Tough, Self-Healing Silicone Materials
Tech ID: 10236 / UC Case 2001-409-0

BRIEF DESCRIPTION

Novel silicone materials that further extend the range of beneficial properties that are controllable. In particular, the novel UC method of Vulcanizing/curing silicones introduces cross-linking agents that efficiently disperse fracture energy in response to stress and that are capable of self-healing after yielding to rupture or deformation.

BACKGROUND

Siloxane- and organosiloxane-based materials (collectively termed "silicones") are ubiquitous in commercially available goods and high technology applications, often in the form of oils, rubbers, resins, and hard solids. Their general usefulness is due to their broad and tunable range of beneficial properties, such as their low dielectric constant, high thermomechanical stability, high biocompatibility, high optical transparency, and controllable hardness, porosity, and hydrophilicity. Moreover, silicones can be synthesized via low temperature processes that allow facile incorporation of organic components and molecular additives.

DESCRIPTION

University of California researchers have developed novel silicone materials that further extend the range of beneficial properties that are controllable. In particular, the novel UC method of vulcanizing/curing silicones introduces cross-linking agents that efficiently disperse fracture energy in response to stress and that are capable of self-healing after yielding to rupture or deformation. Cross-links in the UC silicones will reform after being broken by thermal or mechanical forces, but still provide excellent tear-resistance. Another interesting property of the UC silicones, in contrast to existing silicone materials, is that they can be processed into new shapes even after being cured. Because of these unique properties, UC silicones will likely offer improved performance and longevity for many new and existing silicone applications. Such applications might include advanced marine or biomedical adhesives, lightweight armors, protective, and/or decorative coatings, thermal insulators, optical and electronic components, satellites, and biomedical devices. Another important potential application of UC silicones involves physically or chemically responsive matrices for supporting other organic or inorganic components via dissolution, encapsulation, and/or covalent tethering.

PATENT STATUS

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<td>United States Of America</td>
<td>Issued Patent</td>
<td>6,783,709</td>
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ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Low-Cost Method For Fabrication Of Nanostructured Materials
- Hybrid Supercapacitor and Battery System
- Nanoparticle Assembled Hollow Spheres
- Hemostatic and Wound Healing Compositions
- Polymer Shutter For Infrared Detection Systems
- Hierarchically Ordered Porous Oxides
- Hemostatic Compositions And Methods Of Use
- Inorganic Coploymer-Dye Composites and Dye-Doped Mesoporous Materials
Oxides for Wound Healing and Body Repair

Bio-Inspired Hydraulic Actuator for Improved Structural Control

Precise Neural Circuit Probe with Reversible Functionality

Thermally and Chemically-Stable Core-Shell Silver Nanowires with SnOx Coating

Supercapacitors for Rechargeable Batteries with Longer Lifetimes (2012-657)

Mesocellular Oxide Foams as Hemostatic Compositions and Methods of Use