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Author: Xander K.D. Hillewaere Filip E. Du Prez

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Fifteen Chemistries for Autonomous External Self-Healing Polymers and Composites

Xander K. D. Hillewaere and Filip E. Du Prez*

Polymer Chemistry Research Group, Department of Organic and Macromolecular Chemistry, Ghent University, Krijgslaan 281 S4, B-9000 Gent, Belgium and SIM vzw, Technologiepark 935, B-9052 Zwijnaarde, Belgium. E-mail: filip.duprez@ugent.be

Abstract

This review aims at guiding both new and established researchers in the field of self-healing by providing a clear overview of the fifteen most important chemistries used in autonomous external self-healing systems until today, together with their healing potential for different matrix materials and types of mechanical damage. The described self-healing systems require no manual intervention or additional stimulus for the self-healing event to take place (autonomous) and utilize added healing agents to repair the damage (external). A range of recent developments is discussed with indication of their strengths and weaknesses. An attempt is also made to demonstrate the research opportunities that are still available for each described system and to find the areas that require further elaboration. As such, this review can help to point the reader in the directions these self-healing materials could follow in the future.

Keywords: self-healing polymers, self-repair, autonomous healing, polymer composites