WINNER

EENTRY PS19-0068
Properties of Epoxy Matrix Materials after Chemical Recycling of Carbon Fiber Prepreg

Recycling of thermosetting materials is a major challenge currently facing the composites industry. Although significant research has been published surrounding the reclamation of carbon fibers from expired prepreg and end-of-life composites, little work has assessed the impact of chemical recycling on the matrix materials. This research sought to examine the impacts of chemical recycling on epoxy prepreg scrap. Thermal, mechanical, rheological, and surface properties of the recycled matrix were studied.

Western Washington University – Dr. John Misasi, PhD; Cecile Grubb; Derek Ciampi

FIRST RUNNER UP

ENTRY PS19-0067
Controlling Graphene Nanoplatelet Dispersions through Cure of High-Performance Thermoset Matrices

Rapid and scalable solvent-free and surfactant-free nanoparticle dispersion in high Tg thermoset matrices utilizing the high shear continuous reactor processing. Rheokinetics of viscosity throughout gelation, and characterization of dispersion along multiple length scales, including optical microscopy, SEM/TEM, rheokinetics from b-staged nanocomposites to gelled networks, and SAXS/WAXS measurements to determine platelet thickness and d-spacing of GNPs.

University of Southern Mississippi – Matthew C. Hartline; Hayden A. Hanna; David E. Garcia; Jeffrey S. Wiggins

SECOND RUNNER UP

ENTRY PS19-0057
In Situe Sensing of Damage Progression in Composites Using Glass Fibers with Electrophoretically Deposited Nanotubes

Carbon nanotubes (CNTs) were deposited onto glass fibers using a novel scalable electrophoretic deposition method. Four plies of CNT coated glass fibers are used to make cross-ply [0/90]s specimens, which were tested under tension while monitoring resistance. Due to the transverse cracks in the 90Â° plies, the conductive network was disrupted, increasing the resistance. The resistance response correlated with the measured crack density and acoustic emission hits. The initiation and growth of transverse cracks can be monitored without significantly compromising the mechanical properties of the glass fiber composites. Applications of this work includes in our failing infrastructure.

University of Delaware – Colleen M. Murray; Sagar M. Doshi; Erik T. Thostenson

THIRD RUNNER UP

ENTRY PS19-0073
Effects of Carbon Nanotubes Geometries on Flexural Properties and Shear Strength of Laminated Polymeric Nanocomposites

Laminated composite materials generally fail because of delamination that is due to poor interlaminar strength or out-of-plane strength, which is mainly associated with the lack of reinforcement in transverse or thickness direction. In addition, most composite assemblies and structures generally fail due to the poor performance of their bonded joints that are assembled together with an adhesive layer (due to the lack of reinforcement within the adhesive layer in transverse direction). Based on our prior studies, carbon nanotubes with straight and helical geometries were used as nanoscale reinforcements to address these problems.

Wichita State University – Dr. Davood Askari; Ramanan Sritharan; Nicholas Reyes