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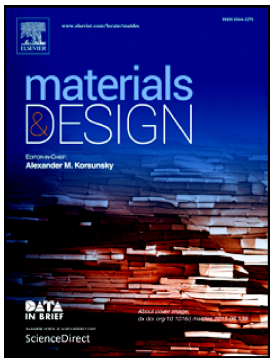


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# Gas Infiltration of Bromine to Enhance the Electrical Conductivity of Carbon Nanotube Fibers

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**Abstract**

Highly conducting and lightweight wires can be created based on carbon nanotube (CNT) assembly materials, where the inter-tube electron transport plays a key role. Here we report a gas infiltration of bromine to improve the electrical properties of CNT fibers, owing to the enhanced inter-tube electron hopping. Although Br infiltration is mainly a physical absorption process, with just a little fraction to form covalent bonding with the defect of CNTs, it can induce electron transfer from CNT to Br, together with the densification effect, increased the pathways for interfacial electron transport between the CNTs. As a result, the infiltration efficiently increases the electrical conductivity from $2.66 \times 10^5$ to $1.63 \times 10^6$ S/m, by 6-fold. Based on the high performance stability, the composite fiber can be used as lightweight and functional conductor for wearable smart devices.

*Keywords:* carbon nanotube, fiber, bromine, gas infiltration, electrical conductivity

## 1. Introduction

Lightweight and robust conducting wires are very vital for electric power transmission, aircraft wires and cables, hybrid electric vehicles and electric vehicles, and aerospace applications.

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