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Tunable Mechanical Properties of Multiwalled Carbon Nanotubes/Thermoplastic Polyurethane Nanocomposites

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The mechanical properties of polymer nanocomposites have been widely studied; however, very few studies have been focused on hydrogel-aerogel-based polymer nanocomposites. Polymer nanocomposites can provide tunable mechanical properties with the addition of nanotubes that are essential for advanced smart nanomaterial industrial applications. In this work, we have used aerogels of individually dispersed multiwall carbon nanotubes (MWCNTs-Baytubes) and thermoplastic polyurethane (TPU) to study tunable mechanical properties. Here, we have used the solution-based fabrication method to prepare composite scaffolds and observed an improvement in tensile modulus about 200-fold over that of the pristine polymer at MWCNTs loading 19 wt%. Further, we have also tested the thermal properties of composite scaffolds and observed the nanotube networks suppress the mobility of polymer chains and the composite scaffold samples have shown thermally stability well above their decomposition temperatures which extend the mechanical integrity of a polymer well above its polymer melting point. The improved mechanical properties of composite scaffolds might be useful in advanced industrial material applications.

Speaker Biography

Parvathalu Kalakonda has completed his PhD from Worcester Polytechnic Institute, MA, USA. He has worked as post-doctoral fellow at Carnegie Mellon University, PA, USA, KAUST, KSA, and IISC Bangalore, India. He is the Assistant professor of Government City College, Osmania University, Telangana, India. He has over 30 publications that have been cited over 160, and his publication H-index is 6 and has been serving as a reviewer of reputed Journals such as Composite part-B, Nanotechnology, Material Letters, Polymer journal, Journal of Material chemistry etc. He has been serving as Reviewer board member of composites and biodegradable polymers.

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