Wet-Spinning Multifunctional Carbon Nanotube/Polymer Composite Fibers

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Abstract

Remarkable progress in the fabrication of carbon nanotube composite fibers has resulted through the development of the wet-spinning technique pioneered by Vigolo *et al.* [1] This process implies the fabrication of gel fibers as a result of the collapse of surfactant-stabilized carbon nanotube dispersions when injected into a coagulation bath. When dried, those gel fibers become solid fibers with high carbon nanotube contents (≥ 50 wt.%), significantly higher than those achieved by other fiber spinning technologies, such as melt-spinning or electrospinning.

We here report how this wet-spinning method provides carbon nanotube composite fibers with tunable properties, which mainly depend on the composition of the coagulation bath used. Polymers such as polyvinyl alcohol (PVA) [2-5], polyethylenimine (PEI) [6], and a polymeric ionic liquid [7] have been here investigated as coagulants. Remarkable transport-, supercapacitor- and electrochemical actuation properties are demonstrated for these coagulation wet-spun fibers, which offer promise for a variety of applications [2-4].

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