

Accepted Manuscript

The effect of agglomeration on the fracture toughness of CNTs-reinforced nano-composites

Afshin Zeinedini, Mahmood M. Shokrieh, Ali Ebrahimi

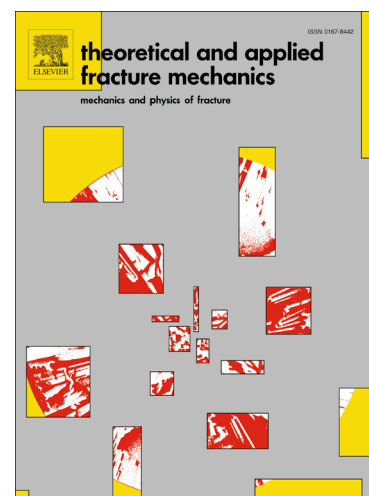
PII: S0167-8442(17)30534-7
DOI: <https://doi.org/10.1016/j.tafmec.2018.01.009>
Reference: TAFMEC 1986

To appear in: *Theoretical and Applied Fracture Mechanics*

Received Date: 19 November 2017
Revised Date: 10 January 2018
Accepted Date: 10 January 2018

Please cite this article as: A. Zeinedini, M.M. Shokrieh, A. Ebrahimi, The effect of agglomeration on the fracture toughness of CNTs-reinforced nanocomposites, *Theoretical and Applied Fracture Mechanics* (2018), doi: <https://doi.org/10.1016/j.tafmec.2018.01.009>

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.



The effect of agglomeration on the fracture toughness of CNTs-reinforced nanocomposites

Afshin Zeinedini, Mahmood M. Shokrieh*, Ali Ebrahimi

Composites Research Laboratory, Center of Excellence in Experimental Solid Mechanics and Dynamics, School of Mechanical Engineering, Iran University of Science and Technology, Tehran, 16846-13114, Iran

*Corresponding Author. Tel.: +98-21-77208127. Fax: +98-21-77491206.

E-mail address: Shokrieh@iust.ac.ir

Abstract

Carbon nanotubes (CNTs) may improve or degrade the fracture toughness of epoxy polymers. The improvement strongly depends on the density of isolated CNTs dispersed in the nanocomposites. On the other hand, the degradation is mainly related to the density of CNTs agglomeration. Hence, the main objective of this paper is to investigate the effect of CNTs agglomeration on the fracture toughness of CNTs/epoxy nanocomposites. First, a theoretical model was developed to predict the fracture toughness of nanocomposites reinforced with well-dispersed CNTs. Then, by introducing a semi-empirical factor, the model was used to predict the effect of CNTs agglomeration on the degradation of the fracture toughness of the nanocomposites. To validate the model, in addition to pure epoxy specimens, 0.1, 0.3, 0.5, 0.6 and 0.7 wt.% MWCNTs-reinforced epoxy samples were fabricated. The Young's modulus and fracture toughness of the samples were experimentally measured. It was observed that the predictions are in a very good agreement with the experimental results.

Keywords: Agglomeration; carbon nanotubes; epoxy; nanocomposites; theoretical model

Download English Version:

<https://daneshyari.com/en/article/7196193>

Download Persian Version:

<https://daneshyari.com/article/7196193>

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