Accepted Manuscript

Prediction of yield strength of MWCNT/PP nanocomposite considering the interphase and agglomeration

K.I. Tserpes, A. Chanteli, I.S. Floros

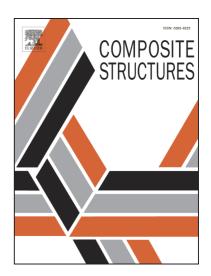
PII: S0263-8223(16)32872-0

DOI: http://dx.doi.org/10.1016/j.compstruct.2017.02.042

Reference: COST 8263

To appear in: Composite Structures

Received Date: 14 December 2016 Revised Date: 10 February 2017 Accepted Date: 10 February 2017



Please cite this article as: Tserpes, K.I., Chanteli, A., Floros, I.S., Prediction of yield strength of MWCNT/PP nanocomposite considering the interphase and agglomeration, *Composite Structures* (2017), doi: http://dx.doi.org/10.1016/j.compstruct.2017.02.042

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

Prediction of yield strength of MWCNT/PP nanocomposite considering the interphase and agglomeration

K.I. Tserpes*, A. Chanteli and I.S. Floros

Laboratory of Technology & Strength of Materials Department of Mechanical Engineering & Aeronautics University of Patras, Patras, 26500, Greece

Abstract

The yield strength of multi-walled carbon nanotube/polypropylene (MWCNT/PP) nanocomposite of 2 wt% is predicted using a two-scale continuum model. In the nano-scale, FE models of representative unit cells (RUCs) consisting of MWCNT agglomerates, the surrounding PP matrix and the interphase between them are developed using TexGen software and ANSYS Workbench. The geometries of the agglomerates were determined from processing and analysis of scanning electron microscopy images of the MWCNT/PP material. The characteristics of the interphase were determined from atomic force microscopy images and nanoindentation tests conducted on MWCNT/PP specimens. The FE models of the RUCs were solved using the LS-DYNA explicit FE code. The non-linear behavior of the PP material was modeled using an elastic-plastic material model for which input data were obtained from uniaxial tension tests. The simulated behavior of the RUCs was assigned to the elements of the FE model of a tension specimen which was used to predict the yield strength of the MWCNT/PP material. The model predictions show a high sensitivity of yield strength with the characteristics of the MWCNT/PP interphase.

Keywords: Carbon nanotubes, Nanocomposite, Multi-scale modeling, Yield strength, Finite element analysis

1

^{*} Corresponding author. Tel.+302610969498, Fax: +302610997190, Email: kit2005@mech.upatras.gr

Download English Version:

https://daneshyari.com/en/article/4912160

Download Persian Version:

https://daneshyari.com/article/4912160

Daneshyari.com