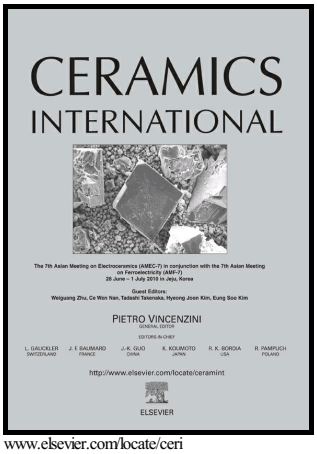
A facile and scalable coating technique of carbon fibers with carbon nanoparticles for surface adhesion enhancement of fibers and resin in 2D C/C composites

Abolhassan Najafi



www.elsevier.com/locate/ceri

PII: S0272-8842(17)31518-3
DOI: http://dx.doi.org/10.1016/j.ceramint.2017.07.087
Reference: CERI15807

To appear in: *Ceramics International*

Received date: 19 June 2017
Revised date: 11 July 2017
Accepted date: 11 July 2017

Cite this article as: Abolhassan Najafi, A facile and scalable coating technique o carbon fibers with carbon nanoparticles for surface adhesion enhancement o fibers and resin in 2D C/C composites, *Ceramics Internationa* http://dx.doi.org/10.1016/j.ceramint.2017.07.087

A facile and scalable coating technique of carbon fibers with carbon nanoparticles for surface adhesion enhancement of fibers and resin in 2D C/C composites

Abolhassan Najafi*

Department of Materials Science and Engineering,Saveh Branch,Islamic Azad University,Saveh,Iran

*Author for correspondence: Tel.: +982173912834; Fax: +982177240291. ab_najafi@iust.ac.ir

Abstract

In order to improve mechanical properties of 2D carbon-carbon composite via increasing fiber/matrix interfacial adhesion, we have developed a simple, low cost and scalable method for carbon fibers (CFs) coating. This method is inspired to ink printing process in which pigments/dyes are transferred and set on the different surfaces via proper chemical bindings. For this purpose, we have used colloidal suspension of carbon nanoparticles in printing ink solution and coated the surfaces through dip-coating procedure. The results of SEM observations showed that colloidal suspension of nano-carbon particles in ink solution could be successfully used as a coating solution for preparing a uniform, well distributed and defect-free coating. Also water wettability measurement test has been conducted in order to evaluate the carbon coating on the surface chemistry of carbon nanofibers. The results revealed significant improvement on wettability of CFs after coating owing to abundant hydrophilic groups introduced from ink solution onto the surface of CFs (approved by FTIR spectroscopy). Finally, the mechanical properties of 2D C/C composites prepared by as-received and nano-coated CFs have been evaluated. The result of mechanical properties showed remarkable improvement in both flexural and shear strength of final composite by 15% and 18%, respectively.

Keywords: Colloidal suspension, nano carbon, Composite, Resin, Coating

1. Introduction

Carbon fiber-reinforced carbon matrix (C/C) composites are primarily developed and designed for advanced and high-temperature structural applications owing to