THE FUTURE OF AUTONOMIC MATERIALS SYSTEMS

Scott White

Willett Professor of Engineering
Department of Aerospace Engineering & Beckman Institute
University of Illinois at Urbana-Champaign

Autonomic materials systems are inspired by biological systems in which an external triggers produce an autonomic functional response. As an example, structural polymers and polymer matrix composites have been recently developed that possess the ability to self-heal [1]. Self-healing is accomplished via microencapsulated healing agents embedded within a polymer matrix. Damage triggers the release of the healing agent and subsequent polymerization and repair. One promising healing chemistry based on the ring-opening-metathesis-polymerization (ROMP) of dicyclopentadiene and Grubbs’ catalyst has yielded static fracture recovery in excess of 90% [2] and greatly extended fatigue life [3]. Beyond this version of self-healing, autonomic materials systems may one day provide self-sensing, thermal stasis, regrowth, and other biologically-inspired functions.

REFERENCES