

Accepted Manuscript

Enhancement of fracture toughness, mechanical and thermal properties of rubber/epoxy composites by incorporation of graphene nanoplatelets

Fuzhong Wang, Lawrence T. Drzal, Yan Qin, Zhixiong Huang

PII: S1359-835X(16)30077-X
DOI: <http://dx.doi.org/10.1016/j.compositesa.2016.04.009>
Reference: JCOMA 4270

To appear in: *Composites: Part A*

Received Date: 7 December 2015
Revised Date: 7 April 2016
Accepted Date: 8 April 2016

Please cite this article as: Wang, F., Drzal, L.T., Qin, Y., Huang, Z., Enhancement of fracture toughness, mechanical and thermal properties of rubber/epoxy composites by incorporation of graphene nanoplatelets, *Composites: Part A* (2016), doi: <http://dx.doi.org/10.1016/j.compositesa.2016.04.009>

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.



**Enhancement of fracture toughness, mechanical and thermal properties of rubber/epoxy composites by
incorporation of graphene nanoplatelets**

Fuzhong Wang ^a, Lawrence T. Drzal ^b, Yan Qin ^a, Zhixiong Huang ^a

^a *Key Laboratory of Advanced Technology for Specially Functional Materials, School of Material Science and Engineering, Wuhan University of Technology, Wuhan 430070, China*

^b *Department of Chemical Engineering and Materials Science, Composite Materials and Structures Center, Michigan State University, East Lansing, Michigan 48824-1226, USA*

Corresponding author:

1. Fuzhong Wang at School of Material Science and Engineering, Wuhan University of Technology, Wuhan 430070, China, Fullblownwang@hotmail.com, Tel. 086-13297916412.

Abstract

Carboxyl terminated butadiene acrylonitrile (CTBN) was added to epoxy resins to improve the fracture toughness, and then two different lateral dimensions of graphene nanoplatelets (GnPs), nominally <1 μm (GnP-C750) and 5 μm (GnP-5) in diameter, were individually incorporated into the CTBN/epoxy to fabricate multi-phase composites. The study showed that GnP-5 is more favorable for enhancing the properties of CTBN/epoxy. GnPs/CTBN/epoxy ternary composites with significant toughness and thermal conductivity enhancements combined with comparable stiffness to that of the neat resin were successfully achieved by incorporating 3 wt.% GnP-5 into 10 wt.% CTBN modified epoxy resins. According to the SEM investigations, GnP-5 debonding from the matrix is suppressed due to the presence of CTBN. Nevertheless, apart from rubber cavitation and matrix shear banding, additional active toughening mechanisms induced by GnP-5, such as crack deflection, layer breakage and separation/delamination of GnP-5 layers contributed to the enhanced fracture toughness of the hybrid composites.

Keywords: A. Polymer-matrix composites (PMCs); B. Fracture toughness; B. Mechanical properties; B. Thermal properties

Download English Version:

<https://daneshyari.com/en/article/7890649>

Download Persian Version:

<https://daneshyari.com/article/7890649>

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