CO2 BASED SELF CATALYZED DYNAMIC BOND FOR EPOXY COVALENT ADAPTABLE NETWORK

Reference: EPOXY-PHU

This invention introduces a new class of dynamic system that enables the recycling, reshaping, and re-use of epoxy-based resins.

TYPE OF DEVELOPMENT

Polymer foams

DESCRIPTION

Epoxides, widely used in adhesives, coatings, and composite matrices for industries like electronics, construction, and aeronautics, present significant end-of-life challenges. Once cured, these materials are non reusable, non-recyclable, and typically end up in landfills or incinerators. This also limits composite manufacturing processes, as uncured epoxy composites need cold storage to prevent premature reactions. While covalent adaptive networks (CANs) offer reprocessability by incorporating dynamic bonds, they often require toxic, expensive catalysts, are challenging to scale, and rarely use renewable sources, limiting their applicability. under mild conditions, allowing fiber recovery for reuse in applications like transportation, electronics, and sports equipment, where demand for recyclable thermosets is rising.

This system uses a CO_2-based linkage with an epoxy network, resulting in an efficient, safe, and potentially bio-based structure that reprocesses without external catalysts, producing recyclable composites with improved fire resistance and minimal modification to existing systems.

INDICATION

Automotive & Aeronotics
- Naval
- Electronics
- Sports & Leisure
- Construction
- Energy

NOVELTY/ADVANTAGE

- Low-toxicity, cost-effective monomer suitable for large-scale applications
- Self-catalyzed dynamic epoxy network
- Use of CO_2-derived cyclic carbonates
- Compatibility with existing epoxyamine systems
- Catalyst-free transcarbamoylation technology

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COOPERATION GOAL

Exclusive, non-exclusive licences and research collaborations.