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MoS₂ nanosheets-decorated carbon fiber hybrid for improving the friction and wear properties of polyimide composite

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Abstract

A novel hybrid material composed of micro-carbon fiber (CF) and hexagonal MoS₂ nanosheets was prepared via a one-step hydrothermal method. The hybrid simultaneously had both lubricating and reinforcing effects to improve friction and wear properties of polyimide (PI). More importantly, MoS₂ nanosheets decorated onto the surface of CF increased the interfacial adhesion between CF and the PI matrix. This enhanced the hardness and thermal stability, and was also favorable for transferring stress from the matrix to CF during friction and wear process. Accordingly, the PI/CF-MoS₂ composite exhibited outstanding tribological properties. Also, its friction coefficient and wear rate were only 0.24 and $2.01 \times 10^{-6} \text{ mm}^3/\text{Nm}$, respectively, which were lower than those of PI, PI/CF and PI/MoS₂; this suggested CF-MoS₂ hybrid was a promising additive for enhancing the tribological properties of polymers.

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