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Improving the interfacial strength of silicone resin composites by chemically grafting silica nanoparticles on carbon fiber

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ACCEPTED MANUSCRIPT

1	Improving the interfacial strength of silicone resin
2	composites by chemically grafting silica nanoparticles
3	on carbon fiber
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9	ABSTRACT
10	Controlling interfacial microstructure and interactions between carbon fiber (CF) and
11	matrix is of crucial importance for the fabrication of advanced polymer composites. In
12	this paper, a hierarchical reinforcement (CF-g-SiO ₂) was prepared through directly
13	grafting 3-aminopropyltriethoxysilane (APS) functionalized silica nanoparticles
14	(SiO ₂ -APS) onto CF surface by the covalent linkage for the first time. SiO ₂ -APS
15	nanoparticles distributed onto the fiber surface uniformly, which could increase surface
16	polarity and roughness obviously. CF-g-SiO ₂ exhibited a low contact angle and high
17	surface free energy, and thus enhanced the wettability between CF and matrix greatly.
18	Simultaneous increases of interlaminar shear strength (ILSS) and interfacial shear
19	strength (IFSS) of CF-g-SiO ₂ composites were achieved, increasing 53.27% in ILSS
20	and 40.92% in IFSS compared with those of untreated composites. These enhancements
21	can be attributed to the existent of SiO2-APS interface with providing sufficient
22	chemical bonding and strong mechanical interlocking between the fiber and matrix.

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