



## Functionalization of Single-Wall Carbon Nanotubes by Photo-Oxidation

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A new technique for carbon nanotube oxidation was developed based upon the photo-oxidation of organic compounds. The resulting method is more benign than conventional oxidation approaches and produces single-wall carbon nanotubes (SWCNTs) with higher levels of oxidation.

In this procedure, an oxygen saturated suspension of SWNTs in a suitable solvent containing a singlet oxygen sensitizer, such as Rose Bengal, is irradiated with ultraviolet light. The resulting oxidized tubes are recovered by filtering

the suspension, followed by washing to remove any adsorbed solvent and sensitizer, and drying in a vacuum oven. Chemical analysis by FT-infrared and x-ray photoelectron spectroscopy revealed that the oxygen content of the photo-oxidized SWCNT was 11.3 atomic % compared to 6.7 atomic % for SWCNT that had been oxidized by standard treatment in refluxing acid.

The photo-oxidized SWCNT produced by this method can be used directly in various polymer matrixes, or can be further modified by chemical reactions at

the oxygen functional groups and then used as additives. This method may also be suitable for use in oxidation of multi-wall carbon nanotubes and graphenes.

*This work was done by Marisabel Lebron-Colon and Michael A. Meador for Glenn Research Center. Further information is contained in a TSP (see page 1).*

*Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steve Fedor, Mail Stop 4-8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18542-1.*