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Optimizing fiber/matrix interface by growth MnO₂ nanosheets for achieving desirable mechanical and tribological properties

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Abstract

A novel and characteristic method is confirmed for enhancing the fibers/resin interfacial strength by growing MnO₂ nanosheets on the woven carbon fiber (WCF) using the hydrothermal method for 1h from 100 to 175°C. An interesting finding is that both the density and length of MnO₂ nanosheets are functions of the growth temperature. The optimal growth temperature is 125°C, and the homogeneous and porous MnO₂ has greatly improved the wettability between the WCF and the matrix and further results in an improvement of 16.3% and 30.2% in the flexural strength and tensile strength of the composite. And then tribological properties are further improved which can be verified by an obvious increment in dynamic friction coefficient and a 38.7% reduction in wear rate.

Keywords: MnO₂/WCF hybrids; Resin composite; Mechanical strength; Friction/wear.

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