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Effects of bonding types of carbon fibers with branched polyethyleneimine on the interfacial microstructure and mechanical properties of carbon fiber/epoxy resin composites

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Abstract: A novel supercritical method for deposition of polyethyleneimine (PEI) onto carbon fibers (CFs) surface was reported. The surface functional groups, morphology, wettability and interphase properties of CFs grafted with PEI (CF-g-PEI) were studied, and compared to physically-adsorbed and chemically-adsorbed ones (CF-c-PEI and CF-ad-PEI). The CF-g-PEI exhibited the highest deposition amount and interfacial adhesion strength. Interface enhancement mechanism and failure mode have also been explored in details. However, impact resistance and single fiber tensile strength of CF-g-PEI were not optimal. Hence, based on different applications, a property balance of the resulting composite should be considered.

Keywords: A. Carbon fiber, A. Polymer-matrix composites (PMCs), B. Interfacial

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