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Polybenzoxazine Precursors As Self-Healing Agents for Polysulfones

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MACROMOLECULES

Volume: 46 Issue: 22 Pages: 8773-8778

DOI: 10.1021/ma4019153

Published: NOV 26 2013

[View Journal Impact](#)

Abstract

In this work, a novel self-healing system based on the use of polybenzoxazine precursor (PBP) as a healing additive is presented. PBP (M-n = 2300 g/mol, M-w/M-n = 2.6) is facilely synthesized in a reasonable yield by Mannich type polycondensation of bisphenol A, 1,6-diaminohexane with paraformaldehyde. The additive PBP faintly undergoes a thermal ring-opening reaction when contained in polysulfone (PSU) films. Thermal treatment at 160 degrees C enables PBP to chemically bind to PSU chains and form networks through the Friedel Crafts reaction, demonstrating a novel self-healing behavior. The extent of the recovery was studied using a stress elongation (%) test and found to be 55%. Thermal properties of the polybenzoxazine precursor and the healed sample were investigated.

Keywords

KeyWords Plus: RING-OPENING POLYMERIZATION; HIGH-PERFORMANCE THERMOSET; MAIN-CHAIN; BENZOXAZINE MOIETIES; SULFONATED POLYSULFONE; PHENOLIC RESIN; POLYMERS; 1,3-BENZOXAZINES; PREPOLYMERS; COMPOSITE

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Funding

| Funding Agency | Grant Number |
|---|--------------|
| Istanbul Technical University Research Fund | |
| FABED (Fevzi Akkaya Scientific Activity Support Fund) | |

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Publisher

AMER CHEMICAL SOC, 1155 16TH ST, NW, WASHINGTON, DC 20036 USA

Categories / Classification

Research Areas: Polymer Science

Web of Science Categories: Polymer Science

Document Information

Document Type: Article

Language: English

Accession Number: WOS:000327752900002

ISSN: 0024-9297

eISSN: 1520-5835

Other Information

IDS Number: 262QO

Cited References in Web of Science Core Collection: [49](#)

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