

Enhancing copper infiltration into alumina using spark plasma sintering to achieve high performance  $\text{Al}_2\text{O}_3/\text{Cu}$  composites

Yingge Shi, Wenge Chen, Longlong Dong, Hanyan Li, Yong Qing Fu



www.elsevier.com/locate/ceri

PII: S0272-8842(17)31989-2  
DOI: <http://dx.doi.org/10.1016/j.ceramint.2017.09.062>  
Reference: CERI16233

To appear in: *Ceramics International*

Received date: 19 June 2017  
Revised date: 2 September 2017  
Accepted date: 9 September 2017

Cite this article as: Yingge Shi, Wenge Chen, Longlong Dong, Hanyan Li and Yong Qing Fu, Enhancing copper infiltration into alumina using spark plasma sintering to achieve high performance  $\text{Al}_2\text{O}_3/\text{Cu}$  composites, *Ceramics International*, <http://dx.doi.org/10.1016/j.ceramint.2017.09.062>

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.

# Enhancing copper infiltration into alumina using spark plasma sintering to achieve high performance Al<sub>2</sub>O<sub>3</sub>/Cu composites

Yingge Shi<sup>a</sup>, Wenge Chen<sup>a\*</sup>, Longlong Dong<sup>a</sup>, Hanyan Li<sup>a</sup>, Yong Qing Fu<sup>b\*</sup>

<sup>a</sup> School of Materials Science and Engineering, Xi'an University of Technology,

Shaanxi, Xi'an, 710048, PR China

<sup>b</sup> Faculty of Engineering and Environment, Northumbria University, Newcastle upon

Tyne, NE1 8ST, UK.

[wgchen001@263.net](mailto:wgchen001@263.net) (Wenge Chen)

[richard.fu@northumbria.ac.uk](mailto:richard.fu@northumbria.ac.uk) (Richard Yongqing Fu)

\*Corresponding author: Professor Wenge Chen.

Abstract: Al<sub>2</sub>O<sub>3</sub>/Cu (with 30 wt% of Cu) composites were prepared using a combined liquid infiltration and spark plasma sintering (SPS) method using pre-processed composite powders. Crystalline structures, morphology and physical/mechanical properties of the sintered composites were studied and compared with those obtained from similar composites prepared using a standard liquid infiltration process without any external pressure. Results showed that densities of the Al<sub>2</sub>O<sub>3</sub>/Cu composites prepared without applying pressure were quite low. Whereas the composites sintered using the SPS (with a high pressure during sintering in 10 minutes) showed dense structures, and Cu phases were homogeneously infiltrated and dispersed with a network from inside the Al<sub>2</sub>O<sub>3</sub> skeleton structures. Fracture toughness of Al<sub>2</sub>O<sub>3</sub>/Cu composites prepared without using external pressure (with a sintering time of 1.5 hours) was 4.2 MPa·m<sup>1/2</sup>, whereas that using the SPS process was 6.5 MPa·m<sup>1/2</sup>.

Download English Version:

<https://daneshyari.com/en/article/7888706>

Download Persian Version:

<https://daneshyari.com/article/7888706>

[Daneshyari.com](https://daneshyari.com)