

عنوان مقاله:

Effect of Interfacial Interphase on the Elastic Response of Hollow Glass Microspheres (HGMS) Reinforced Polyester Micro-composites: A Comparative Study

محل انتشار:

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خلاصه مقاله:

The Hollow Glass Microspheres (HGMS) have been recently used in fabrication of low-density polymeric composites due to rather high stiffness nature of the fillers together with their light weight that in turn results in the development of micro-composites of engineered properties with enhanced mechanical properties. Interfacial interactions at the filler/polymer interface control the load transfer and thus bulk properties of composites resulting in unpredicted performance of composites embedded with inclusions. No studies so far have reported the analytical modeling of HGMS reinforced composites emphasizing the role of the interphase at the vicinity of fillers. Therefore, useful analytical models are required to estimate the mechanical behavior of the HGMS based composites with the incorporation of the effect of interfacial interactions and possible agglomeration of fillers. This study aims at the fabrication of ۰-۲۰ wt% HGMS reinforced polyester micro-composites followed by micromechanical modeling of the elastic modulus of the fabricated parts whilst the effect of the interphase region is emphasized by models modification. The results indicated strong correlation amongst the interphase characteristics and the Young's modulus of the parts revealing the dependency of the modulus on the thickness and modulus of the interphase as well as the level of agglomeration of the HGMSs. The results demonstrated that with considering no interphase, the micromechanical models underestimate the results compared to those obtained from experiment, which suggests the presence of the stiff interphase around the HGMS governed by changes in the interfacial cross link density of the parent polymer.

کلمات کلیدی:

hollow glass micro-sphere (HGMS), Halpin-Tsai, interphase, elastic modulus, polyester

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