Accepted Manuscript

Surface initiated grafting of polymer chains on carbon nanotubes via one-step cycloaddition of diarylcarbene

Zhen Hu, Qing Shao, Xirong Xu, Dayu Zhang, Yudong Huang

PII: S0266-3538(16)31514-7

DOI: 10.1016/j.compscitech.2017.02.027

Reference: CSTE 6680

To appear in: *Composites Science and Technology*

Received Date: 14 December 2016

Revised Date: 21 February 2017

Accepted Date: 26 February 2017

Please cite this article as: Hu Z, Shao Q, Xu X, Zhang D, Huang Y, Surface initiated grafting of polymer chains on carbon nanotubes via one-step cycloaddition of diarylcarbene, *Composites Science and Technology* (2017), doi: 10.1016/j.compscitech.2017.02.027.

Surface initiated grafting of polymer chains on carbon nanotubes via one-step cycloaddition of diarylcarbene

Zhen Hu*, Qing Shao, Xirong Xu, Dayu Zhang, Yudong Huang*[1]

School of Chemistry and Chemical Engineering, MIIT Key Laboratory of Critical Materials Technology for New Energy Conversion and Storage, Harbin Institute of Technology, Harbin 150001, China.

Abstract: In the present study, we report a direct and nondestructive method to functionalize carbon nanotubes (CNTs). Novel highly reactive diarylcarbene derivative is designed and synthesized. Different to previous approaches, this diarylcarbene contains atomic transfer radical polymerization (ATRP) initiator segments, which can serve as starting points for further polymer grafting. Then, the initiator segments are covalently bonded to the CNTs via one-step cycloaddition of diarylcarbene and the succeeding ATRP links polystyrene (PS) chains to the CNTs. In order to further verify the effectiveness of modification, we use the obtained CNTs (PS-*f*CNTs) as reinforcement to enhance PS films. By addition 0.5 wt% PS-fCNTs, the PS composite films reveal 79.3 and 85.2% increases in tensile strength and Young's modulus. The protocol is believed to offer alternate strategy to modify the CNTs and greatly expand the application field of CNTs in material science.

Keyword: A. Carbon nanotubes, A. Polymer-matrix composites (PMCs), B. Interphase, B. Mechanical properties

---

[1] *Corresponding author. E-mail: yudonghuang@163.com (Yudong Huang), huzhen@hit.edu.cn (Zhen Hu); Fax: +86-451-86413711*