

Accepted Manuscript

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PII: S0266-3538(17)32183-8

DOI: [10.1016/j.compscitech.2018.02.011](https://doi.org/10.1016/j.compscitech.2018.02.011)

Reference: CSTE 7087

To appear in: *Composites Science and Technology*

Received Date: 2 September 2017

Revised Date: 30 January 2018

Accepted Date: 9 February 2018

Please cite this article as: Gair Jr. JL, Lambeth RH, Cole DP, Lidston DL, Stein IY, Kalfon-Cohen E, Hsieh AJ, Bruck HA, Bundy ML, Wardle BL, Strong process-structure interaction in stoveable Poly(Urethane-Urea) aligned carbon nanotube nanocomposites, *Composites Science and Technology* (2018), doi: 10.1016/j.compscitech.2018.02.011.

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Strong Process-Structure Interaction in Stoveable Poly(Urethane-Urea) Aligned Carbon Nanotube Nanocomposites

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Abstract

The exceptional static and dynamic physical properties of poly(urethane-urea) (PUU) elastomers make them prime candidates for impulsive loading structural applications, such as blast protection coatings. Since the theoretical physical properties of carbon nanotubes (CNTs) are among the best for any currently known material, a number of previous studies explored the use of CNTs as nanoscale fillers to enhance the properties of PUU nanocomposites. However, due to the challenges inherent in dispersing CNTs in a PUU matrix and the resulting random orientation of the CNTs, these previous works observed marginal improvements in physical properties, and were unable to establish clear structure-property relations. Here, we report the synthesis of aligned-CNT (A-CNT) reinforced PUU polymer nanocomposites (A-PNCs) by infusing A-CNT forests with a stoveable PUU, and establish process-structure-property relations

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