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Effects of process parameters on chemical functionalization of helicoil carbon nanotubes

Sean Reza Taklimi and Davood Askari
Wichita State University, USA

Functionalization of carbon nanotubes with helical configuration was performed through a reflux technique; furthermore, the influence of time and temperature as two key parameters of the treatment process were investigated. To evaluate the effectiveness of the process parameters, the functionalized helicoil nanotubes (HCNTs) were analyzed using various characterization instruments such as, Raman Spectroscopy, Visual Dispersion Test, Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and X-ray Diffraction Spectroscopy (XRD). The characterization results showed that most processes parameters were effective and the surface of HCNTs were successfully modified. The functionalized HCNTs demonstrated a higher solubility and more uniform dispersion rate compared to pristine HCNTs. The results also showed that increasing the reflux time and process temperature had no obvious effects on the solubility of HCNTs. On the other hand, prolonging of process time increased the (D/G) ratio in Raman spectrum and changed the intensities and places of the FTIR peaks. With the exception, for the functionalized HCNTs which were treated for 24 hours, all other samples exhibited at least a change in FTIR spectrum.

Biography

Sean Reza Taklimi, currently, is a PhD candidate in the Mechanical Engineering Department of Wichita State University (WSU), USA. He has expertise in functionalization and characterization of nanomaterials, specifically, carbon nanotubes. He received his Bachelor's degree in Chemical Engineering from Sharif University of Technology in Iran and Master of Science in Mechanical Engineering from Linkoping University, Sweden. His PhD research work is mainly focused on improvement of the mechanical properties of composite materials, using different types of nanomaterials. In the past, he has also worked as Research and Development Engineer in the area of energy and environment; furthermore, he has participated in and managed different projects during his job.

sxhosseinitalimi@shockers.wichita.edu

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