Dynamic polymers based on siloxane exchange

Tech ID: 29162 / UC Case 2017-986-0

BRIEF DESCRIPTION

Researchers at UCI have developed a novel method for generating malleable, recyclable polymers which have higher thermal stability than those previously reported..

SUGGESTED USES

·For introduction into thermosets and other polymers suffering from low malleability and reusability

FEATURES/BENEFITS

·Stable: Due to the strength of both thermoset and siloxane linkages, the proposed vitrimers are highly mechanically and thermally stable.

·Reusable: By simple melt-pressing methods, these vitrimers are easily reshaped and reused.

·Simple: Inserting siloxane into thermosets is significantly easier than other common plastics additions.

·Tunable: The flexibility of the final vitrimer is easily and dynamically controlled.

TECHNOLOGY DESCRIPTION

Thermosets are a family of plastics characterized by their strength, chemical inertness, and high thermal stability. As such, they have found use in products ranging from electronics to mattresses and automobiles. Thermosets are formed by heating viscous prepolymers – the high temperatures cause the polymers to irreversibly cross-link, solidifying into insoluble, impenetrable networks. Though these cross-linked networks afford thermosets their great mechanical durability, it also prevents them from being recycled or remolded into new shapes. Efforts to combat this typically involve introducing other, more flexible polymers into the thermoset linkages to form what are called “vitrimers”. Unfortunately, the increased flexibility displayed in vitrimers often comes at the cost of drastically reduced thermal stability.

Recently, researchers at UCI have circumvented these thermal shortcomings through use of siloxane. In addition to being inexpensive, siloxane is easily inserted into the thermoset linkages, creating a new class of vitrimer that has high flexibility while retaining its mechanical and thermal stability. Such siloxane thermosets are also reusable, to the extent that fractured vitrimers can be successfully reworked into new shapes via simple melt pressing procedures.

STATE OF DEVELOPMENT

Experimental stage.

PATENT STATUS

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OTHER INFORMATION

CATEGORIZED AS

» **Materials & Chemicals**
» Composites
» Polymers
» **Engineering**
» Other

RELATED CASES

2017-986-0

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,208,534	12/28/2021	2017-986

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Dendritic Peptide Bolaamphiphiles for siRNA Delivery
- Biodegradable Polymeric Vectors For Delivery Of Various RNAs
- Electrically Fueled Active Supramolecular Materials

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