عنوان مقاله:

Multiscale Composites Based on CNFs/Epoxy/UHMWPE Fiber: Interfacial Properties

محل انتشار:

اولین همایش ملی تکنولوژی های نوین در شیمی و پتروشیمی (سال: 1393)

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خلاصه مقاله:

In this study, the effect of epoxy matrix modification with different carbon nanofiber loadings consisting of 0.5, 1.0 and 1.5 wt. % on interfacial shear strength of epoxy/ultra-high molecular weight polyethylene fiber composites was investigated. In this research, UHMWPE fiber surface was treated with glycidyl methacrylate as much as 5% by weight. Then, the success of the grafting was proved with attenuated total reflectance-infra red. As the fiber was treated, the effect of surface treatment on morphology of fiber surface was evaluated by scanning electron microscopy. Along with modifying fibers, epoxy resin was modified with carbon nanofibers and dispersion of carbon nanofibers in the resin was investigated by optical microscopy. Afterwards, in order to investigate the changes in surface wetting and adhesion between the fiber and matrix, microbond test and fiber-matrix contact angle measurements of the different samples were accomplished. The results showed that the chemical process of grafting glycidyl methacrylate on the fiber surface increased the fiber surface roughness. Microbond test results revealed that the simultaneous modification of fiber surface with 5 wt. % of GMA monomer and matrix with 0.5 wt. % of carbon nanofibers considered as the maximum amount of improvement as much as 319 percent. By comparing microbond and contact angle results, synergetic effect of fiber treatment and matrix modification on improving interfacial adhesion was proved and the highest interfacial adhesion and lowest contact angle were observed as the fiber and matrix were treated at the same time.

کلمات کلیدی:

UHMWPE fiber, epoxy resin, glycidyl methacrylate, carbon nanofibers, interfacial shear strength, contact angle