Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M18-092P^
Published: 2/26/2020

Inventors

Ryan Gunckel
Lenore Dai
Aditi Chattopadhyay
Bonsung Koo

Contact

Shen Yan
shen.yan@skysonginnovations.com

Stress-Responsive Inorganic Material Reinforced Composites Via Functionalizing the Inorganic Materials

Stress-Responsive Inorganic Material Reinforced Composites Via Functionalizing the Inorganic Materials

Background

Reducing catastrophic structural failures using early damage detection methods is crucial in many industries. One method of achieving this goal is through mechanochemistry. Mechanochemistry is the study of stress-responsive molecular units that sense force changes in their local environment to allow for determination of the stress, strain, or damage applied. Certain mechanophores emit light when undergoing stress, thus illuminating instances of structural decay. While stress responsive units have been added to 3D matrices before, there is a need for photoactive mechanophores which can be applied to the surface of a structure

Invention Description

Researchers at ASU have developed a stress-responsive material which can detect mechanical failure. This material can be applied as a coating to the surface of a structure. This material is suited towards detecting delamination of the underlying structure as well as other mechanical failures. Excitingly, the researchers have shown that the intensity of the emitted light is proportional to the strain applied on the material. Identifying damage prior to catastrophic failure and eliminating the need for self-monitoring sensors this technology will reduce costs and improve safety.

Potential Applications

- Damage detection in pipeline structures
- Damage detection in laminates
- Damage detection in wind turbines

Benefits and Advantages

- Florescent Early Damage Detection – damage detection occurred immediately after the yield point
- Self-Sensing – a chemical reaction caused during stress or strain is induced revealing damage detection under florescent lighting
- Lowers Cost – eliminates the need for self-monitoring means such as crack

sensors

Original Document

Professor Chattopadhyay's Website