Accepted Manuscript

Title: Effect of Growth Temperature on Carbon Nanotube Grafting Morphology and Mechanical Behavior of Carbon Fibers and Carbon/Carbon Composites

Author: Lei Feng, Ke-zhi Li, Jin-hua Lu, Le-hua Qi

PII: S1005-0302(16)30137-2
DOI: http://dx.doi.org/doi: 10.1016/j.jmst.2016.08.015
Reference: JMST 778

To appear in: *Journal of Materials Science & Technology*

Received date: 2-9-2015
Revised date: 26-10-2015
Accepted date: 31-10-2015

Please cite this article as: Lei Feng, Ke-zhi Li, Jin-hua Lu, Le-hua Qi, Effect of Growth Temperature on Carbon Nanotube Grafting Morphology and Mechanical Behavior of Carbon Fibers and Carbon/Carbon Composites, *Journal of Materials Science & Technology* (2016), http://dx.doi.org/doi: 10.1016/j.jmst.2016.08.015.

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.

ACCEPTED MANUSCRIPT

Effect of Growth Temperature on Carbon Nanotube Grafting Morphology and Mechanical Behavior of Carbon Fibers and Carbon/carbon Composites

Lei Feng[1], Ke-zhi Li[1],*, Jin-hua Lu[1], Le-hua Qi[2]

[1] *State Key Laboratory of Solidification Processing, Carbon/Carbon Composites Research Center, Northwestern Polytechnical University, Xi'an 710072, China*

[2] *School of Mechatronic Engineering, Northwestern Polytechnical University, Xi'an 710072, China*

[Received 2 September 2015; Received in revised form 26 October 2015; Accepted 31 October 2015]

* Corresponding authors Ph.D.; Tel./Fax: +86 29 8849 5764.

E-mail address: likezhi@nwpu.edu.cn (K.-Z. Li).

High-purity carbon nanotubes (CNTs) with different orientation and lengths were grafted on carbon fibers (CFs) in woven fabrics by using double injection chemical vapor deposition and adjusting the growth temperature. Scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Raman investigations reveal that the grafted CNTs change from being predominantly aligned and uniform in diameter to absolutely disordered and variable in diameter, whilst they show significantly increased crystallinity, as the growth temperature is increased from 730 °C to 870 °C. In tensile tests of fiber bundles, much more strength degradation of CFs was observed after the growth process at higher temperature than that at lower temperature. These hybrid preforms produced at different growth temperatures were used to reinforce carbon/carbon (C/C) composites. An increment of 34.4% in out-of-plane compressive strength (OCS) was obtained for the composites containing CNTs grown at 730 °C, while the OCS increment exhibits an obvious decrease with increasing the growth temperature. Compared with the higher growth temperature, the lower temperature contributes to the decrease in the strength loss of reinforcing fibers and meanwhile the growth of large extending length of CNTs, which can provide long reinforcement to the pyrocarbon matrix, and thus increase the compressive strength better.

Accepted Manuscript

Download English Version:

https://daneshyari.com/en/article/5451544

Download Persian Version:

https://daneshyari.com/article/5451544

Daneshyari.com