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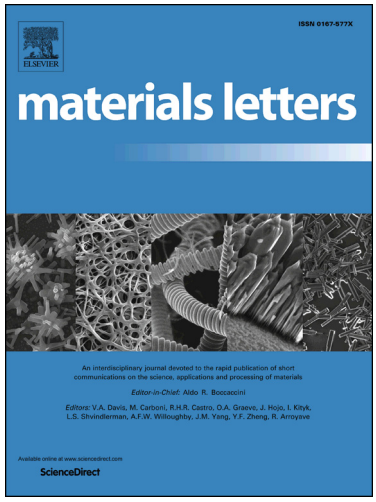

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A two-step method for high efficient and continuous carbon fiber treatment with enhanced fiber strength and interfacial adhesion

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Abstract

Most of the surface modification technologies for carbon fibers, no matter in laboratory scale or for commercial manufacture, are usually accompanied by a decrease of tensile strength. Here, we proposed a novel and high efficient two-step strategy for carbon fiber continuous modification with obviously improved fiber strength and interfacial adhesion through helium atmospheric plasma etching and ethanol pyrolysis deposition. The experimental results show that the pyrolytic carbon significantly increased the fiber surface roughness and surface energy, and healed the surface flaws. The fiber strength increased from 3.02 to 3.43GPa and the interlaminar shear strength enhanced from 70.1 to 85.7MPa. The comparative study indicates that, compared with commercial anodic oxidation and epoxy sizing, this method is more efficient and will be a promising modification method for carbon fiber online manufacture.

Keywords: Carbon fiber; Surfaces; Polymeric composites; Interfaces

1. Introduction