

Accepted Manuscript

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PII: S0167-577X(18)31646-X
DOI: <https://doi.org/10.1016/j.matlet.2018.10.077>
Reference: MLBLUE 25119

To appear in: *Materials Letters*

Received Date: 25 July 2018
Revised Date: 28 September 2018
Accepted Date: 13 October 2018

Please cite this article as: J. Fu, M. Zhang, L. Liu, L. Xiao, M. Li, Y. Ao, Layer-by-Layer electrostatic self-assembly silica/graphene oxide onto carbon fiber surface for enhance interfacial strength of epoxy composites, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.10.077>

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Layer-by-Layer electrostatic self-assembly silica/graphene oxide onto carbon fiber surface for enhance interfacial strength of epoxy composites

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Abstract: Incorporating nano-scale reinforcements onto carbon fiber (CF) surface is a promising approach to enhance the interfacial strength of epoxy composites. Herein, a hierarchical reinforcement (CF/SiO₂/GO) was prepared through deposition silica (SiO₂) and graphene (GO) onto CF surface by Layer-by-Layer electrostatic self-assembly (ESA) for the first time. The experimental results confirmed that the SiO₂ and GO were successfully assembly, and scanning electron microscopy (SEM) indicated a uniformly coverage on the CF surface. After assembly with SiO₂/GO of CF showed the surface roughness and wettability of CF increase obvious, which supplying strong mechanical interlocking between fiber and resin. Meanwhile, the interlaminar shear strength (ILSS) of CF/SiO₂/GO epoxy composites were 46.3% higher than Untreated-CF composites.

Keywords: Carbon fiber; Layer-by-Layer electrostatic self assembly; Nanoparticles; Composite materials; Interfaces.

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