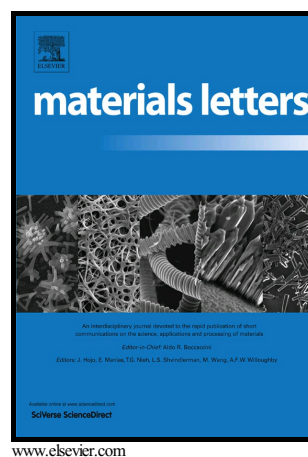


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# Graphene oxide-encapsulated Ag nanoparticle-coated silk fibers with hierarchical coaxial cable structure fabricated by the molecule-directed self-assembly

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## Abstract

Herein, we designed graphene oxide (GO)-encapsulated Ag nanoparticle (AgNP)-coated silk fibers with GO serving as the protective film through hyperbranched poly(amide-amine) (HBPAAs)-directed self-assembly for protecting AgNP coatings from detachment. Robust, hard, and closely fitted protective films were achieved on the fiber surfaces through self-assembled GOs by introducing 2D GO nanosheets. Silk fibers were hierarchically coated with HBPAAs-capped AgNPs (HBPAAs/AgNPs) and GOs by successively impregnating the fibers in solutions of HBPAAs/AgNPs and GOs to design a well-defined hierarchical structure. In such structure, HBPAAs served as a “double-sided tape” not only gluing AgNPs to the fiber surfaces but also adhering GOs to the surfaces of HBPAAs/AgNPs. The developed coaxial cable-structured coatings could isolate Ag nanocoatings from external stimuli, opening a potential route to improve the function persistence and biosafety of AgNP-coated biotextiles.

**Keywords:** directed self-assembly; carbon materials; biomaterials; nanoparticles

## 1. Introduction

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