

## Improved fire retardancy of thermoset composites modified with carbon nanofibers

Zhongfu Zhao *et al* 2009 *Sci. Technol. Adv. Mater.* **10** 015005 (6pp) doi: [10.1088/1468-6996/10/1/015005](https://doi.org/10.1088/1468-6996/10/1/015005) [Help](#)

[Full text](#) PDF (1.87 MB) | [References](#) | [Articles citing this article](#)

[Zhongfu Zhao](#)<sup>1</sup> and [Jan Gou](#)<sup>2</sup>

<sup>1</sup> State Key Laboratory of Fine Chemicals, Department of Polymer Science and Engineering, School of Chemical Engineering, Dalian University of Technology, 158 Zhongshan Road, Dalian 116012, People's Republic of China

<sup>2</sup> Department of Mechanical, Materials and Aerospace Engineering University of Central Florida, FL 32816, USA

E-mail: [zhongfuzhao@gmail.com](mailto:zhongfuzhao@gmail.com)

**Abstract.** Multifunctional thermoset composites were made from polyester resin, glass fiber mats and carbon nanofiber sheets (CNS). Their flaming behavior was investigated with cone calorimeter under well-controlled combustion conditions. The heat release rate was lowered by pre-planting carbon nanofiber sheets on the sample surface with the total fiber content of only 0.38 wt.%. Electron microscopy showed that carbon nanofiber sheet was partly burned and charred materials were formed on the combusting surface. Both the nanofibers and charred materials acted as an excellent insulator and/or mass transport barrier, improving the fire retardancy of the composite. This behavior agrees well with the general mechanism of fire retardancy in various nanoparticle-thermoplastic composites.

**Keywords:** flame retardance, carbon nanofiber, composites


Received 28 November 2008, accepted for publication 1 February 2009

Published 4 March 2009

[BOOKMARK](#)  [Post to CiteUlike](#) | [Post to Connotea](#) | [Post to Bibsonomy](#)

### Find related articles

By author



[jn IOP](#)

[jn CrossRef Search](#)

### Article options

[E-mail this abstract](#)

[Download citation](#)

[Add to Filing Cabinet](#)

[Create e-mail alerts](#)

[Recommend this journal](#)

### Authors & Referees

[Author services](#) **NEW**

[Submit an article](#)

[Track your article](#)


[Referee services](#)

[Submit referee report](#)

**physicsworld**  
Subscribe Now

[eprintweb.org](http://eprintweb.org) YOUR NEW ADDRESS FOR E-PRINTS

### CONTENT FINDER

Science and Technology of Advanced Materials 

[Full Search](#)

[Help](#)

Author:  Vol/Year:  Issue/Month:  Page/Article No:

[Journals Home](#) | [Journals List](#) | [EJs Extra](#) | [This Journal](#) | [Search](#) | [Authors](#) | [Referees](#) | [Librarians](#) | [User Options](#) | [Help](#) | [Recommend this journal](#)

Setup information is available for [Adobe Acrobat](#).

EndNote, ProCite® and Reference Manager® are registered trademarks of ISI Researchsoft.

Copyright © Institute of Physics and IOP Publishing Limited 2010.

Use of this service is subject to compliance with the [Terms and Conditions](#) of use. In particular, reselling and systematic downloading of files is prohibited.

Help: [Cookies](#) | [Data Protection](#) | [Privacy policy](#) | [Disclaimer](#)