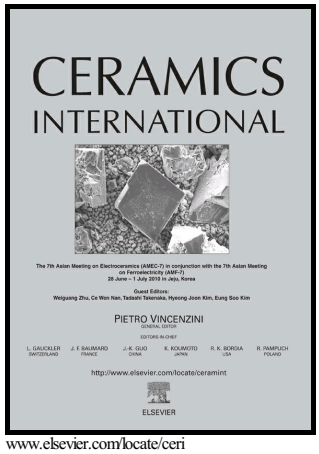

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Relaxation of Residual Microstress in Reaction Bonded Silicon Carbide

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Abstract

High temperature annealing reduces the residual microstress in the silicon phase and silicon carbide phase in monolithic reaction bonded silicon carbide and in the matrix of melt-infitrated composites of silicon carbide reinforced with silicon carbide fibers. Stress relaxation is related to creep of the silicon carbide with power-law creep exponents similar to tensile creep in reaction bonded silicon carbide.

Keywords: Composites; Silicon Carbide; Silicon

1. Introduction

Reaction bonded SiC (RBSiC) is a well-established industrial grade of SiC prized for good high temperature properties, and the ease of manufacturing net shape components[1]. RBSiC is fabricated by the reaction of a liquid silicon alloy with carbon, usually in the presence of a pre-reacted silicon carbide filler[2]. The reactive silicon is often introduced by melt infiltration (MI)[3,4]. The reaction does not go to completion[5], leaving unreacted liquid free silicon as a minority phase[6]. Reaction bonding is also used to

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