

Accepted Manuscript

Novel self-healing CFRP composites with high glass transition temperatures

Lisha Zhang, Xuanzhe Tian, Mohammad H. Malakooti, Henry A. Sodano

PII: S0266-3538(18)31222-3

DOI: [10.1016/j.compscitech.2018.09.008](https://doi.org/10.1016/j.compscitech.2018.09.008)

Reference: CSTE 7390

To appear in: *Composites Science and Technology*

Received Date: 21 May 2018

Revised Date: 10 September 2018

Accepted Date: 10 September 2018

Please cite this article as: Zhang L, Tian X, Malakooti MH, Sodano HA, Novel self-healing CFRP composites with high glass transition temperatures, *Composites Science and Technology* (2018), doi: [10.1016/j.compscitech.2018.09.008](https://doi.org/10.1016/j.compscitech.2018.09.008).

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.



Lisha Zhang ^a, Xuanzhe Tian ^b, Mohammad H. Malakooti ^b, Henry A. Sodano ^{a, b, c}

a. Department of Macromolecular Science and Engineering, University of Michigan, Ann Arbor, MI 48109, USA

b. Department of Aerospace Engineering, University of Michigan, Ann Arbor, MI 48109, USA

c. Department of Materials Science and Engineering, University of Michigan, Ann Arbor, MI 48109, USA

Email: hsodano@umich.edu

ABSTRACT

Carbon fiber reinforced polymer (CFRP) composites were fabricated using a novel intrinsically healable isocyanurate-oxazolidone (ISOX) thermosetting matrix. After multiple delamination events, repeatable strength recovery of the composites has been demonstrated with a first healing efficiency up to 85% after thermal treatment. The healing mechanism results from transformation of the isocyanurate with epoxide groups to yield new oxazolidone rings at the fracture surface. This novel ISOX polymer utilizes commercial diglycidyl ether of bisphenol F (DGEBF) and toluene diisocyanate to produce a high cross-link density thermoset with a glass transition temperature (T_g) up to 285°C, and 99.5% of the composite weight remains at 300°C. The strength and stiffness of the composites are comparable with an engineering grade polymer matrix composite typically used in aerospace applications and the thermal stability places the materials in the polybismaleimide performance region although with greater toughness. This polymer exhibits the highest T_g of any

Download English Version:

<https://daneshyari.com/en/article/10152785>

Download Persian Version:

<https://daneshyari.com/article/10152785>

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