conferenceseries.com

Jennifer Lynch-Branzoi, J Nanomed Nanotechnol 2017, 8:7 (Suppl)
DOI: 10.4172/2157-7439-C1-061

19th International Conference on

NANOTECHNOLOGY AND EXPO

November 13-14, 2017 | Atlanta, USA

Modulus enhancement of polymer nanocomposites reinforced with graphene nanoflakes

Jennifer Lynch-Branzoi
Rutgers University, USA

Graphene-polymer matrix composites (G-PMCs) are promising structural materials due to the exceptional properties of graphene. Single-layer graphene has a Young's modulus of 1 TPa and intrinsic strength of 130 GPa. To harness these properties, graphene must be incorporated, uniformly distributed and well-bonded with the surrounding polymer matrix. However, graphite conversion to graphene is costly due to multiple steps required that typically involve toxic chemicals, low yields and potential re-stacking and currently, there is not a scalable method that produces large quantities of defect-free graphene. Here, we demonstrate a general approach to produce G-PMCs using *in situ* shear exfoliation of graphite particles to create graphene nanoflakes directly within molten thermoplastic polymer, which provides strong graphene-matrix bonding, possibility for high graphene concentrations and reduced materials costs. Modulus enhancement of 300–500% occurs for the nanocomposite due to graphite exfoliation, depending on the polymer matrix chemistry. This approach enables fabrication of a new class of lightweight, high performance PMCs with tunable, multifunctional properties; simple, versatile manufacturing; and low materials costs for military, aerospace, automotive and infrastructure applications.

Biography

Jennifer Lynch-Branzoi has completed her PhD and Postdoctoral studies from Rutgers University. She is Research Faculty in the Materials Science and Engineering Department at Rutgers University. She holds 13 US patents and several patent applications and she has published 24 journal articles and conference proceedings. She has served as Guest Editor for a special issue in Materials Science and Engineering Part B, titled graphene-polymer matrix composites. Her research interests include: graphene-reinforced thermoplastic polymer matrix composites; advanced materials development for structural and functional applications; structure-processing-property-performance relations in polymer composites and nanocomposites and computational materials science, regarding long-term properties of polymer composites.

jklynch@soe.rutgers.edu

Notes: