**High-Yield, Single-Step of Slicing and Converting of Metallic to Semiconducting SWCNTs Using Vortex Fluidic Device.**

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Preparation of single-wall carbon nanotubes (SWCNTs) with specific chirality remains challenging in the nanotube field. Here we report a simple, high-yield, and effective method for converting metallic SWCNTs to semiconducting using a vortex fluidic device (VFD). Four types of sliced single-wall carbon nanotubes (SWNTs) with different length distribution have been synthesized using a vortex fluidic device (VFD). SWCNTs have been sliced in the VFD while irradiated with a pulsed laser operating at 1064 nm 1, 2, with the ability to slice them in a specific solvent in the VFD, without laser irradiation. For the later, the chirality of the SWCNTS remain as the as received material. However, slicing the SWCNT in the VFD while irradiated with the laser results in disappearance of the peaks in the NIR spectrum corresponding to metallic SWCNTs. Thus, laser processing coupled with NIR radiation results in conversion of metallic into semi-conducting SWCNTs.

**References**

1. Alharbi, T. M.; Vimalanathan, K.; Lawrance, W. D.; Raston, C. L., Controlled slicing of single walled carbon nanotubes under continuous flow. *Carbon* **2018**.

2. Vimalanathan, K.; Gascooke, J. R.; Suarez-Martinez, I.; Marks, N. A.; Kumari, H.; Garvey, C. J.; Atwood, J. L.; Lawrance, W. D.; Raston, C. L., Fluid dynamic lateral slicing of high tensile strength carbon nanotubes. *Sci. Rep.* **2016,** *6*, 22865.