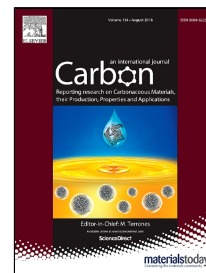


Accepted Manuscript

Enhanced electrical and thermal conductivities of silicon oxycarbide nanocomposites containing carbon nanofibers.

M.A. Mazo, A. Tamayo, A.C. Caballero, J. Rubio



PII: S0008-6223(18)30553-0
DOI: 10.1016/j.carbon.2018.05.075
Reference: CARBON 13202
To appear in: *Carbon*
Received Date: 01 March 2018
Accepted Date: 30 May 2018

Please cite this article as: M.A. Mazo, A. Tamayo, A.C. Caballero, J. Rubio, Enhanced electrical and thermal conductivities of silicon oxycarbide nanocomposites containing carbon nanofibers., *Carbon* (2018), doi: 10.1016/j.carbon.2018.05.075

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.

Title: Enhanced electrical and thermal conductivities of silicon oxycarbide nanocomposites containing carbon nanofibers.

M.A. Mazo^{a,1}, A. Tamayo^a, A.C. Caballero^b, J. Rubio^a

^aDepartamento de Química Física de Superficies y Procesos, Instituto de Cerámica y Vidrio (CSIC), C/ Kelsen 5, 28049 Madrid (Spain).

^bDepartamento de Electrocerámica, Instituto de Cerámica y Vidrio (CSIC), C/ Kelsen 5, 28049 Madrid (Spain).

Abstract

Novel silicon oxycarbide-carbon enriched composites (SiOC-C) were prepared from mixtures of SiOC and different amounts of carbon nanofibers (CNF) (0-10%) sintered through spark plasma sintering at 1500 °C. During sintering, the SiOC matrix experiences a rearrangement to SiO₂, SiC and C, and the growth of SiC wires within the material which produce epitaxial graphene-like carbon flakes with AB stacking. Small additions of CNFs (0.5-1%) promote the generation of large amounts of β-SiC which produce more graphene-like carbon. When large amounts of CNFs are added graphene-like carbon and also huge entanglements of turbostratic carbon are formed widespread all over the SiOC-C material. These facts deeply influenced the observed properties. Small additions of CNFs (0.5-1%) produce an improvement of the thermal conductivity of 30 % and an enhancement of three orders of magnitude in the electrical conductivity (2.44x10⁻³ to 1.82 Sm⁻¹) mainly due to a great increase in both the crystallite size and structural order of SiC and also the presence of graphene-like carbon homogeneously dispersed within the SiOC matrix. Further additions of CNFs (10%) continue increasing both thermal and electrical conductivities (40% and 100 Sm⁻¹, respectively) but such increases are less effectively by the presence of entanglements of turbostratic carbon.

¹ Corresponding author. E-mail: sandra@icv.csic.es (M.Alejandra Mazo)

Download English Version:

<https://daneshyari.com/en/article/7847382>

Download Persian Version:

<https://daneshyari.com/article/7847382>

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