

## Supplemental

The experimental apparatus to synthesize carbon nano “peapods” in Fig. S1.

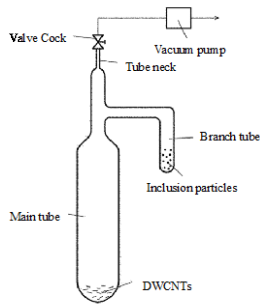


Fig. S1 A schematic picture of an apparatus to synthesize carbon nano peapods. The lower part of the glass tube was covered and heated by a mantle heater.

Experimental results were plotted in Figs. S2-S5 with their standard deviations and those fitting lines are calculated using Eq.(2).

$$S_{rad} = -q \ln|C_{Dn} + s| + q(C_{Dn} + s) + r \quad (2)$$

where  $q$ ,  $r$ , and  $s$  are arbitrary constant coefficients. Eq. (2) is numerically solved using “Solver” function in Microsoft Excel (For Mac2011 Ver.14) to determine  $q$ ,  $r$ , and  $s$ .

The detail derivation of Eq. (2) refers to our previous article [3].

Raman spectra and C-ray photoelectron spectra for Creos 24PS are shown in Fig. S6

and S7, respectively.

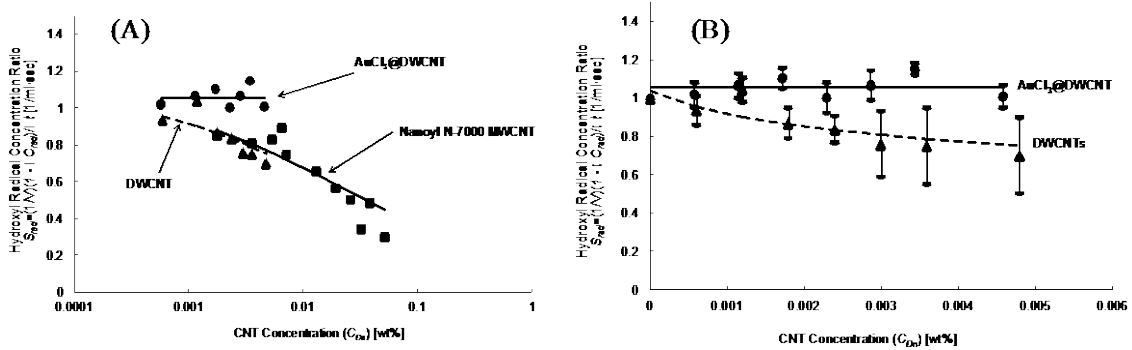


Fig. S2. Relationship between hydroxyl radical concentration ratio and CNT concentrations. (A) Toray DWCNTs, AuCl<sub>3</sub>@DWCNT peapods, and Nanocyl N-7000. (B) Toray DWCNTs and AuCl<sub>3</sub>@DWCNT peapods. Vertical bars show those standard deviations of experimental results.

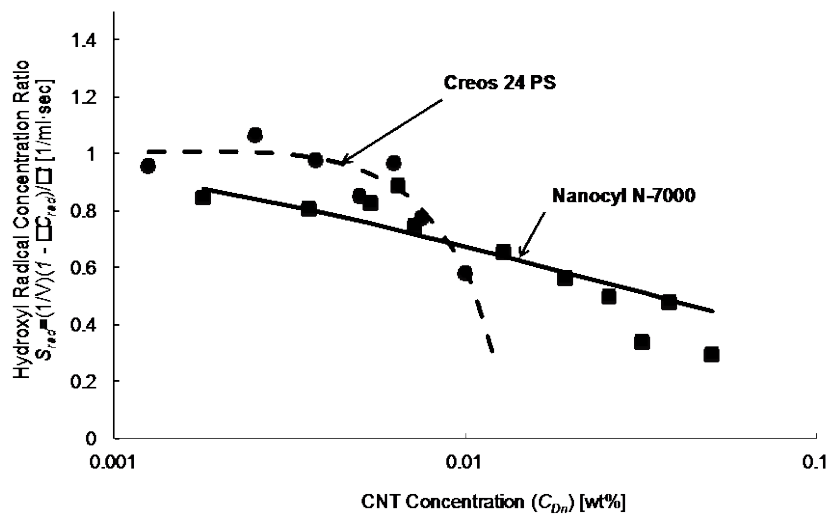


Fig. S3. Relationship between hydroxyl radical concentration ratio and CNT concentrations of Creos 24PS MWCNTs and Nanocyl N-7000.

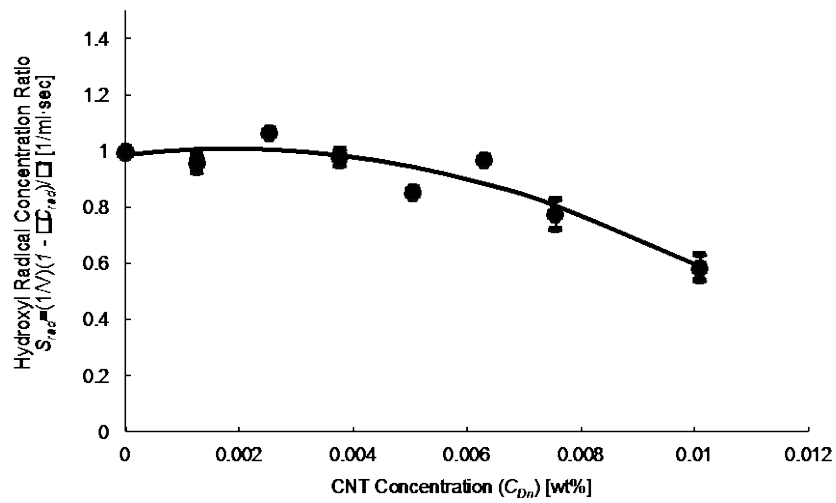


Fig. S4. Relationship between hydroxyl radical concentration ratio and CNT concentrations of Creos 24PS MWCNTs. Vertical bars show those standard deviations of experimental results.

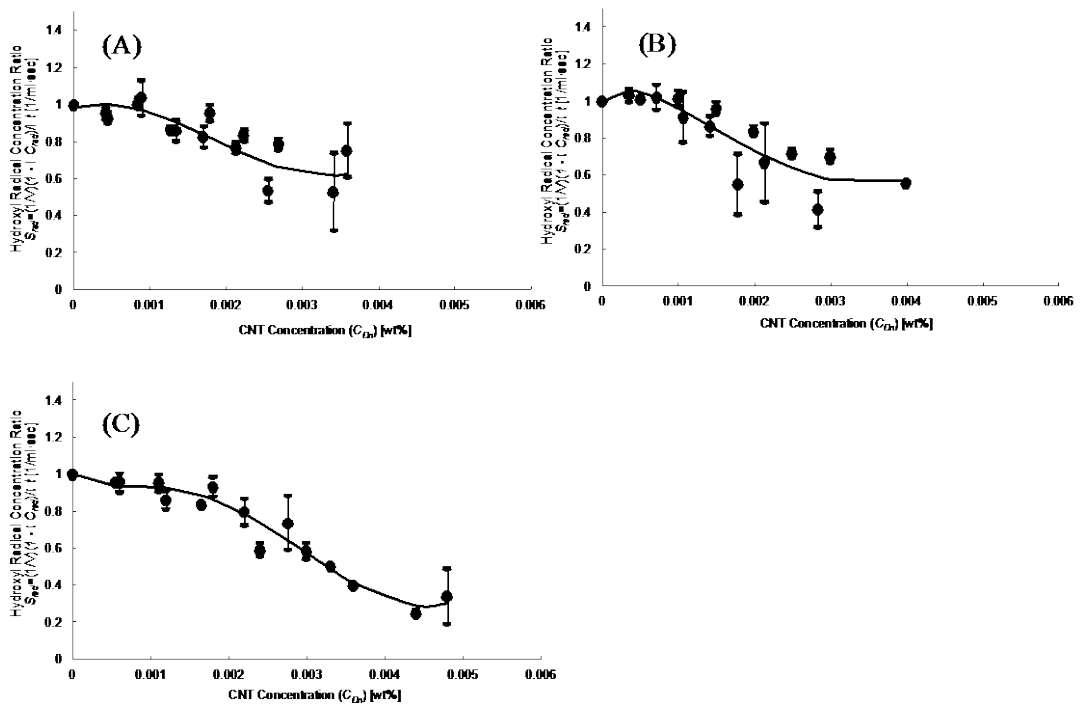


Fig. S5. Relationship between hydroxyl radical concentration ratio and CNT concentrations of derivatives from Creos 24PS MWCNTs. Vertical bars show those standard deviations of experimental results. (A) Dew 60, (B) AR50, and (C) AR50HT-Pt

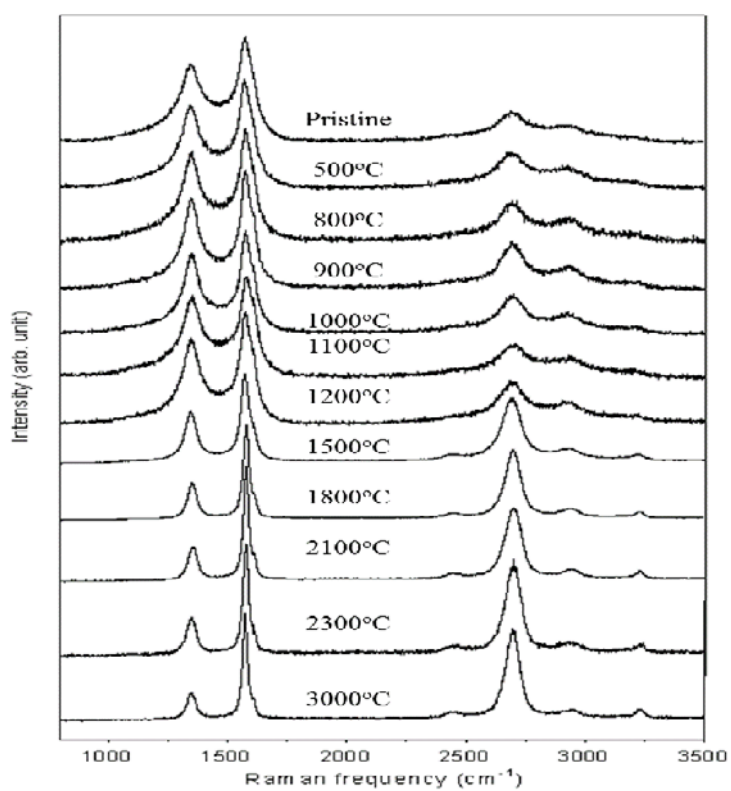


Fig. S6. Raman spectra for Creos 24PS. Measurements were carried out by Renishaw Raman Image Microscope System 1000, Renishaw UK.

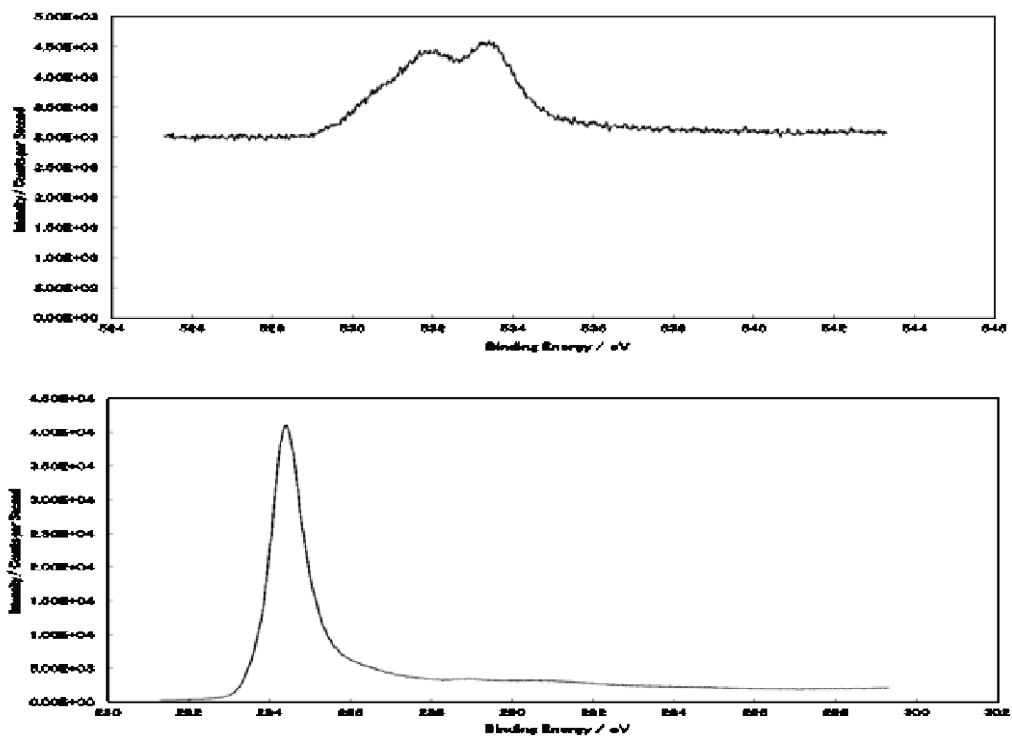


Fig. S7. X-ray Photoelectron Spectroscopy images of O1s for Creos 24PS Measurements were carried out by AXIS Ultra DLD X-ray photoelectron spectrometer, Shimadzu, Japan.