

Accepted Manuscript

Nano-sized zirconium carbide powder: Synthesis and densification using a spark plasma sintering apparatus

Lun Feng, Seahoon Lee, Heesoo Lee



PII: S0263-4368(16)30406-1

DOI: doi: [10.1016/j.ijrmhm.2017.01.006](https://doi.org/10.1016/j.ijrmhm.2017.01.006)

Reference: RMHM 4401

To appear in: *International Journal of Refractory Metals and Hard Materials*

Received date: 15 July 2016

Revised date: 6 January 2017

Accepted date: 20 January 2017

Please cite this article as: Lun Feng, Seahoon Lee, Heesoo Lee , Nano-sized zirconium carbide powder: Synthesis and densification using a spark plasma sintering apparatus. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Rmhm(2017), doi: [10.1016/j.ijrmhm.2017.01.006](https://doi.org/10.1016/j.ijrmhm.2017.01.006)

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 proof before it is published in its final 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.

Nano-sized zirconium carbide powder: synthesis and densification using a spark plasma sintering apparatus

Lun Feng^a, Seahoon Lee^{a,*}, Heesoo Lee^b

^aDivision of Powder/Ceramics Research, Korea Institute of Materials Science, Changwon641-831, Republic of Korea

^bSchool of Materials Science and Engineering, Pusan National University, Busan 609-735, Republic of Korea

Abstract

Nano-sized zirconium carbide powder was synthesized at 1600 °C by the carbothermal reduction of ZrO₂ using a modified spark plasma sintering (SPS) apparatus. The synthesized ZrC powder had a fine particle size of approximately 189 nm and a low oxygen content of 0.88 wt%. The metal basis purity of the synthesized powder was 99.87%. The low synthesis temperature, fast heating/cooling rate and the effect of current during the modified SPS process effectively suppressed the particle growth. Using the synthesized powder, monolithic ZrC ceramics with high relative density (97.14%) were obtained after the densification at 2100 °C for 30 min at a pressure of 80 MPa by SPS. The average grain size of the densified ZrC ceramics was approximately 9.12 μm.

Key words: zirconium carbide; nanoparticles; synthesis; spark plasma sintering; densification

*Corresponding author: Sea-Hoon Lee Tel:+82-10-8992-6972. E-mail:seahoon1@kims.re.kr

1. Introduction

Due to its high melting point (3550 °C), solid-state phase stability and low evaporation rate, zirconium carbide (ZrC) is a promising material for potential ultra-high temperature applications

Download English Version:

<https://daneshyari.com/en/article/5457978>

Download Persian Version:

<https://daneshyari.com/article/5457978>

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