

A study on the Acrolein and Methacrylonitrile grafted-Kevlar Fiber Reinforced Composites

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Abstract The discontinuous Kevlar fiber-reinforced composites which structure was random-in-plane fiber orientation were prepared by solvent casting in dichloromethane at room temperature. The interfacial interaction of Kevlar fiber [original Kevlar fiber (O-K) and grafted Kevlar fibers(acrolein-grafted-Kevlar (ACL-g-K) & methacrylonitrile-grafted-Kevlar (MAN-g-K)] which matrix polymers(Phenoxy, PMMA, and SAN) were investigated by dynamic mechanical, thermomechanical analyses and FT-IR spectroscopy. By dynamic mechanical analysis at 11Hz, the storage modulus (E') and the declined temperature of E' increased in the order of reinforcements using $MAN-g-K > ACL-g-K > O-K$. The glass transition temperature(T_g) obtained from $\tan \delta$ peak increased slightly in the same order shown above. By thermomechanical analysis, the trends mentioned above was also seen for T_g obtained from the first displacement change as a function of temperature. However, the second transition which was appeared at higher temperature may be due to interfacial interaction between the fiber and the matrix. By FTIR spectroscopy, the characteristic peaks of matrix polymers(phenoxy : C-O-C(1240cm^{-1}), PMMA : C=O(1720cm^{-1}), and SAN : C \equiv N(2240cm^{-1}) of composite films shifted to the amide peak(amide I : 1650cm^{-1} & amide II : 1540cm^{-1}) of original Kevlar fiber, however, the amide peak of original and grafted Kevlar fibers of composites moved to the characteristic peaks of matrix polymers.