

- properties of epoxy-silica nanocomposites from nanoscale colloidal silica[J]. *Polymer*, 2003, 44: 5159–5167.
- [13] Kwon S C, Adachi T, Araki W, et al. Thermo-viscoelastic properties of silica particulate-reinforced epoxy composites: Considered in terms of the particle packing model[J]. *Acta Materialia*, 2006, 54: 3369–3374.
- [14] Jin S H, Choi D K, Lee D S. Electrical and rheological properties of polycarbonate/multiwalled carbon nanotube nanocomposites [J]. *Colloids and Surfaces A: Physicochem. Eng. Aspects*, 2008, 313–314: 242–245.
- [15] 何曼君, 陈维孝, 董西侠. 高分子物理[M]. 上海: 复旦大学出版社, 2005.
- [16] Yakushev P N, Peschanskaya N N. Creep rate variability in gel-spun polyethylene[J]. *Polymer Engineering and Science*, 1975, 15(3): 1286–1293.
- [17] Lee S Y, Yang H S, Kim H J, et al. Creep behavior and manufacturing parameters of wood flour filled polypropylene composites[J]. *Composite Structures*, 2004, 65: 459–469.

Characterization Viscoelastic Properties of Multi-walled Carbon Nanotubes/F2314 Composites Using DMA Method

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Abstract: Multi-walled carbon nanotubes (MWCNTs)/fluoropolymer (F2314) composites were prepared via a melt blending process. The influences of MWCNTs content on the viscoelastic properties (dynamic mechanical behavior and three-point bending creep properties of MWCNTs/F2314) were explored using dynamic mechanical analysis (DMA) method. The results show that with increasing the MWCNTs content, the storage modulus (E') of MWCNTs/F2314 composites increases, the glass transition temperature (T_g) and peak value of loss factor ($\tan\delta_{\max}$) decrease. The creep strain and constant creep strain rate of MWCNTs/F2314 composites distinctly decrease due to the presence of MWCNTs. At 80 °C/0.1 MPa, when the MWCNTs content (mass fraction) increases from 2% to 20%, the creep strain and constant creep strain rate of MWCNTs/F2314 composites decrease by 87.6% and 84.7%, respectively. Burger four-element mechanical model can be used to simulate the creep behaviors of MWCNTs/F2314 composites and obtain the constitutive equations of creep curves.

Key words: multi-walled carbon nanotubes(MWCNTs); fluoropolymer (F2314); composite; creep

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《含能材料》高效毁伤弹药专栏征稿

高效毁伤弹药以“利用最小化成本获得最大化效果”为目标,对含能材料的性能和能量提出了更高的要求。为进一步促进高效毁伤弹药及其技术的研究,本刊将于2015年增设高效毁伤弹药专栏,内容涉及(1)传统含能材料的优化和改进以及先进含能材料的开发和应用,包括:传统含能材料合成、制造、处理和应用的新技术,新的CHON含能材料的开发和应用,金属化炸药,非传统概念炸药(如燃料空气炸药、温压炸药),高能量密度材料;(2)含能材料能量的控制输出研究,包括:能量输出增强(如组合装药),能量输出聚焦/定向,能量输出模式可控(如多模装药),能量输出范围可控(如低附带毁伤炸药)。欢迎广大学者投稿,来稿时请选择对应的专栏。

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