Commodity Self-Healing Copolymers (2018-027)

Self-healing material made with commodity copolymersthat reduce maintenance costs

Market Overview

This material made with specific ratios of commodity copolymers can autonomously self-heal, reducing time and money spent on repairs and creating opportunities for substances like self-healing paints and plastics. In 2025 the global self-healing material market is projected to be worth USD 4.1 billion, a 26.4% growth from 2017. The growth of the market is expected to escalate due to the unique properties of the products yielding long-term financial benefits as compared to conventional composites. Preexisting self-healing materials rely on methods such as encapsulated fluids that burst open and fill damaged areas, nanomaterials that respond to electric or electromagnetic fields, or incorporating living organisms into the design. Clemson University researchers have developed self-healing materials that are made with specific molar ratios of commonly available copolymers that can heal without any aid. These copolymers are more cost efficient, while having the added benefit of being more environmentally friendly.

Technical Summary

Commodity copolymers, such as methyl methacrylate/n-butyl acrylate (pMMA/nBA), in certain ratios can self-heal. This form of self-healing property processes without human intervention, reducing maintenance costs. Self-healing materials without human intervention can benefit many fields, from construction to aerospace industries, as products within the fields rely on components made with copolymers. Copolymers like pMMA/nBA rely only on van der Waal forces to self-heal and are simpler alternatives to preexisting materials that repair with more complex methods. These copolymers are commonly known, and accessible and their self-healing capabilities are fully autonomous.

Application

Plastics production; paint and other coatings

Development Stage

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Advantages

- Commodity copolymers self-heal using van der Waal forces, reducing the cost of self-healing materials
- Van der Waals forces enable materials to self-heal without outsie influence, eliminating the need for human time investment
- The copolymers can self-heal multiple times, increasing the longevity of the material

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Provisional	United States	62/702,410	N/A	2018-27	Marek W. Urban

About the Inventors

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Dr. Marek W. Urban is the Sirrine Foundation Endowed Chair and Professor at the Department of Materials Science and Engineering at Clemson University. He received his Ph.D. from Michigan Technological University in 1984. Since then he has as the director of the Industry/University Cooperative Research and Materials Research Science and Engineering Centers funded by the National Science Foundation. In addition he has served as department chair at North Dakota State University and the University of Southern Mississippi. Having published over 300 research papers and the author of three books and creator of several patents, he has received multiple awards and featured by a multitude of media. His research interests include polymer design, self-healing polymers, and stimuli-responsive materials.

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