Poster

CHARACTERIZATION OF CARBON NANOTUBE FIBERS PREPARED BY DIELECTROPHORESIS

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Carbon nanotubes (CNT`s) are extraordinary materials due to their several superior properties like ultra-high strength (~150 GPa), Young's modulus (~1 TPa), chemical stability, thermal and electrical conductivity [1,2]. The technologies to produce the materials with high aspect ratio (up to 10^6) make CNT-s very promising for wide variety of technological applications like nanoelectronics, nanooptics, NEMS, advanced materials etc.

Being a part of numerous technical solutions, many drawbacks still exists on CNT`s way for real applications. For example, the preparation of very promising CNT organic and inorganic composites usually met difficulties related to dissolving of the tubes in desired matrix material. Single nanotube based applications are limited due to problems in preparing the tubes one by one. Chemical modification of the tubes is also difficult task.

Still in some cases lucky and smart investigators have found tricks to easy handle of these materials. For example dielectrophoresis method is suggested for preparing long aligned CNT`s based fibers [3,4].

Here we report mechanical and electrical properties of CNT fibers prepared by dielectrophoresis method. Our experimental set-up enables us to vary essential preparation parameters like concentration of CNT solution, drawing speed, operational voltage and frequency. Different precursor properties are varied and tested from fibers drawing point of view. Obtained fibers are tested in terms of important characteristics like: density, tensile strength, Young's modulus and conductivity. Typical as-grown fibers shows the following characteristics: diameter 1–200 μm, length up to 10 cm, density 0.2 - 0.5 g/cm^3, tensile strength up to 150 MPa, Young's modulus 5,5 GPa, and conductivity ~10^3 S/m. We also show that slight alterations of the fibers like heat- and specific chemical treatment can considerably improve the above-mentioned characteristics.

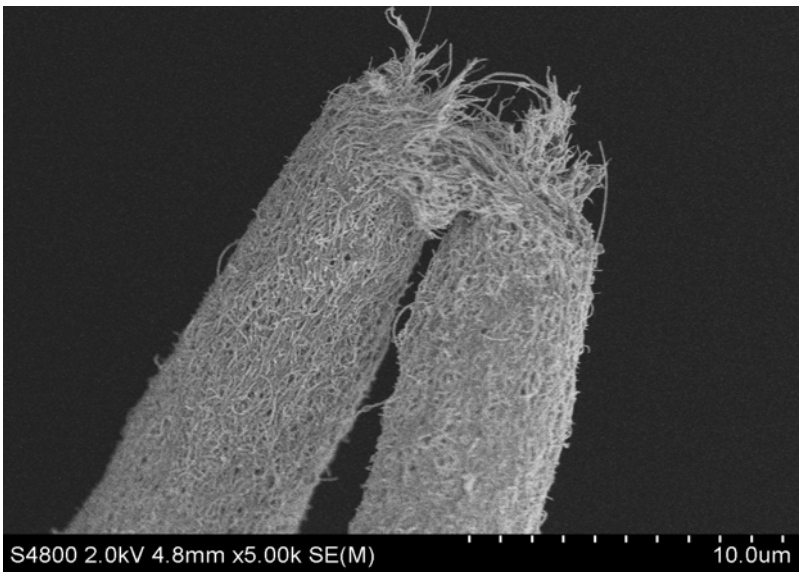

Figure 1. SEM image of broken dielectrophoresis grown carbon nanotube fiber.

Acknowledgements

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