Carbon Nanotube- and Graphene Oxide / 2D Oligoglycine Tectomer Composites and Coatings

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Amino-terminated oligoglycines non-covalently self-assemble, through cooperative hydrogen bonding formation, into biocompatible rigid 2D nanostructures called tectomers, either in solution or in surface-promoted processes [1,2]. Tectomers effectively coat carboxylated multi-walled carbon nanotubes (MWCNT-COOH) and strongly interact with graphene oxide (GO). Electrostatic interactions and hydrogen bonding formation accounts for the strong interfacial interaction of tectomers with MWCNT-COOH and GO, respectively. The resulting composites were characterized by electron- and atomic force microscopies, UV-vis and X-ray photoelectron (XPS) spectroscopies and contact angle measurements [2].
Because of this high affinity of tectomers to GO, tectomers efficiently coat wet-spun GO fibers (Fig. 1). We also show that, due to their versatile surface chemistry, tectomers act as supramolecular peptidic adhesives for the immobilization of a variety of carbon nanomaterials, nanoparticles, molecules and drugs on the GO fiber surface therefore allowing GO fiber functionalization. The resulting ultrathin coatings exhibit remarkable water-resistant properties. This tectomer-based “double-sided sticky tape” fiber functionalization strategy can be extended to other fibers, fabrics and substrates, making it very attractive for technological and smart textile applications [3].

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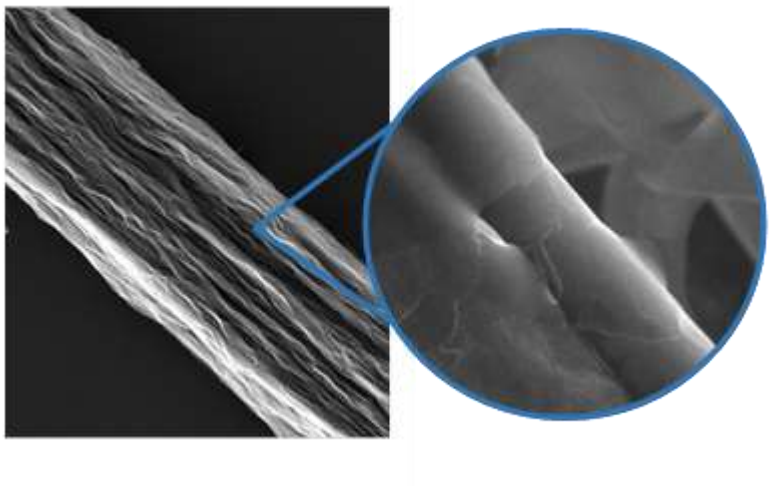

Figure 1: GO fiber coated by ultrathin oligogycine 2D assemblies (tectomers).