

Supporting Information for:

**Photodegradation of polymer-CNT nanocomposites: Effect of CNT loading and CNT
release characteristics**

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Table of Contents:

Figures SI 1: UV-Vis spectra of as prepared CNT-free PCL, along with indications of the wavelengths used in this study.

Figures SI 2: TEM and EDX of the as received CNTs

Figure SI 3: Raman spectra of 1.5% CNT-PCL nanocomposite

Figure SI 4: SWCNT calibration curve used for calculating CNT concentration of ^{89}Y signal with sp-ICP-MS.

Figure SI5: Absolute mass loss measurements for nanocomposite samples

Figure SI 6: Additional SEM images of the CNT free polymer

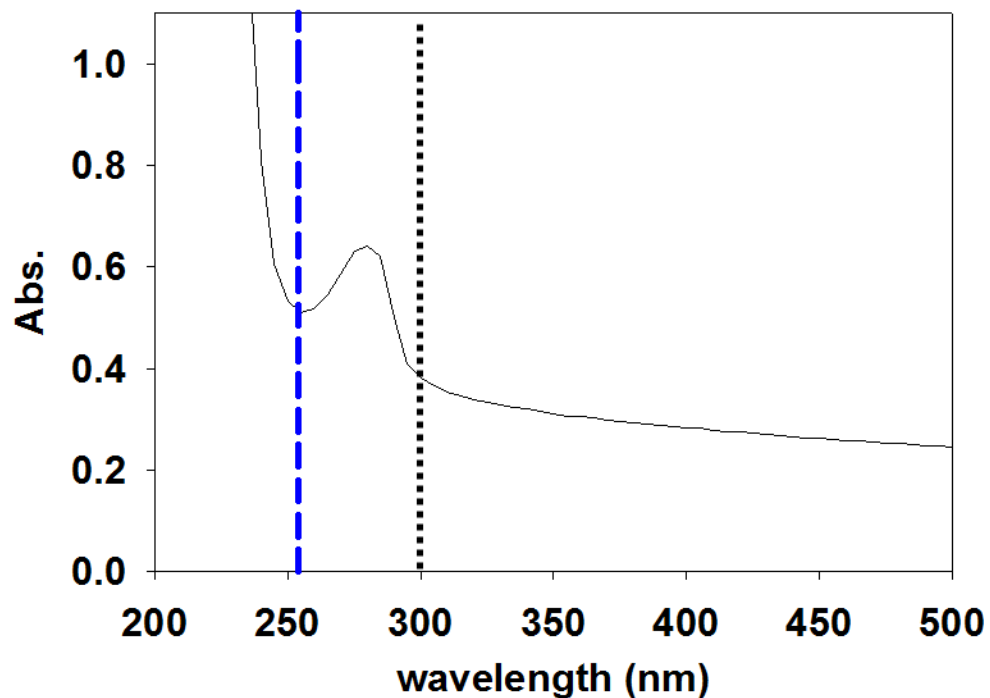
Figure SI 7: Additional, higher magnification images of 0.25% CNT sample following UVC exposure

Figure SI 8: Additional XPS spectra of the CNT free polymer samples

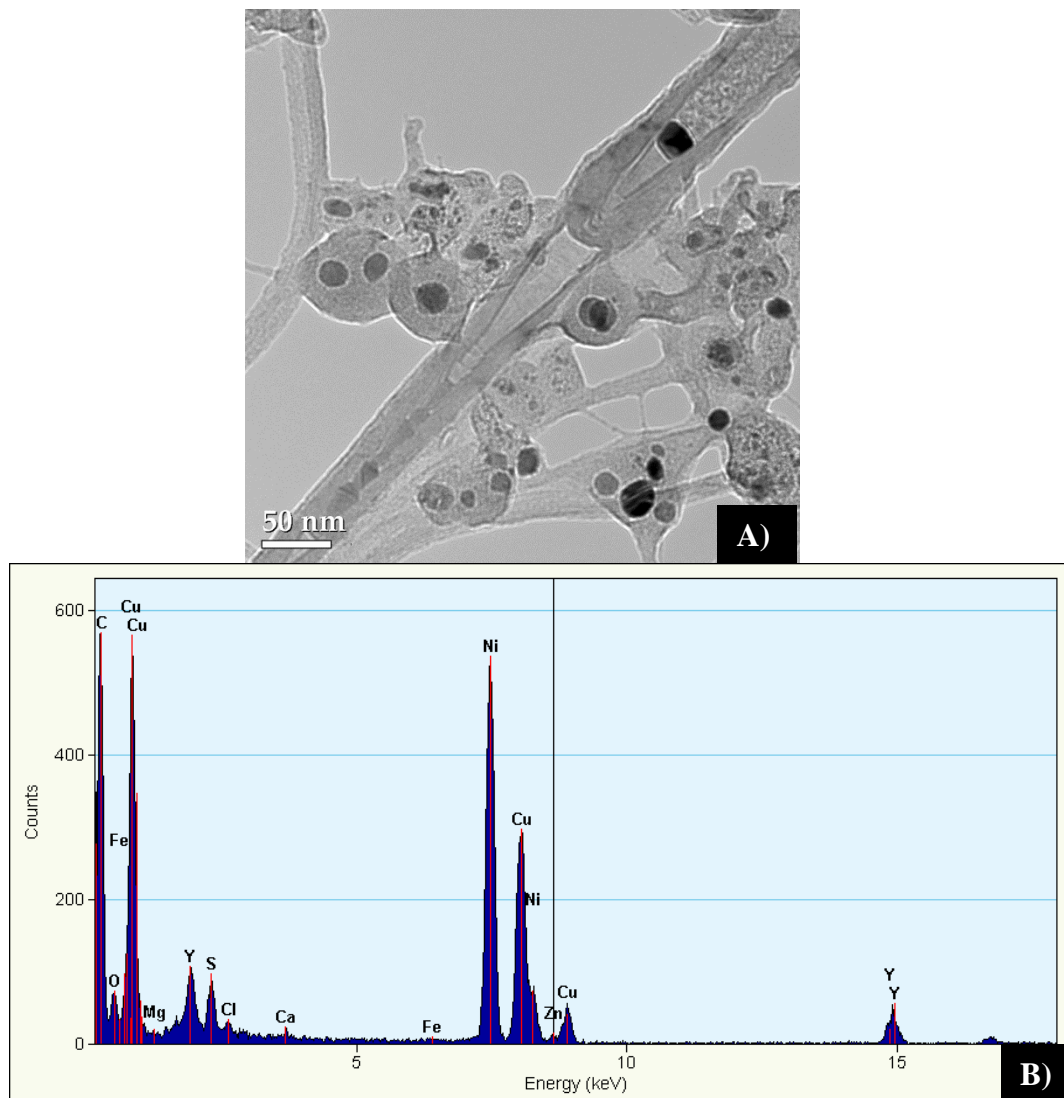
Figure SI 9: Additional XPS spectra of CNT nanocomposite samples

Figure SI 10: ATR-FTIR of C-H stretching regions before and after UVC irradiation and delta spectra of each sample following exposure

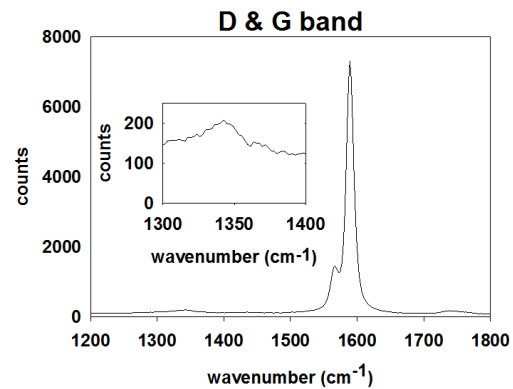
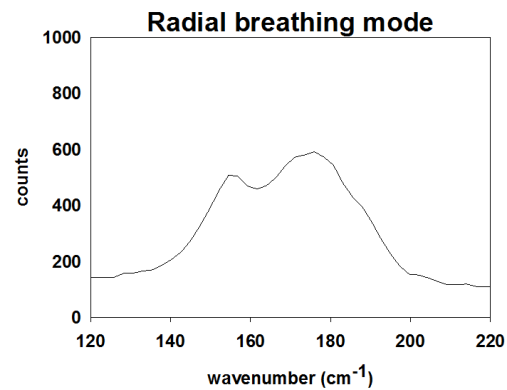
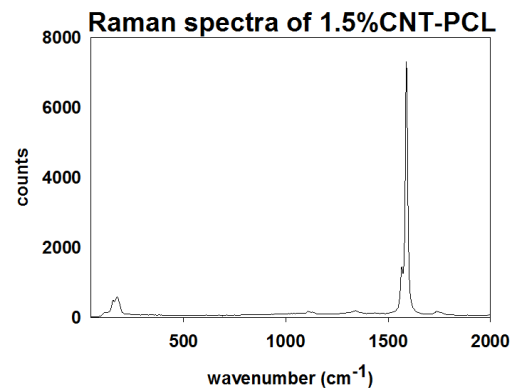
UV-Vis of pure poly- ϵ -caprolactone (PCL) nanocomposite



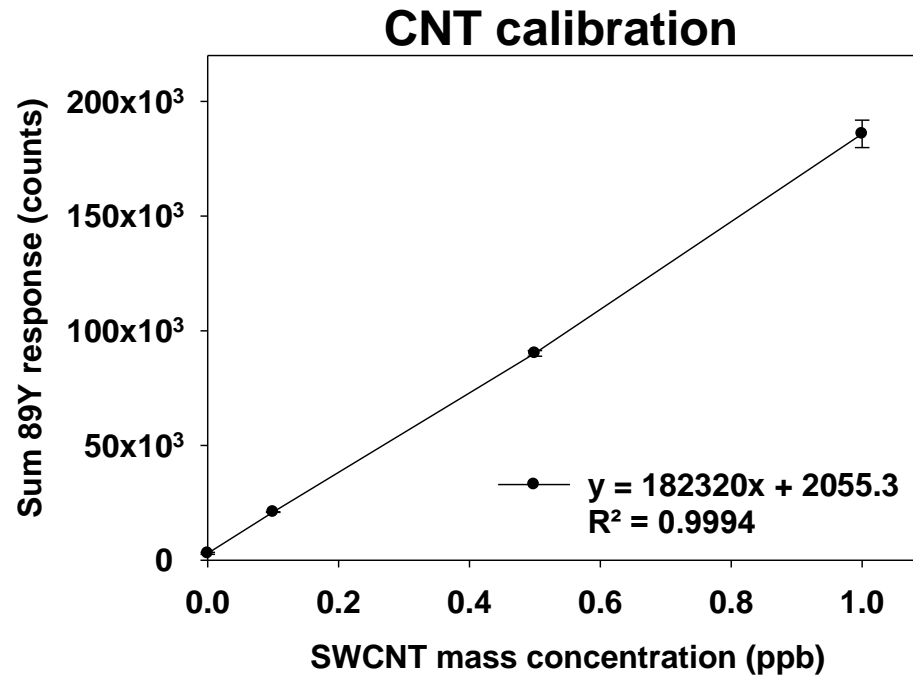
SI 1: Low pressure mercury lamps used in this study have an intense emission at 254nm (blue dashed line). The ester functionality of PCL is photoexcited with light below 300nm (black dashed line) and photodegrades by means of a Norrish type II reaction¹.



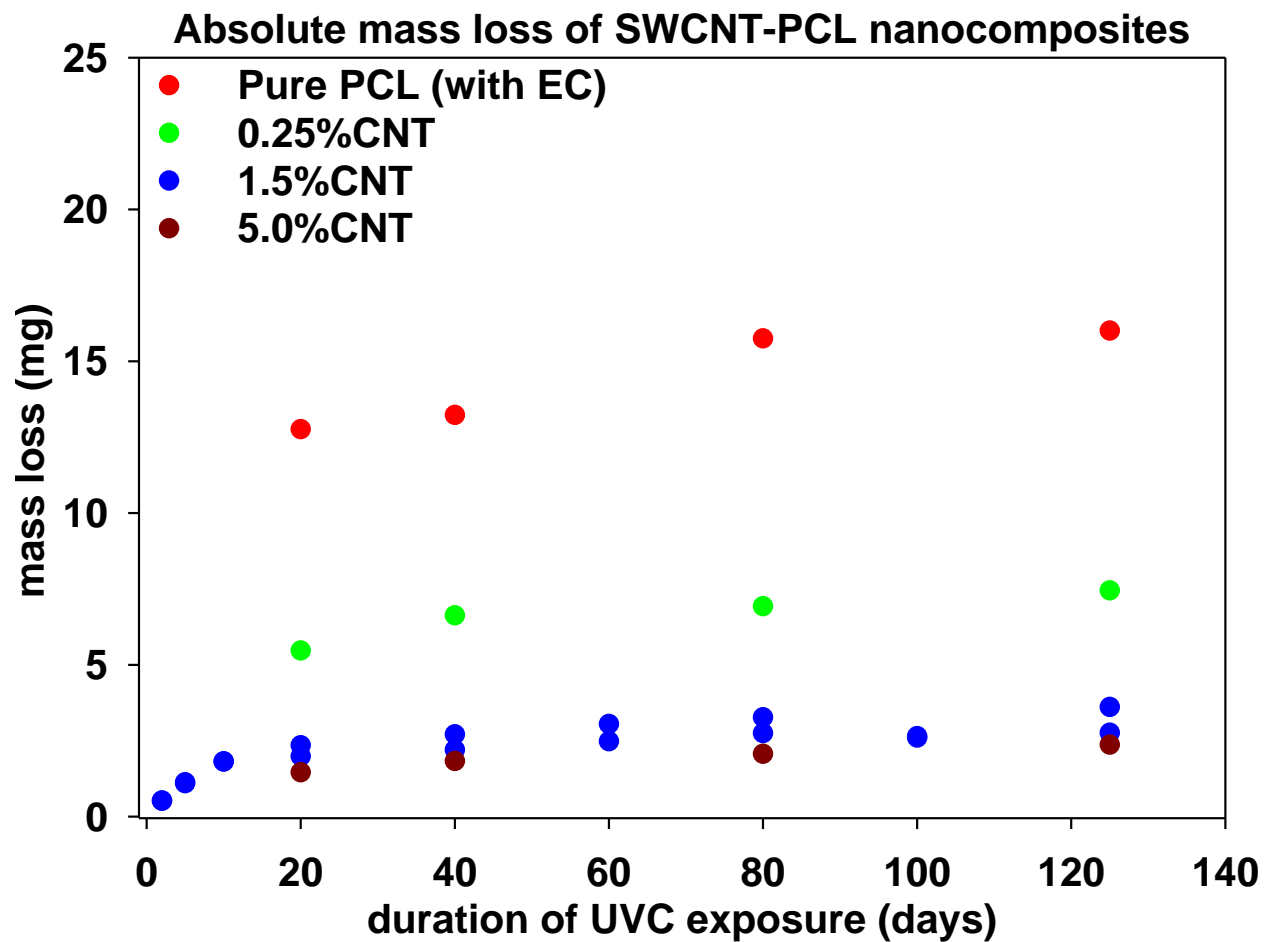
SI 2: A) TEM imaging as received SWCNTs, highlighting their residual metal nanoparticles. B) EDX confirms presence of yttrium and nickel, residual from synthesis. Manufacturer reports a metal content < 30% (via TGA). Copper is measured due to the Cu grid.



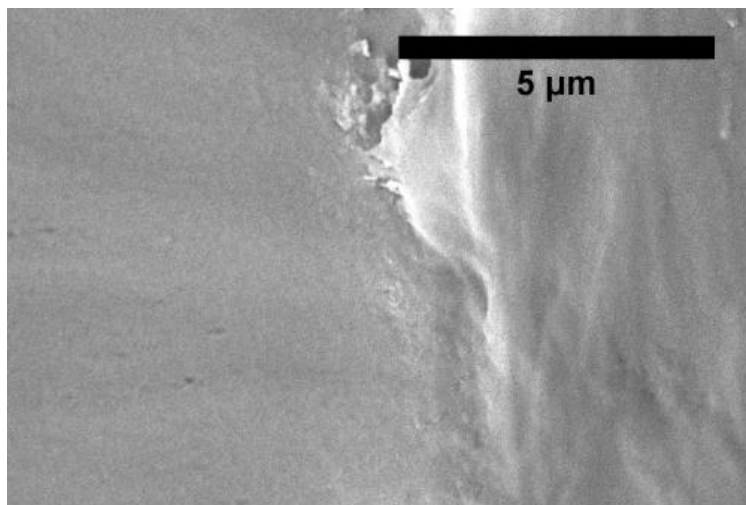
SI 3: Raman spectra of the as received SWCNTs within a 1.5% CNT-PCL sample



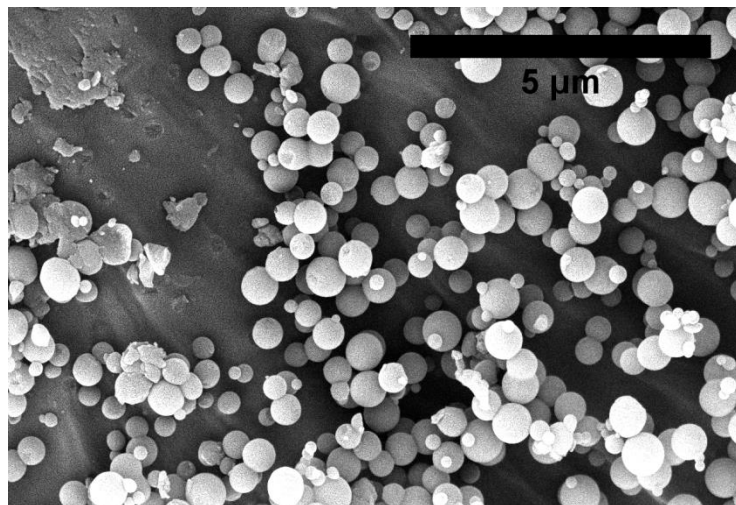
SI 4: Calibration curve constructed from SWCNT suspensions of increasing concentration. 89Y response to CNT concentration established from this plot is used to determine CNT concentration in release supernatants.



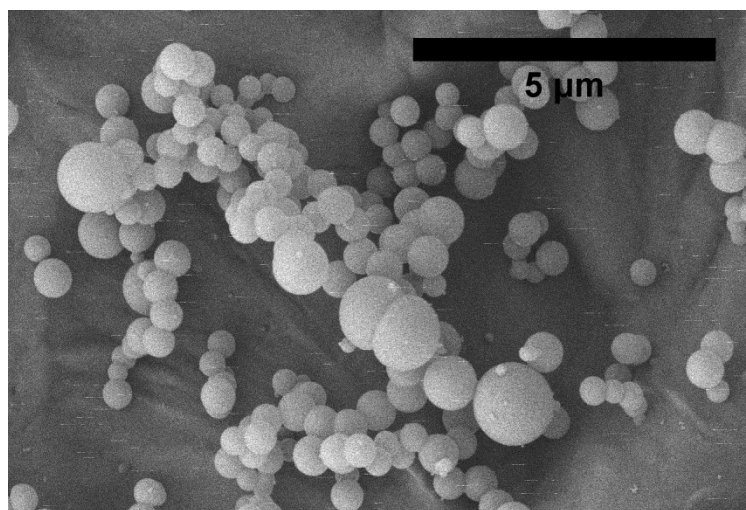
SI 5: Absolute mass loss, in mg, of each nanocomposite sample irradiated with 254nm light. Also shown is the mass loss for the Pure PCL containing ethyl cellulose irradiated with 300nm light.



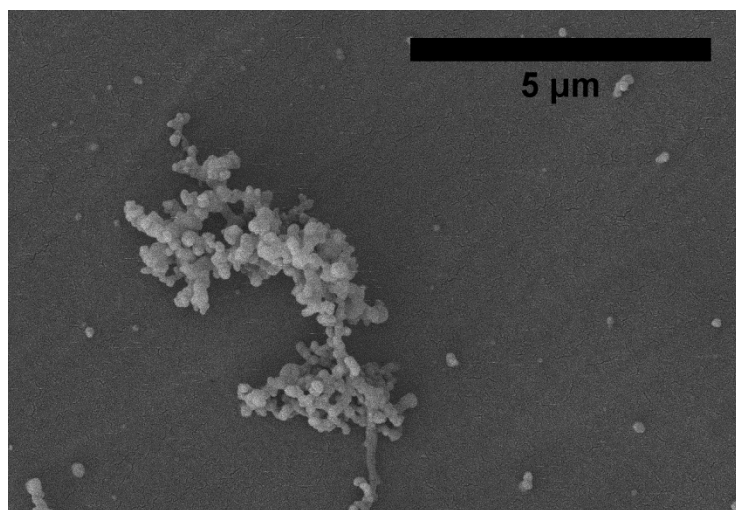
A) 0 days Exposure (with ethyl cellulose)



B) With ethyl cellulose: 20 days UVC Exposure

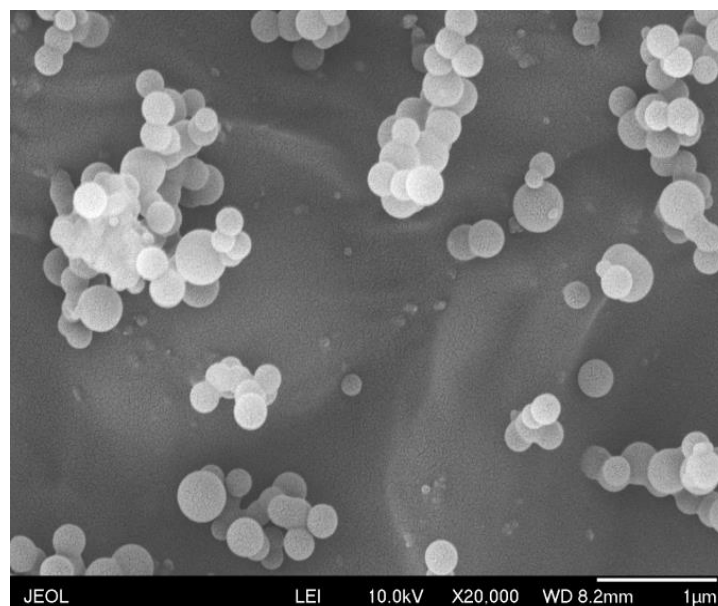
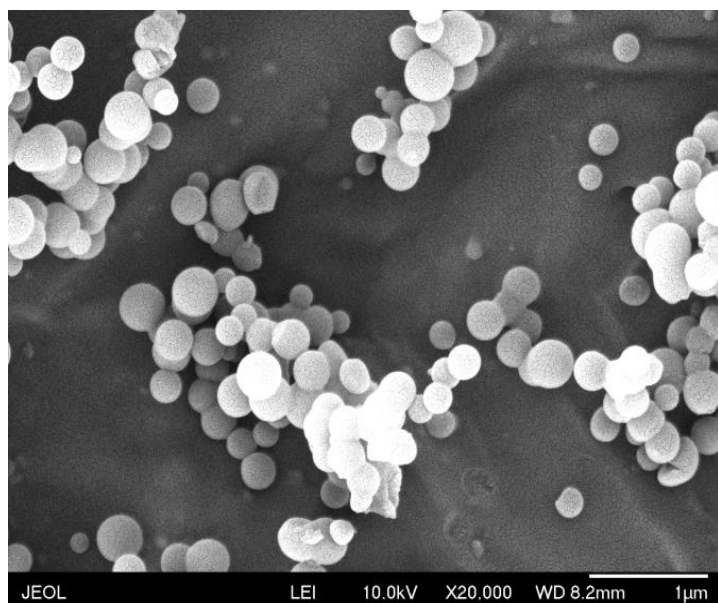


C) Without ethyl cellulose: 20 days UVC Exposure

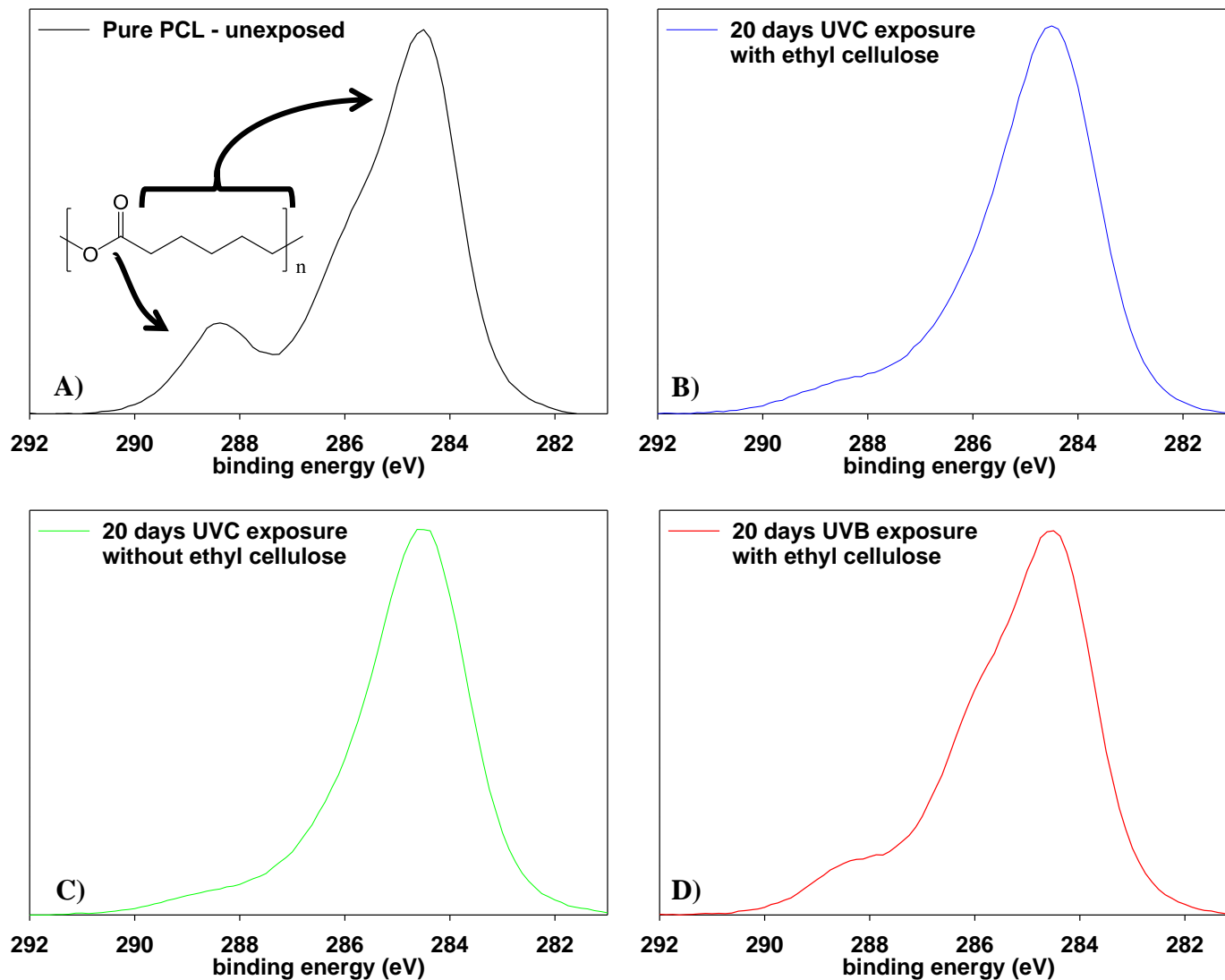


D) With ethyl cellulose: 20 days UVB Exposure

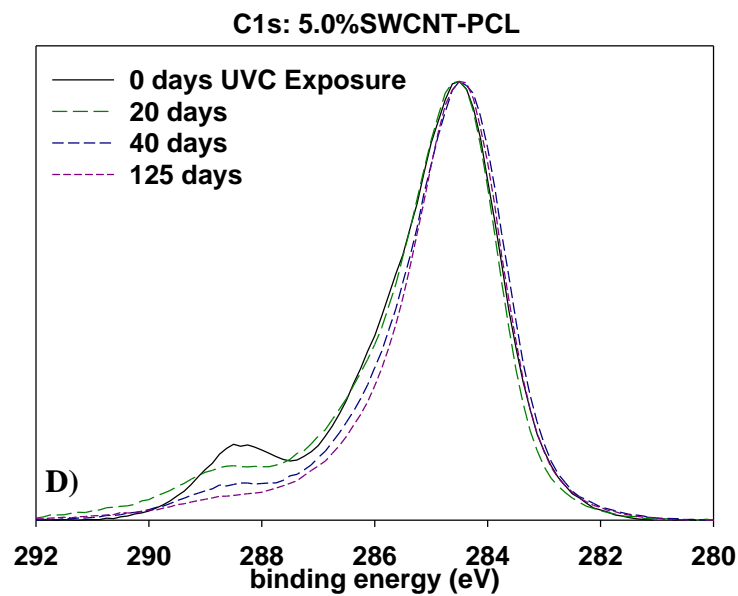
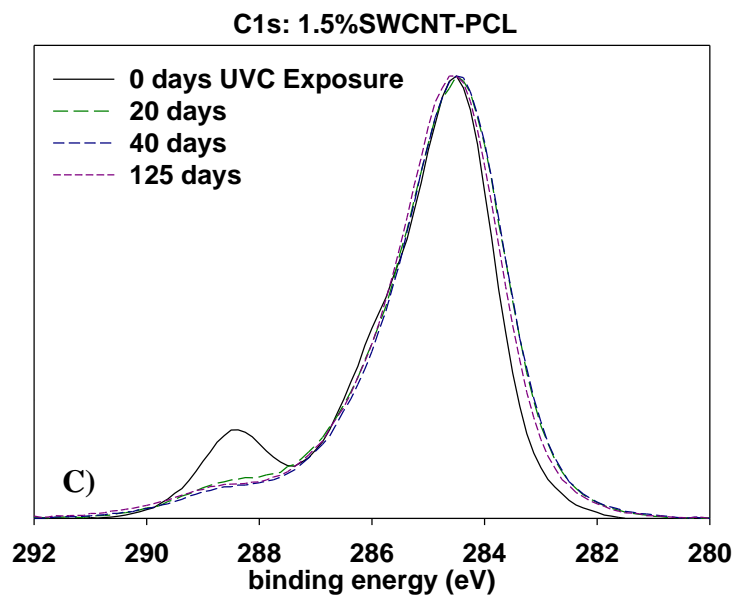
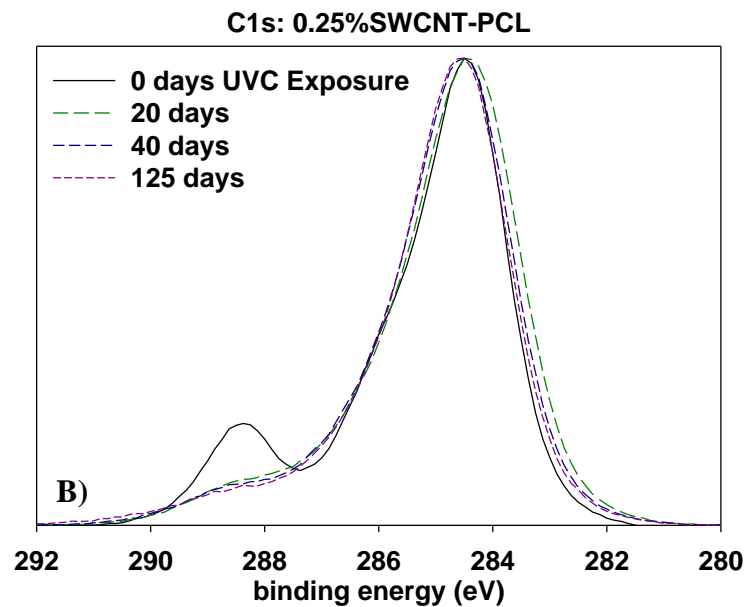
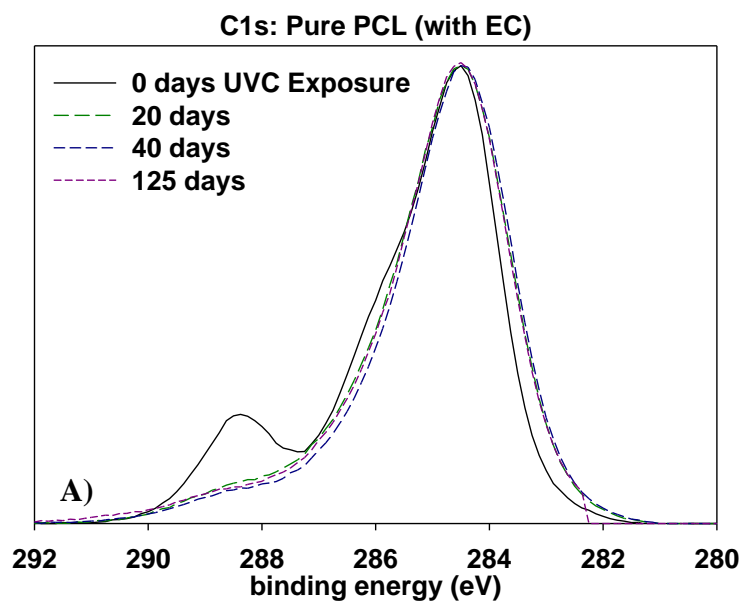
SI 6: SEM imaging of Pure PCL with and without ethyl cellulose shows the formation of bulbous like features following UVC exposure (B and C, respectively). Pure PCL samples with ethyl cellulose show the formation of the smaller bulbous features following UVB exposure (D).



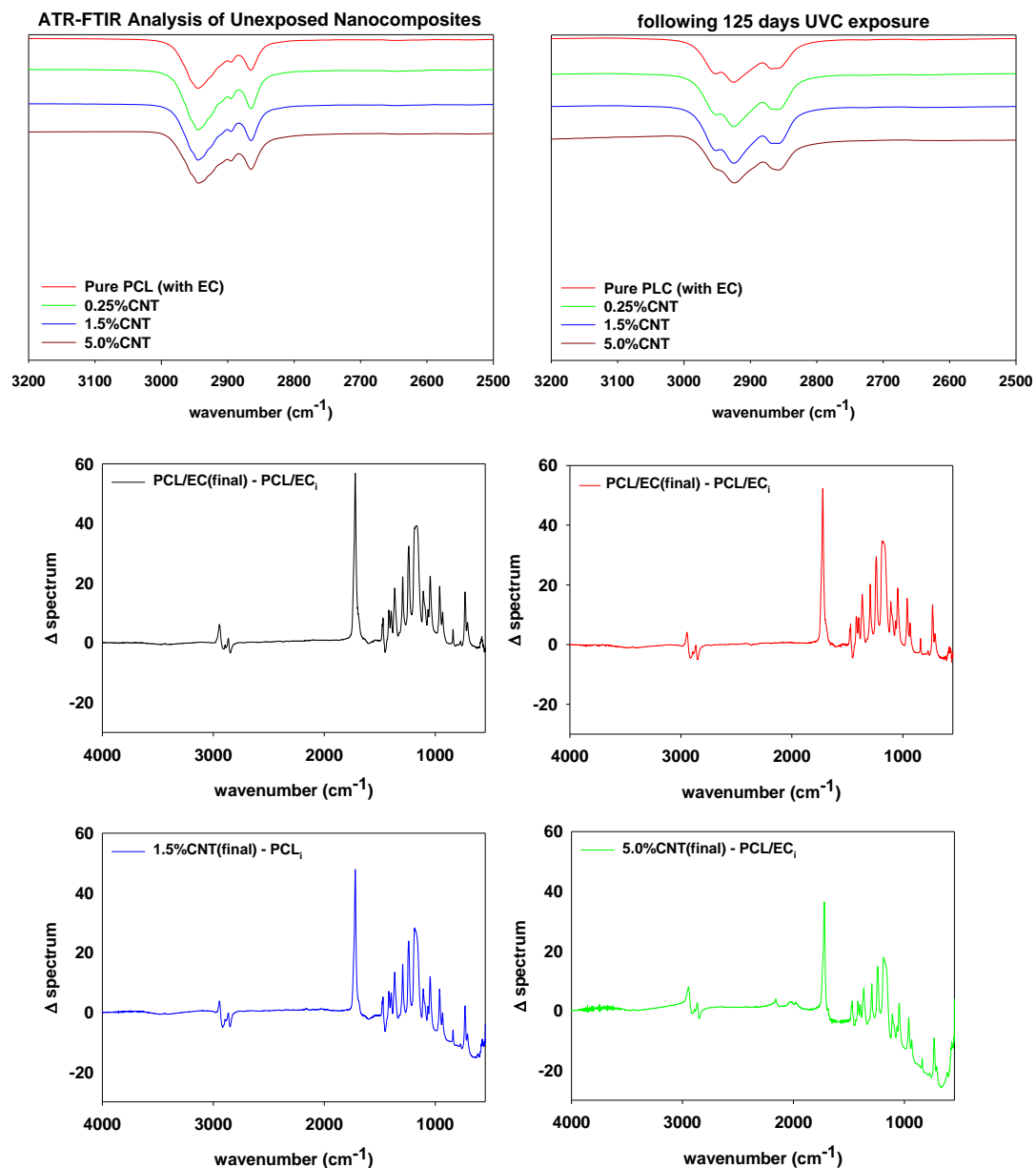
SI 7: SEM images of 0.25% CNT-PCL sample following 20 days of UVC Exposure, (left) and 0.25% CNT-PCL sample following 125 days of UVC Exposure (right)



SI 8: XPS characterization of Pure PCL with and without ethyl cellulose both lose the ester peak following UVC exposure (compare B and C to A). Pure PCL with ethyl cellulose show a diminished ester peak following UVB exposure (compare D to A).



SI 9: XPS characterization of nanocomposites shows consistent loss of ester peak within the first 20 days of UVC exposure for the three lower loadings; the 5%CNT samples appears to lose ester by day 40



SI 10: ATR-FTIR of all composites before and after exposure highlights similarity of finer spectral features among the nanocomposites (Top). Difference IR spectra for each exposed nanocomposite sample. Spectra is calculated by subtracting the unexposed PCL/EC spectra from the spectra collected after 125 days of UVC exposure, for each sample (bottom).