Composite Materials & Manufacturing

Composites Manufacturing and Repair

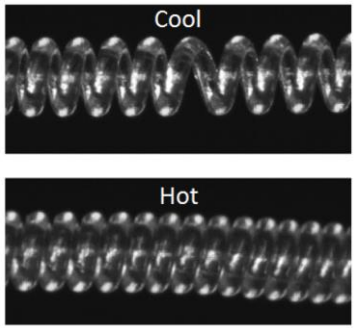
- **Composite Specimen Fabrication**
- **Development of Self-Healing Composite Materials**
  - **Use of shape-memory polymers**
  - **Use of thermoplastic particles**

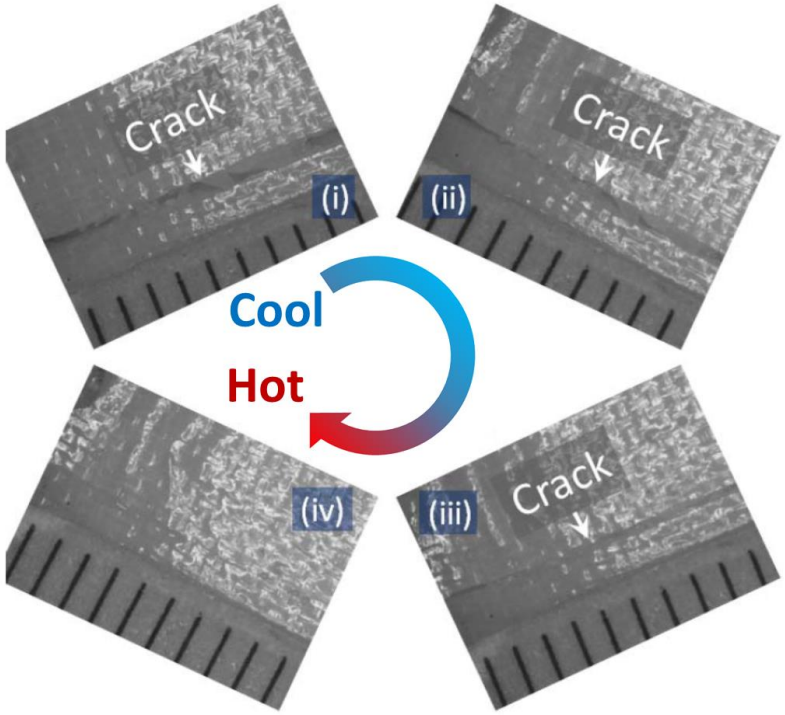
NASA EPSCoR

Guoqiang Li's Group

Crack closed through thermal activation of shape memory polymer elements

A shape-memory element





"Healing" effected by the melting of thermoplastic particles in the polymer matrix, and solidification after cooldown

LSU College of Engineering
Department of Mechanical & Industrial Engineering

Composites – Thermoset and Thermoplastic

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Assistant Professor (August 2017 –)

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Research expertise and interests:

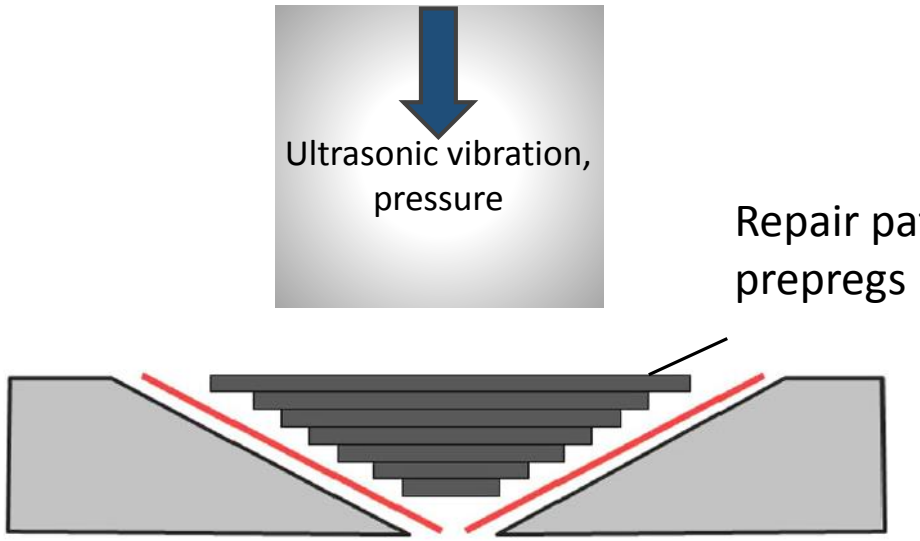
- Composite materials (thermoset & thermoplastic matrices)
  - Manufacturing (sustainability)
  - Rivetless assembly (welding, dissimilar materials, structural health monitoring)
  - Characterization (chemo-physical, mechanical, non-destructive, etc)
  - Process simulations
  - Additive manufacturing (fiber-reinforced thermoplastics)

Example: *CleanSky Eco-Design* – Thermoplastic composite airframe panel, The Netherlands

Refs: Palardy et al, SAMPE Baltimore, 2015 and ASC, Williamsburg, 2016.

Ultrasonic-Assisted Repair and Bonding of Thermoset Composites

LA Board of Regents – NASA EPSCoR RAP (2018 – 2019)



Material characterization	• Viscosity, μ • Cure kinetics, dα/dt, α • Loss modulus, E”
Process parameters	• Pressure • Duration • Temperature
Specimen characterization	• Quality (porosity) • Degree of cure • Tensile strength

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