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The effect of double grafted interface layer on the properties of carbon fiber reinforced polyamide 66 composites

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1 **The effect of double grafted interface layer on the properties of carbon fiber**  
2 **reinforced polyamide 66 composites**

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9 **Abstract**

10 Given the advantages of polyethyleneimine (PEI) for interface modification of carbon  
11 fiber reinforced polyamide 66 composite (CF/PA66), an effective method was  
12 developed to fabricate CNT@PEI-CF. The XPS results confirmed CNT@PEI-CF was  
13 covered with a double grafted layer. Interface stability investigated showed thermal  
14 stability (under injection molding temperature, about 270°C) and structural stability of  
15 CNT@PEI-CF/PA66 interface were both improved, but PA66 crystallization behavior  
16 affected by CNT@PEI-CF was identical with that of pure PA66. The contact angle tests  
17 exhibited that its compatibility with PA66 was also enhanced. Its interfacial shear  
18 strength, composite tensile strength and elastic modulus increased by 64.74%, 27.58%  
19 and 22.68 % compared with that of untreated-CFs and composite, respectively. These  
20 best mechanical properties were ascribed to the formation of “fish-scale” layers on  
21 pull-out fibers resulted from CNT@PEI-CF modification. It could be concluded that  
22 CNT@PEI-CF would not only enhance its composite mechanical properties, but also  
23 exhibit much fiber pull-out and avoid the catastrophic failure for CNT@PEI-CF/PA66  
24 composites. This CF surface modification study would be beneficial to expand  
25 application of thermoplastic composite with reusability.

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