Supporting Information for:

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

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ES Nano

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# UV-Vis of pure poly-ε-caprolactone (PCL) nanocomposite
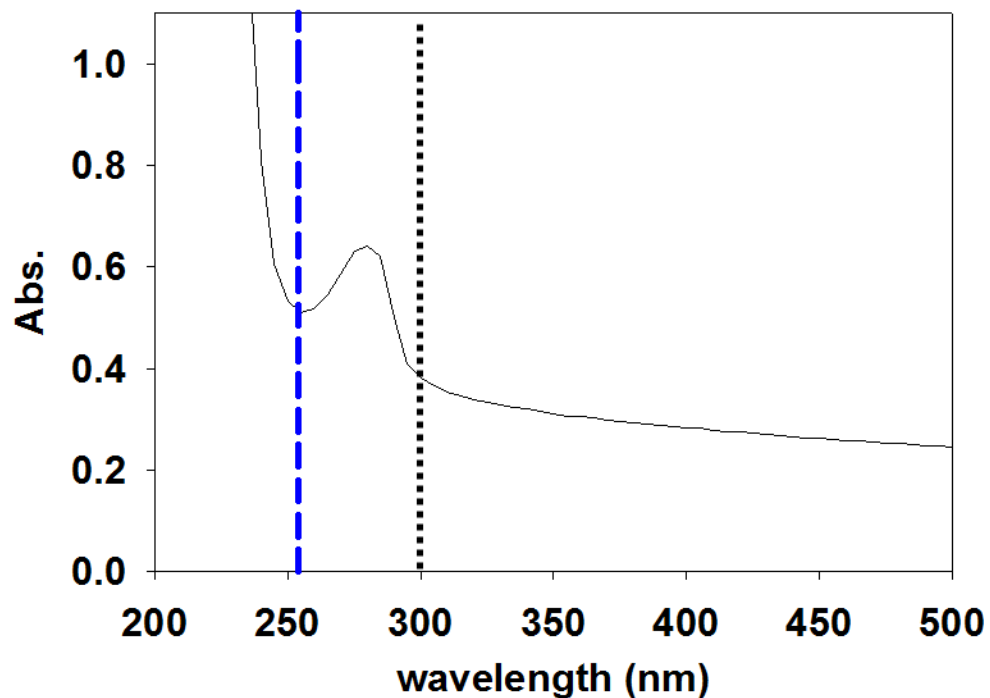
SI 1: Low pressure mercury lamps used in this study have an intense emission at 254nm (blue dashed line). The ester functionality of PCL is photoexcited with light below 300nm (black dashed line) and photodegrades by means of a Norish type II reaction[1] .

1)   J. Photopolym. Sci. Technol., Vol.11, No.1, 1998
Photo decomposition of Aliphatic Poly esters. V
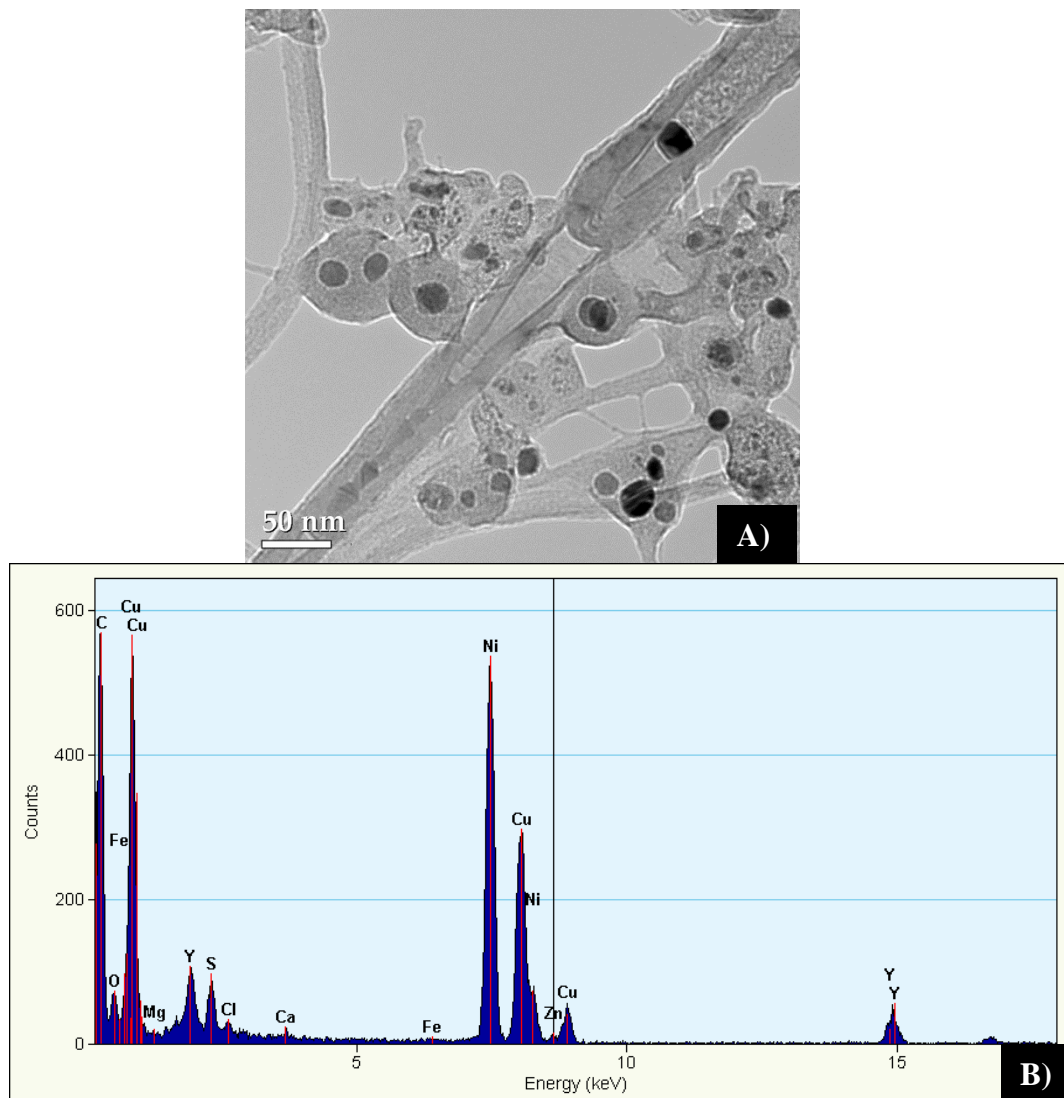
SI 2: A) TEM imaging as received SWCNTs, highlighting their residual metal nanoparticles. B) EDX confirms presence of yttrium and nickel, residual from synthesis. Manufactorer reports a metal content < 30% (via TGA). Copper is measured due to the Cu grid.
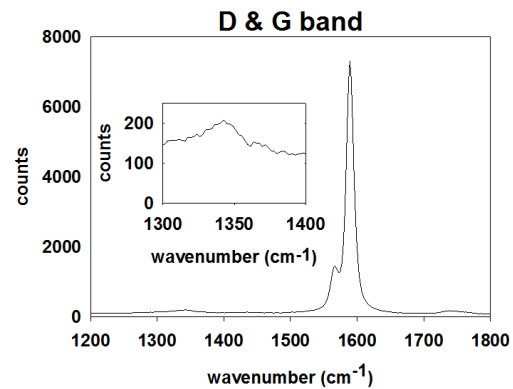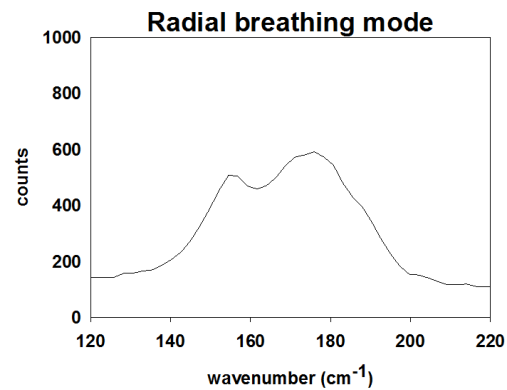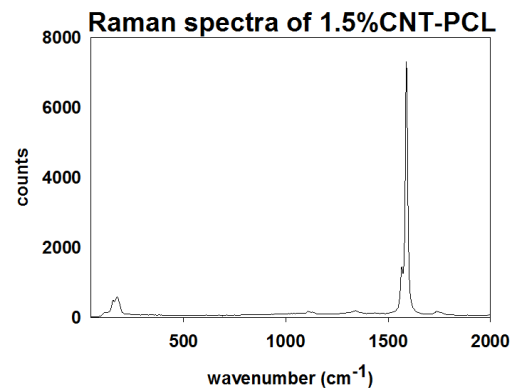
SI 3: Raman spectra of the as received SWCNTs within a 1.5%CNT-PCL sample
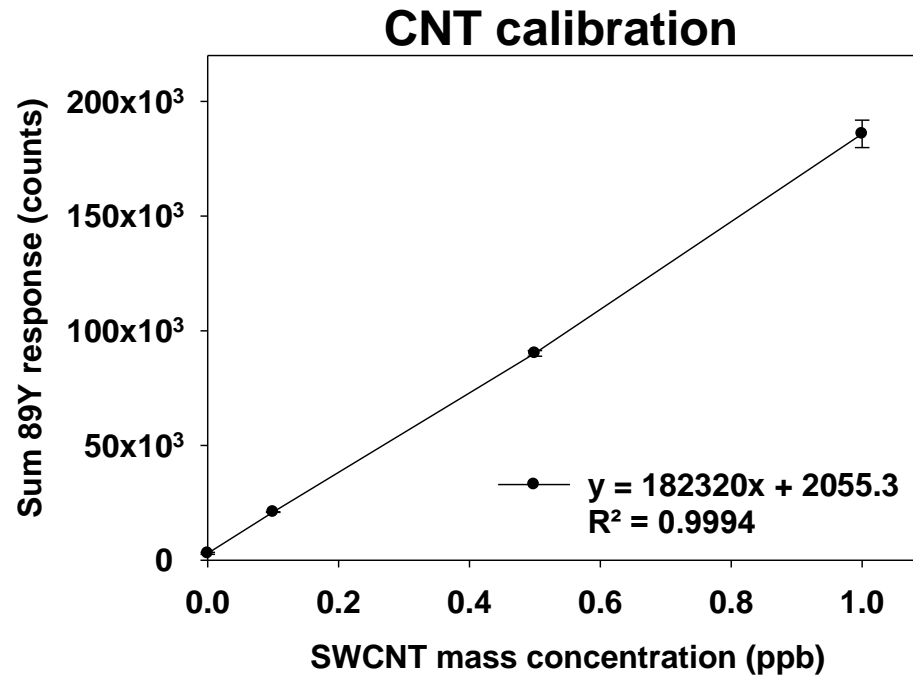
SI 4: Calibration curve constructed from SWCNT suspensions of increasing concentration. 89Y response to CNT concentration established from this plot is used to determine CNT concentration in release supernatants.
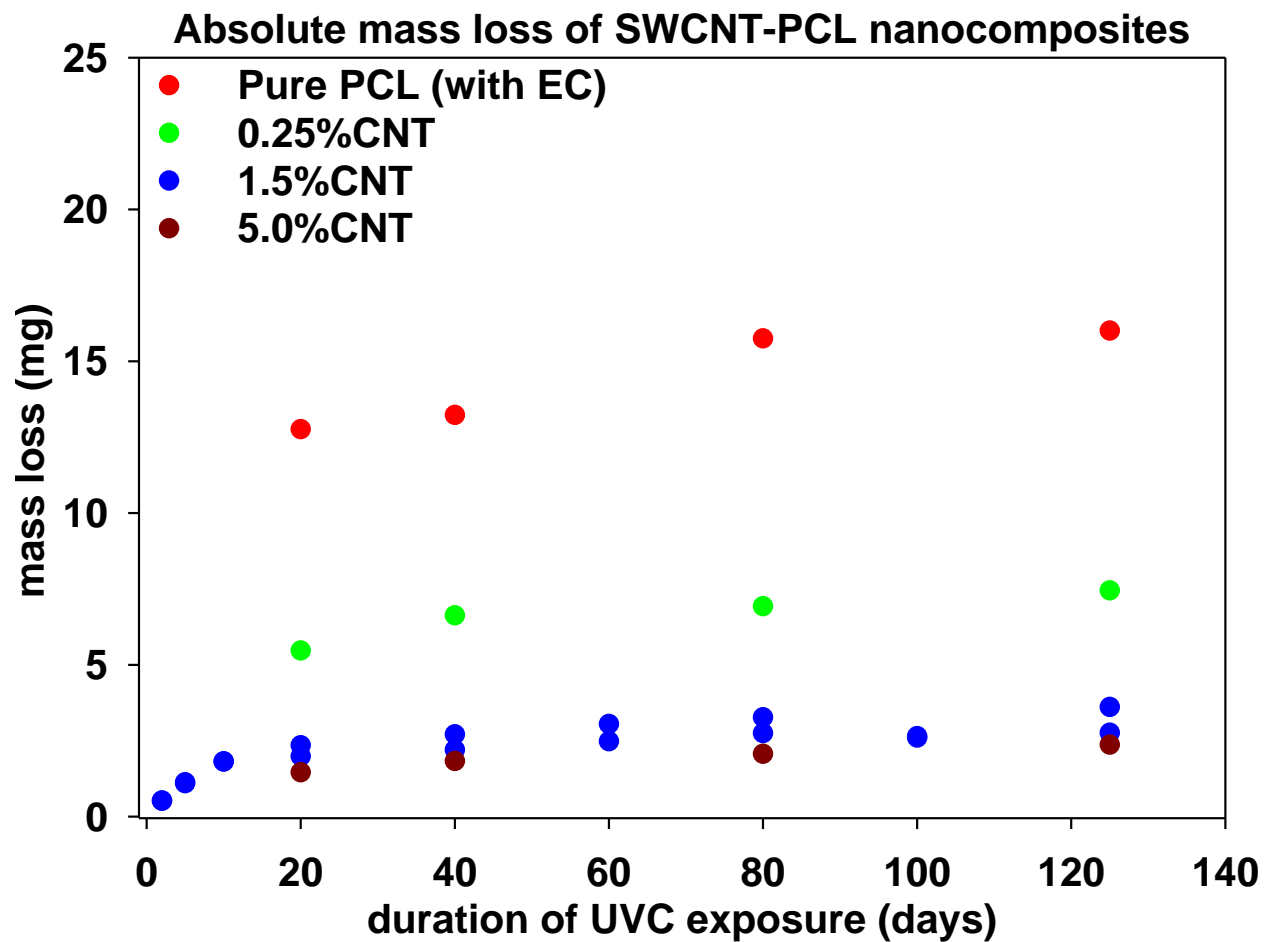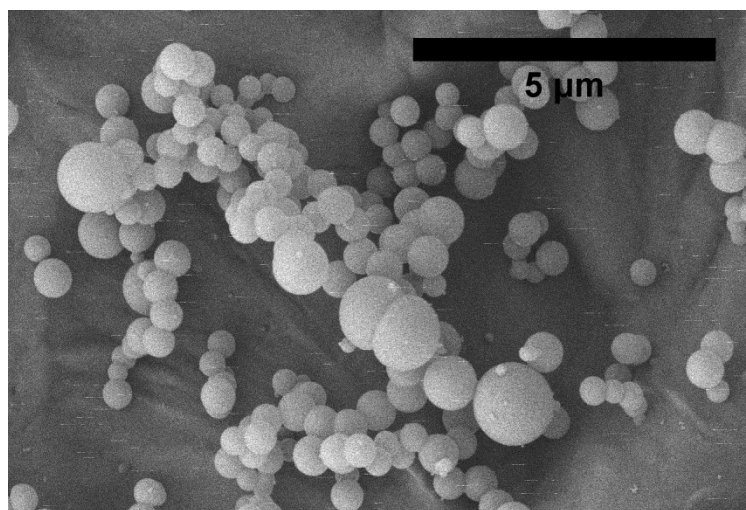
SI 5: Absolute mass loss, in mg, of each nanocomposite sample irradiated with 254nm light. Also shown is the mass loss for the Pure PCL containing ethyl cellulose irradiated with 300nm light.
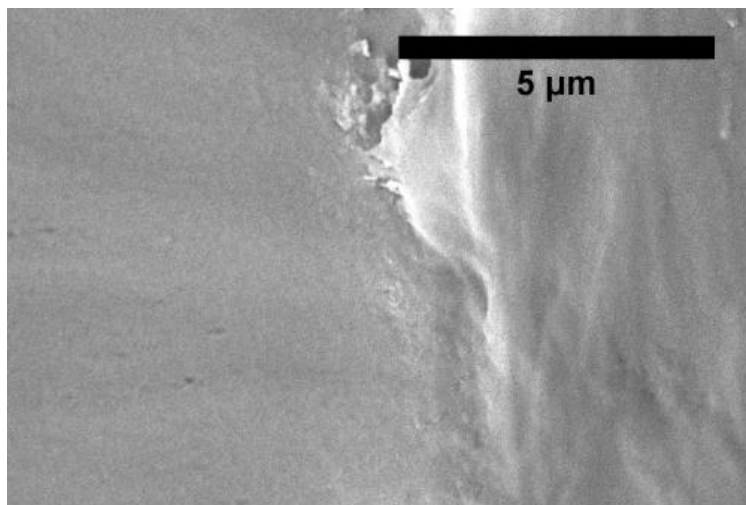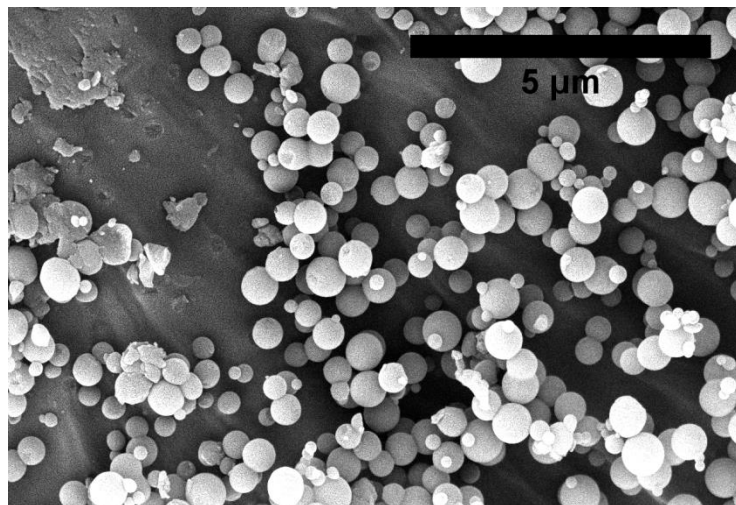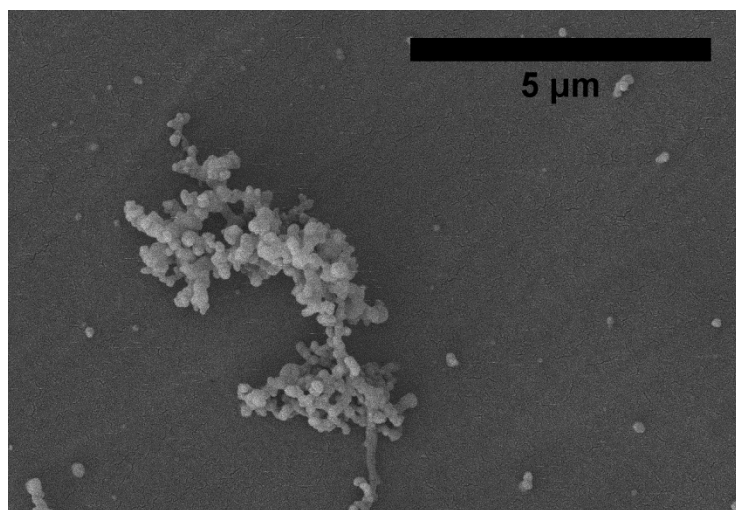
SI 6: SEM imaging of Pure PCL with and without ethyl cellulose shows the formation of bulbous like features following UVC exposure (B and C, respectively). Pure PCL samples with ethyl cellulose show the formation of the smaller bulbous features following UVB exposure (D).
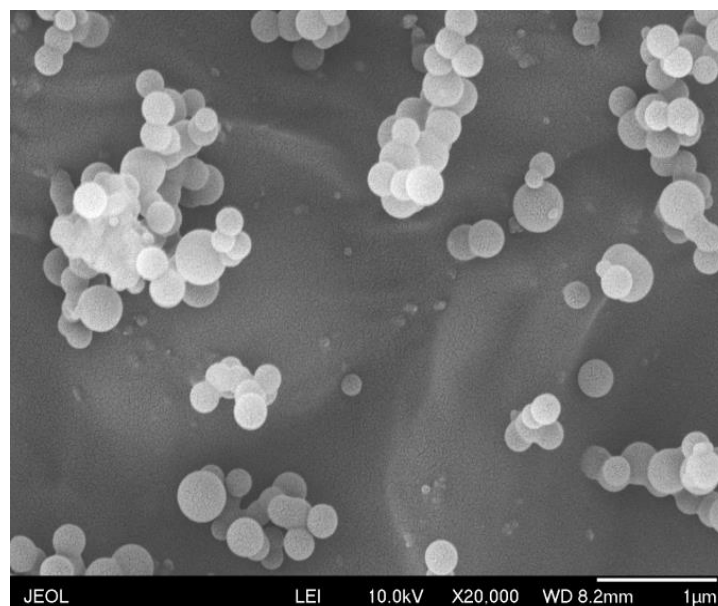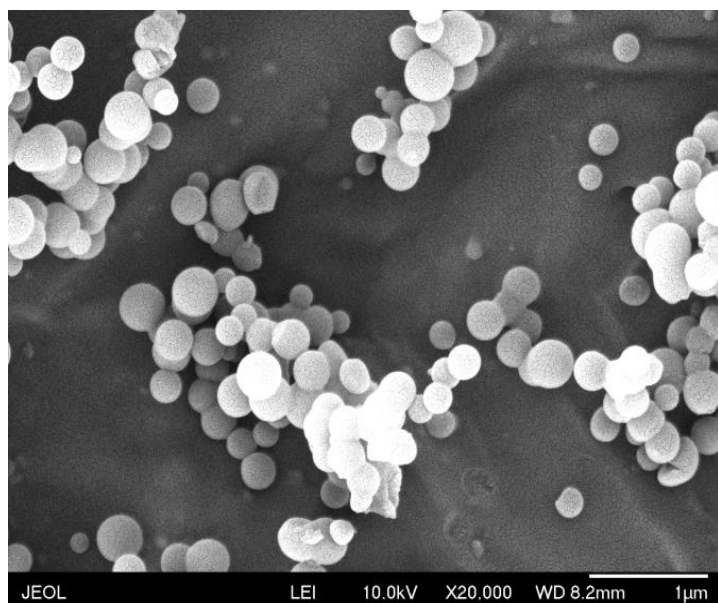
SI 7: SEM images of 0.25%CNT-PCL sample following 20 days of UVC Exposure, (left) and 0.25%CNT-PCL sample following 125 days of UVC Exposure (right)
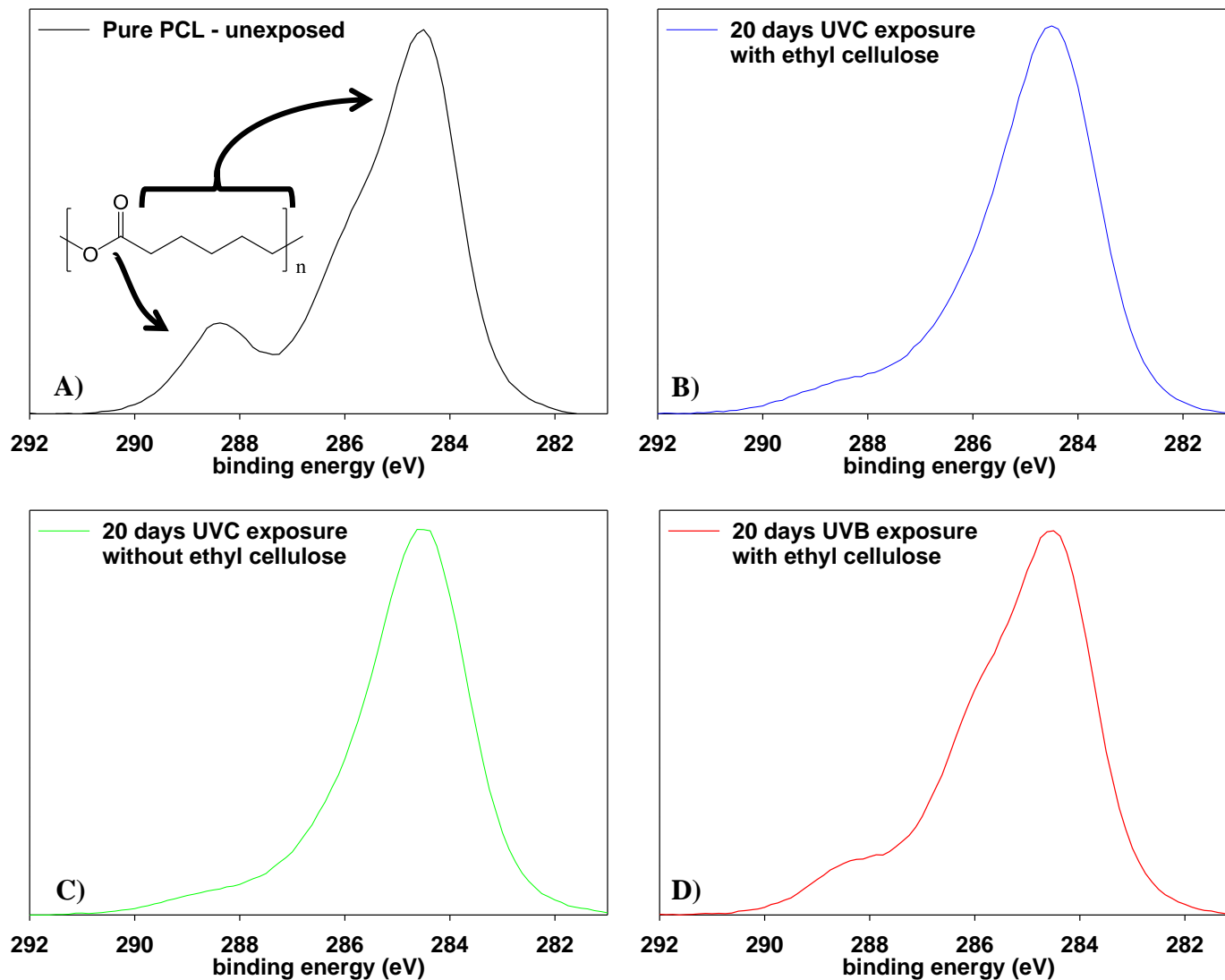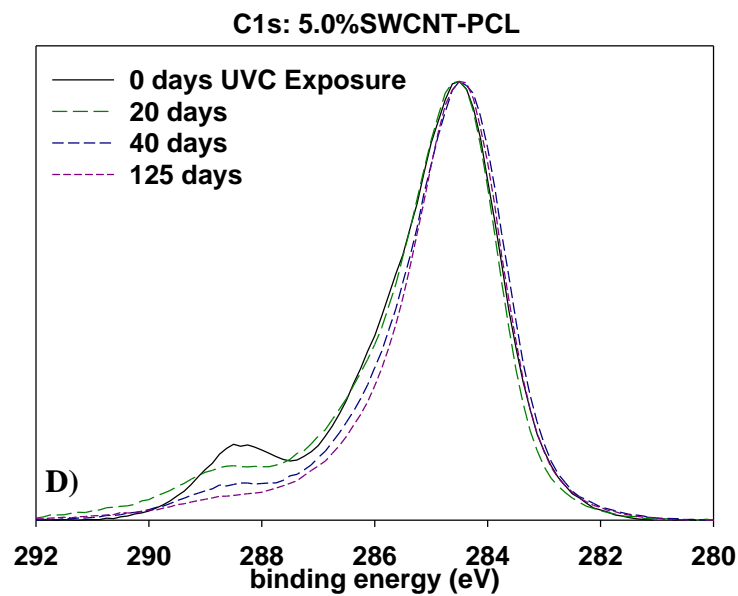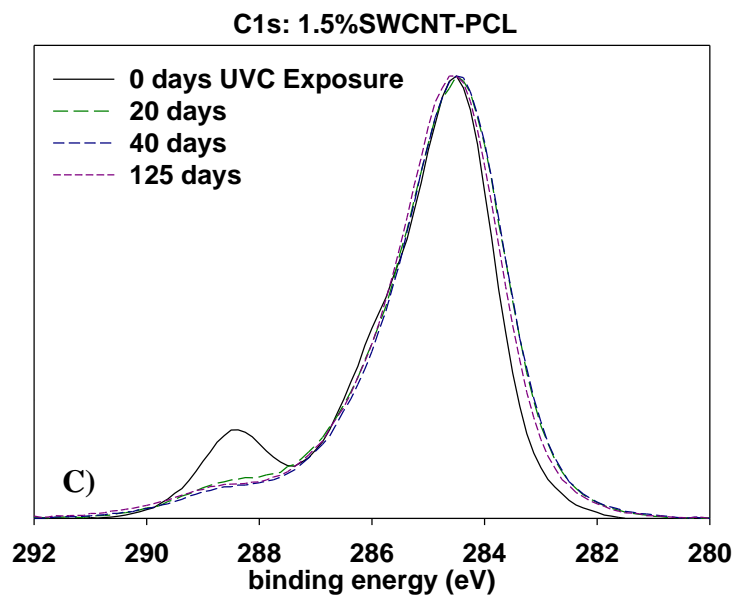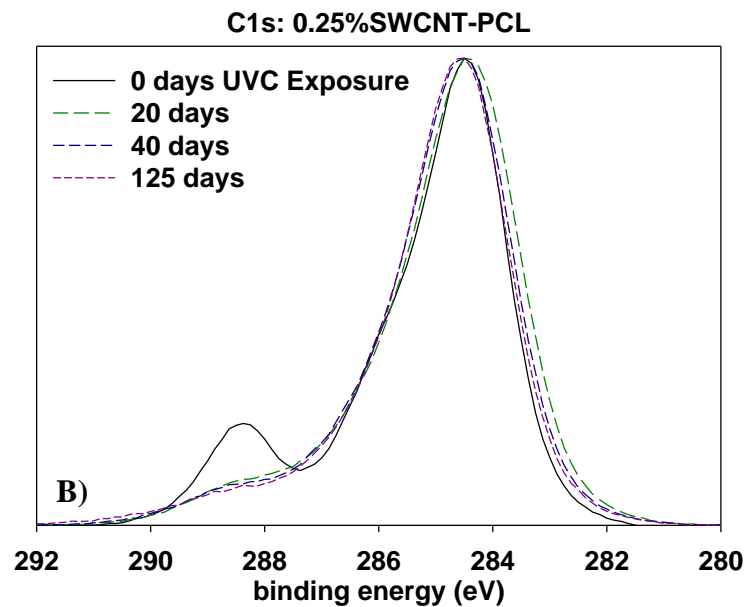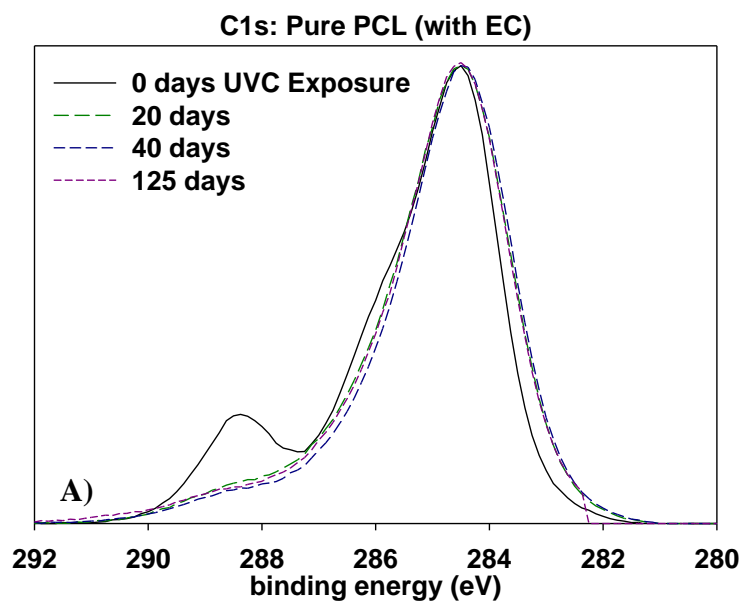
SI 8: XPS characterization of Pure PCL with and without ethyl cellulose both lose the ester peak following UVC exposure (compare B and C to A). Pure PCL with ethyl cellulose show a diminished ester peak following UVB exposure (compare D to A).

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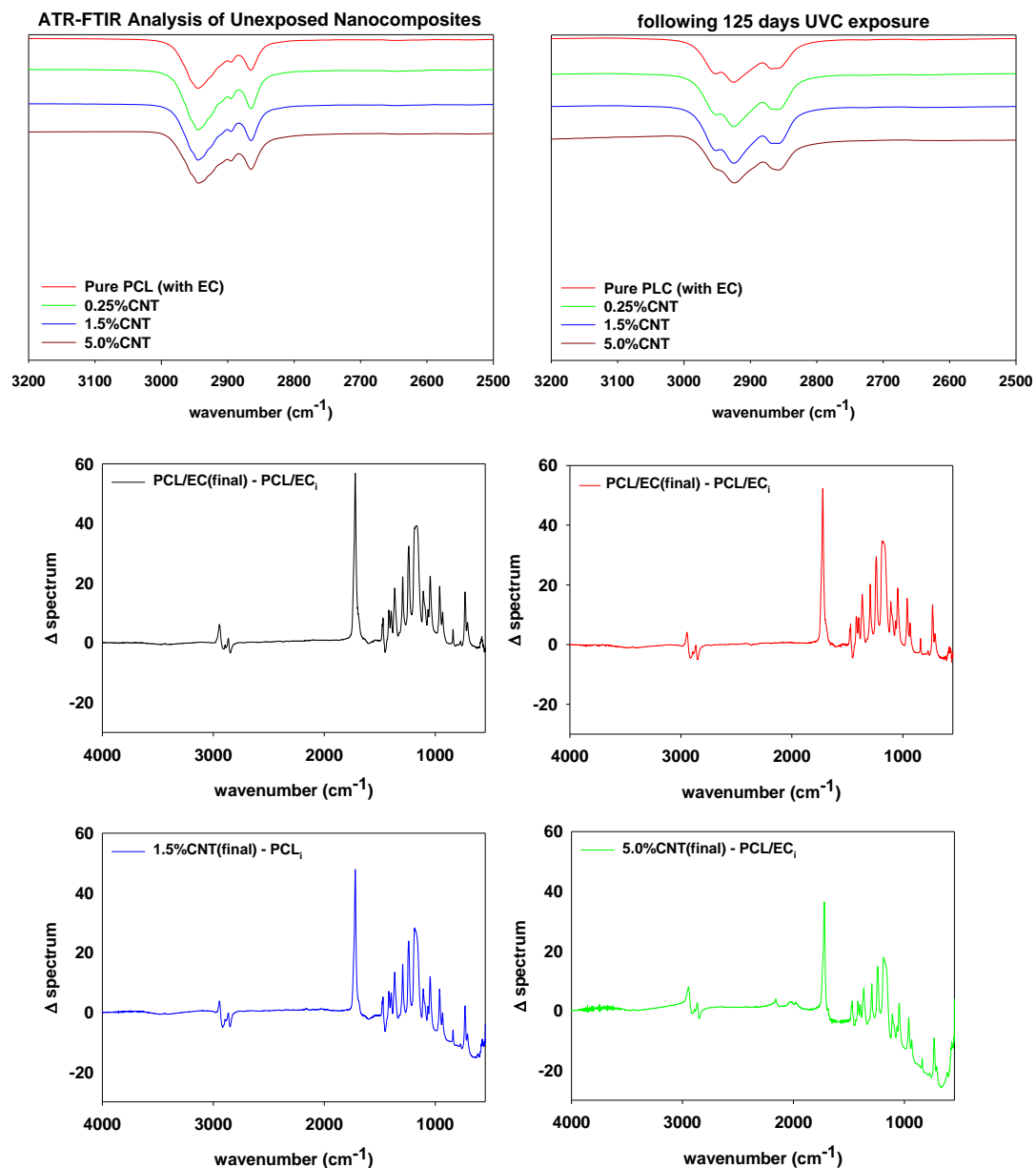
SI 10: ATR-FTIR of all composites before and after exposure highlights similarity of finer spectral features among the nanocomposites (Top). Difference IR spectra for each exposed nanocomposite sample. Spectra is calculated by subtracting the unexposed PCL/EC spectra from the spectra collected after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