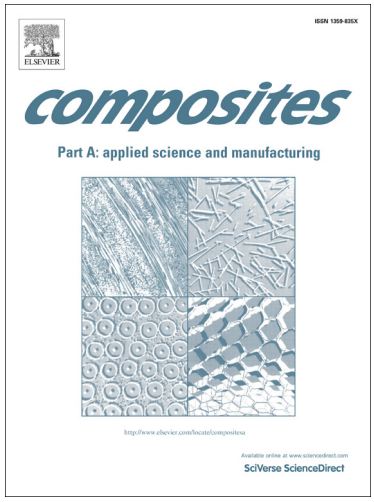

Self-repair of structural and functional composites with intrinsically self-healing polymer matrices: A review

Nan Zhong, Wouter Post

PII: S1359-835X(14)00379-0
DOI: http://dx.doi.org/10.1016/j.compositesa.2014.11.028
Reference: JCOMA 3795

To appear in: *Composites: Part A*

Received Date: 13 March 2014
Revised Date: 10 September 2014
Accepted Date: 26 November 2014

Please cite this article as: Zhong, N., Post, W., Self-repair of structural and functional composites with intrinsically self-healing polymer matrices: A review, *Composites: Part A* (2014), doi: http://dx.doi.org/10.1016/j.compositesa.2014.11.028

Self-repair of structural and functional composites with intrinsically self-healing polymer matrices: A review

Nan Zhong[1,*], Wouter Post[1]

1. Novel Aerospace Materials, Faculty of Aerospace Engineering, Delft University of Technology, Kluyverweg 1, 2629 HS, Delft, The Netherlands

*Corresponding author. Tel.: +31152788621; Fax: +31152784472. E-mail address: n.zhong@tudelft.nl

Abstract

Self-healing is a smart and promising way to make materials more reliable and longer lasting. In the case of structural or functional composites based on a polymer matrix, very often mechanical damage in the polymer matrix or debonding at the matrix-filler interface is responsible for the decrease in intended properties. This review describes the healing behavior in structural and functional polymer composites with a so-called intrinsically self-healing polymer as the continuous matrix. A clear similarity in the healing of structural and functional properties is demonstrated which can ultimately lead to the design of polymer composites that autonomously restore multiple properties using the same self-healing mechanism.

Keywords: B. Mechanical properties; B. Electrical properties; B. Thermal properties; Self-healing.

1. Introduction

Over the last decades the amount of studies reporting on polymer composite functionality and mechanical properties has grown significantly. Polymer composites showing for example thermal and electrical properties can be found in daily life in communication, lightning and aerospace applications [1, 2]. Although the field of multifunctional polymer composites is increasing rapidly, researchers are far away from reaching the diversity in functionalities that nature has established in its composites over the past millions of years. Wood is one of nature's finest examples of a multifunctional fibrous composite material. This well-known material consists of parallel hollow tubular cells reinforced by spirally wound cellulosic fibrils embedded in a hemicellulose and lignin matrix. The helix angle of the spiral fibrils is responsible