



Materials and Coatings

# Mechanoresponsive Healing Polymers

Polymer strands utilizing mechanically responsive  
chemical groups to induce self-healing

NASA Langley Research Center is developing an innovative self-healing resin that automatically reacts to mechanical stimuli. Current structural materials are not self-healing, making it necessary to depend on complicated and potentially destructive repair methods and long down times. Unlike other proposed self-healing materials that use microencapsulated healing agents, this technology utilizes viscoelastic properties from inherent structure properties. The resulting technology is a self-healing material with rapid rates of healing and a wide range of use temperatures.

## BENEFITS

- Healing capability at elevated temperatures
- Fast healing rates (less than 100 microseconds)
- Healing without the need of foreign inserts or fillers (via structural chemistry)

technology solution



# NASA Technology Transfer Program

Bringing NASA Technology Down to Earth

## THE TECHNOLOGY

The method chemically introduces mechanically sensitive chemical groups into the structure of a resin. By introducing mechanoresponsive functional groups to a polymer, it is possible to induce self-healing through the transformation of such chemical groups to where mechanical properties of a structure are almost completely restored. The forces imparted by a damage event can therefore be used to enable healing or repair of the structure.

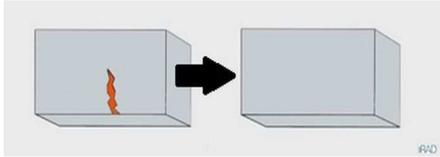


Illustration of mechanoresponsive healing response within fractions of seconds after a damage event.

## APPLICATIONS

The technology has several potential applications:

- Aircraft
- Rotocraft
- Spacecraft

## PUBLICATIONS

Patent Pending

National Aeronautics and Space Administration

### The Technology Gateway

### Langley Research Center

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