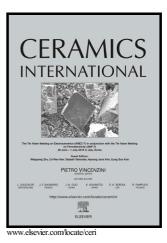
Author's Accepted Manuscript

Effect of carbon nanoparticle reinforcement on mechanical and thermal properties of silicon carbide ceramics

Anna Kaźmierczak-Bałata, Jacek Mazur



 PII:
 S0272-8842(18)30586-8

 DOI:
 https://doi.org/10.1016/j.ceramint.2018.03.034

 Reference:
 CERI17671

To appear in: Ceramics International

Received date: 16 January 2018 Revised date: 14 February 2018 Accepted date: 5 March 2018

Cite this article as: Anna Kaźmierczak-Bałata and Jacek Mazur, Effect of carbon nanoparticle reinforcement on mechanical and thermal properties of silicon carbide ceramics, *Ceramics International*, https://doi.org/10.1016/j.ceramint.2018.03.034

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Effect of carbon nanoparticle reinforcement on mechanical and thermal properties of silicon carbide ceramics

Anna Kaźmierczak-Bałata^{1*}and Jacek Mazur²

¹ Institute of Physics-CND, Silesian University of Technology, Konarskiego 22B, Gliwice 44-100, Poland

² Institute of Non Ferrous Metals, Sowińskiego 5, Gliwice 44-100, Poland

*Corresponding author: Anna Kaźmierczak-Bałata, akazmierczak@polsl.pl, phone: +48 32 237 10 06, fax: +48 32 237 1778

Abstract

This research presents an analysis of the influence of graphene reinforcement on the thermal and mechanical properties of silicon carbide ceramics, at 2.5 % (wt%.) graphene content. The SiC composites, containing various carbon nanofillers (graphene oxide and graphene nanoparticles), were sintered by the classical two stage spark plasma sintering method. Two current modes were used, the continuous mode and the pulsed current mode. The results from photothermal radiometry and investigations of the mechanical properties showed that graphene additives significantly improve the thermal properties and toughness of material, sintered from a SiC powder. An 45 % growth in the toughness was observed, which increased from 1.21 to 1.75 MPa/m^{1/2}. The thermal diffusivity value also increased from 0.60 to 0.71 cm²/s and giving an improvement in thermal properties of 18 %. The friction coefficient reached 7 % giving an increase in value from 0.62 to 0.66. Microscopic investigations supported the photothermal radiometry (PTR) results. Whilst, thermal imaging revealed homogeneity of the local thermal properties of the products fabricated from the starting SiC powder.

Keywords

SiC composites B, graphene oxide D, spark plasma sintering A, thermal properties C, mechanical properties C

1 Introduction

Download English Version:

https://daneshyari.com/en/article/7887023

Download Persian Version:

https://daneshyari.com/article/7887023

Daneshyari.com