

عنوان مقاله:

Investigation of Carbon Black/ Polyester Micro-composites: An Insight into Nano-size Interfacial Interactions

محل انتشار:

ماهنامه بین المللی مهندسی، دوره 35، شماره 6 (سال: 1401)

تعداد صفحات اصل مقاله: 9

نویسنده:

M. Karevan - Department of Mechanical Engineering, Isfahan University of Technology, Isfahan, ۸۴۱۵۶-۸۳۱۱۱, Iran

خلاصه مقاله:

In the micro/nanomaterial reinforced composites, interfacial interactions at the interface of filler/polymer lead to the formation of a third layer called interphase as the secondary reinforcing mechanism. The interphase may be formed due to local adsorption of polymer chains at the interface, mechanical interlocking, and interdiffusion of polymer chains. Since the interactions govern the load transfer at the filler/polymer interface, they play a key role in the mechanical response of reinforced composites. However, there exist only a few well-established and validated studies in the description of the interfacial interactions presented in thermosetting composites. This research aims at the understanding of correlations amongst the mechanical properties of thermosetting polyester composites reinforced with ۱۵ wt. % of carbon black (CB) focusing on the nano-size cooperative rearranging region (CRR). To estimate the length of CRR, thermal analysis of the variations in the specific heat capacity or the relaxation strength within the glass transition temperature (T_g) range was measured using a thermodynamic model. A nano-size CRR of ۱۰ nm on average was estimated and correlated to the enhanced impact and toughness behavior of the specimens. The results suggested the presence of softer interphase based on the T_g values influenced by the CBs agglomeration level and cross-linking density, which in turn governs the mechanical response of the composites. The methodology introduced in this study can be used in the explanation of changes in mechanical and physical properties of reinforced composites with a focus on the underlying role of nano-size interfacial interactions.

کلمات کلیدی:

interfacial interactions, cooperative rearranging region, nano-micro composites, Mechanical properties, Interphase

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/1437743>

