



Photoluminescent Mechanoresponsive Polymers

Applications

- Stress sensing coating used on hard structures such as bridges, car and aircraft frames
- Mechanical probe to monitor applied mechanical stress in soft materials.

Problem & Solution

Mechanoresponsive polymers are a class of “smart” materials that demonstrate specific property changes induced by mechanical stimuli. The design of mechanoresponsive polymers capable of self-reporting mechanical stress is of high importance not only for preventing the materials’ failure, but also for the better understanding of polymer response to mechanical force. However, the majority of commonly used mechanophores (stress or strain activated molecular units of mechanoresponsive polymers) are based on organic molecules with an irreversible response, or a slow recovery. This hinders the development of a mechanical stress probe that can visualize subtle stress changes repeatably.

This invention overcomes the above problems by providing a photoluminescent copper-containing compound used as a cross-linker in elastomeric polymers to provide a material that shows response to mechanical stress. Methods are provided to prepare a material which changes photoluminescence intensity in response to mechanical stress, measurable by spectroscopic methods or by direct imaging. Using the aforementioned copper-containing cross-linkers, reversible, repeatable and fast response to mechanical stimulus is achieved.

Benefits

- Reversible
- Repeatable
- Fast
- Sensitive

Patent Pending

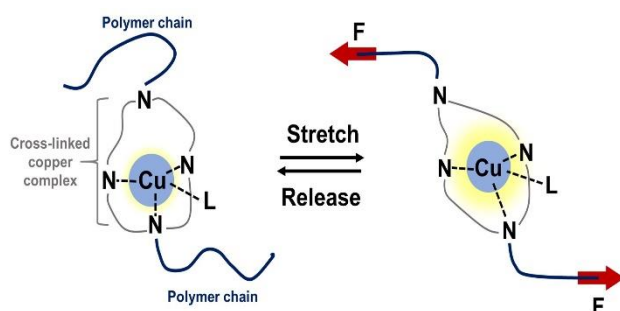
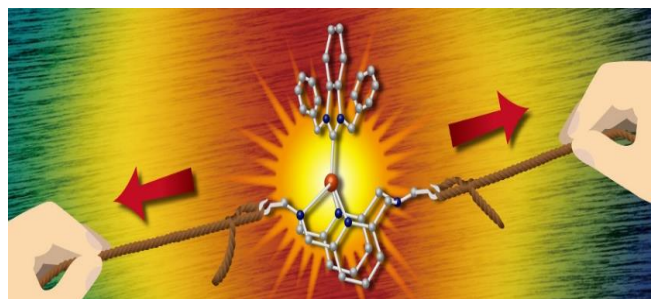
Keywords

Mechanophore, mechanoresponsive, stress probe, aircraft, automotive, bridge, photoluminescence, polymer, cross-linker

For more information

Business Development/Technology Licensing Section

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Schematic of mechanoresponsive polymer