

Self-Healing Polycarbonate Containing Polyurethane Nanotube Composite

Researchers at the University of South Florida have developed an autonomous, intrinsic, and reversible self-healing polymer that requires no intervention to induce self-healing.

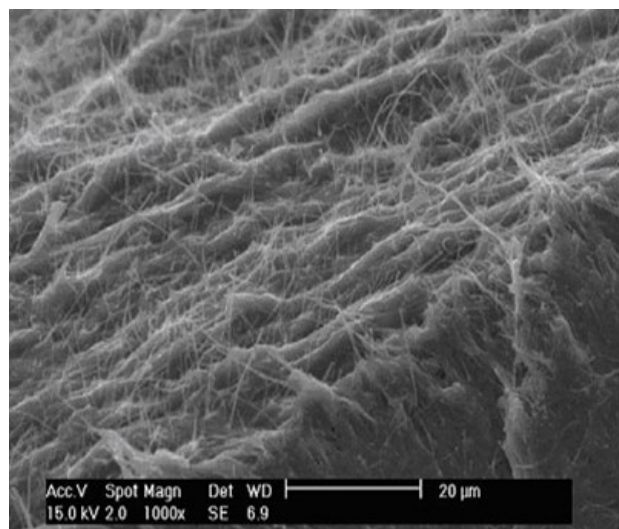
Elastomers are widely utilized because of their ability to recover shape and dimension after being subjected to deformation forces (stress). The cycle of stress and recovery can normally be repeated; however, all elastomers suffer from mechanical degradation over time which usually results in failure of the structural integrity of the material. Similarly, shape memory polymers are now used in a wide variety of applications, including wrinkle free clothing, robotics, and in the medical field. Shape memory polymers usually exist in one of two states: the native state, and a different shape that is induced by some sort of additional stimulus (e.g., heat, light, electromagnetic radiation etc.). What is needed is an autonomous, intrinsic, and reversible self healing polymer that requires no intervention to induce self healing, that requires no sequestered healing agents to be added to the matrix, and is capable of multiple healing events.

USF researchers have invented an autonomous self-healing polycarbonate-containing polyurethane (PCU) nanotube composite that has exceptional mechanical properties and shape memory. Once structural failure occurs (break or rupture) it is repaired by simply bringing surfaces of freshly broken segments in contact with one another. The composite is also intrinsic, meaning no sequestered healing agents are added to the matrix. Moreover, the healing is reversible, meaning the composites and neat polymer are capable of multiple healing events. This material can be used anywhere soft polyurethanes are appropriate.

ADVANTAGES:

- Requires no sequestered healing agents
- Capable of multiple healing events
- Retains 66% original mechanical strength upon polymer self-healing

Autonomous, Intrinsic, and Reversible Self-Healing Polymer that Requires no Intervention to Induce Healing



Magnified Look at Carbon Nanotubes Inserted Within Polymer Matrix

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