

Accepted Manuscript

Smart cord-rubber composites with integrated sensing capabilities by localised carbon nanotubes using a simple swelling and infusion method

Yinping Tao, Yi Liu, Han Zhang, Christopher A. Stevens, Emiliano Bilotti, Ton Peijs, James J.C. Busfield



PII: S0266-3538(18)31215-6

DOI: [10.1016/j.compscitech.2018.07.023](https://doi.org/10.1016/j.compscitech.2018.07.023)

Reference: CSTE 7309

To appear in: *Composites Science and Technology*

Received Date: 21 May 2018

Revised Date: 2 July 2018

Accepted Date: 13 July 2018

Please cite this article as: Tao Y, Liu Y, Zhang H, Stevens CA, Bilotti E, Peijs T, Busfield JJC, Smart cord-rubber composites with integrated sensing capabilities by localised carbon nanotubes using a simple swelling and infusion method, *Composites Science and Technology* (2018), doi: 10.1016/j.compscitech.2018.07.023.

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.

Smart cord-rubber composites with integrated sensing capabilities by localised carbon nanotubes using a simple swelling and infusion method

*Yinping Tao¹, Yi Liu¹, Han Zhang^{*1,2}, Christopher A. Stevens³, Emiliano Bilotti^{1,2}, Ton Peijs^{1,2}, James JC Busfield^{*1}*

¹ School of Engineering and Materials Science, and Materials Research Institute, Queen Mary University of London, Mile End Road, E1 4NS London, UK

² Nanoforce Technology Ltd., Joseph Priestley Building, Queen Mary University of London, Mile End Road, E1 4NS London, UK

³ NGF Europe Limited, Lea Green, St Helens, England, WA9 4PR

Abstract: Smart self-sensing composites with integrated damage detection capabilities are of particular interests in various applications ranging from aerospace and automotive structural components, to wearable electronics and healthcare devices. Here, we demonstrate a feasible strategy to introduce and localise conductive nanofillers into existing elastomeric coatings of reinforcing cords for interfacial damage detection in cord-rubber composites. A simple swelling and infusion method was developed to incorporate carbon nanotubes (CNTs) into the elastomeric adhesive coating of glass cords. Conductive CNT-infused glass cords with good self-sensing functions were achieved without affecting the bonding provided by the coating with rubber matrix. The effectiveness of using these smart cords as interfacial strain and damage sensors in cord-rubber composites was demonstrated under static and cyclic loading. It showed the possibility to identify both reversible deformation and irreversible interfacial damage. The simplicity of the proposed swelling and infusion methodology provides great potential for large-scale industrial production or modification of CNT functionalised elastomeric products such as cord-rubber composites.

**corresponding author. Tel.: +44 020 7882 8866 (J.JC Busfield); +44 020 7882 2726 (H Zhang)*

E-mail: j.busfield@qmul.ac.uk; han.zhang@qmul.ac.uk

Download English Version:

<https://daneshyari.com/en/article/7213922>

Download Persian Version:

<https://daneshyari.com/article/7213922>

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