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Ruirui Cao, Haihui Liu, Sai Chen, Dongfang Pei, Jinlei Miao, Xingxiang Zhang

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Fabrication and properties of graphene oxide-grafted-poly(hexadecyl acrylate) as a solid-solid phase change material

Cao Ruirui, Liu Haihui, Chen Sai, Pei Dongfang, Miao Jinlei, Zhang Xingxiang*

Tianjin Municipal Key Lab of Advanced Fiber and Energy Storage Technology, School of Material Science and Engineering, Tianjin Polytechnic University, Tianjin 300387, China

Corresponding Author

*Tel/Fax: +86-022-83955054. E-mail: zhangpolyu@aliyun.com.

Abstract: A novel shape-stabilized solid-solid phase change material of graphene oxide-grafted-poly(hexadecyl acrylate) (GO-*g*-PHDA) was fabricated by hexadecyl acrylate (HDA) covalently bonding to GO nanosheets via free radical polymerization (FRP). The evidences of various spectroscopic and microscopic confirm the successful grafting of PHDA onto the surfaces of GO. Thermal energy storage properties and stability of GO-*g*-PHDA were determined by DSC and TGA. The melting and freezing points are 35.0 and 30.5 °C, respectively. The latent heats of melting and freezing are 79 and 77 J g^{-1}, respectively. The degradation temperature ($T_{0.05}$) is approximately 214.4 °C, which is much higher than the working temperature region for energy storage applications.

Keywords: Solid-solid phase change material, Graphene oxide, Comb-like polymer, Free radical polymerization