

Accepted Manuscript

Improving the Transesterification and Electrical Conductivity of Vitrimers by Doping with Conductive Polymer Wrapped Carbon Nanotubes

Hong Zhang, Xuecheng Xu

PII: S1359-835X(17)30140-9

DOI: <http://dx.doi.org/10.1016/j.compositesa.2017.03.037>

Reference: JCOMA 4627

To appear in: *Composites: Part A*

Received Date: 19 October 2016

Revised Date: 30 March 2017

Accepted Date: 30 March 2017

Please cite this article as: Zhang, H., Xu, X., Improving the Transesterification and Electrical Conductivity of Vitrimers by Doping with Conductive Polymer Wrapped Carbon Nanotubes, *Composites: Part A* (2017), doi: <http://dx.doi.org/10.1016/j.compositesa.2017.03.037>

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.



Improving the Transesterification and Electrical Conductivity of Vitrimers by

Doping with Conductive Polymer Wrapped Carbon Nanotubes

Hong Zhang and Xuecheng Xu*

Department of Physics, East China Normal University, No. 500 Dong Chuan Road, 200241 Shanghai, China.

Corresponding author. E-mail: xcxu@phy.ecnu.edu.cn

Abstract

Vitrimers, thermosets with exchangeable covalent bonds, have recently attracted increasing attention in the field of functional polymer materials. However, their transesterification rates and electrical properties are inadequate for many practical applications. In this study, we showed that doping vitrimers with conductive polymer wrapped carbon nanotubes could effectively facilitate the transesterification for stress relaxation and endow vitrimers with enhanced electrical conductivity. The vitrimer network was formed by curing epoxy with citric acid, in the presence of polypyrrole wrapped carbon nanotubes (CNT/PPy) as dopant. The transesterification performance, evaluated by stress relaxation analysis, showed 3.6 times faster relaxation rate, reduced transesterification activation energy and 15 °C lower T_v , after doping with only 3 wt% of CNT/PPy. The improved transesterification in stress relaxation, benefited from the higher thermal conductivity of carbon nanotubes and the interfacial interaction between CNT/PPy and vitrimer matrix. In contrast, pure CNT as dopant results in little enhancement suffering from strong agglomeration in the matrix. Tensile fracture analysis suggested the major role of π - π and p - π conjugation in the doping enhancement. In addition, CNT/PPy doping improved the conductivity for several orders of magnitude. This work provides a promising method for lowering temperature of transesterification and fabricating vitrimers with improved performance and extended applications.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات