Supplemental Information

Green bionanocomposites from high-elasticity "soft" polyurethane and high-crystallinity "rigid" chitin nanocrystals with controlled surface acetylation

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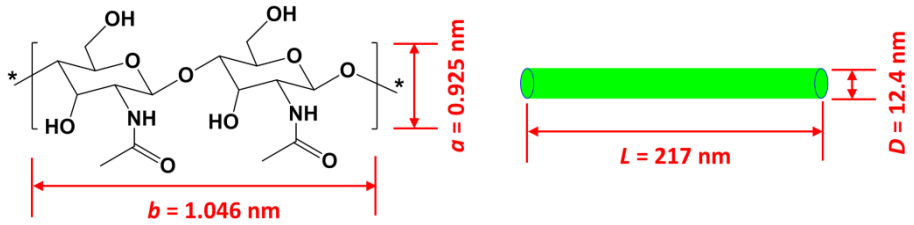
Amount of Surface Hydroxyl Groups ($n_{surface\text{-}OH}$) on Chitin Nanocrystals



$$n_{surface-OH} = \frac{N_1 N_2}{N_A} \qquad (S-1)$$

$$N_1 = (\frac{w}{\rho_{chitin}})/V_{ChN} = (\frac{w}{\rho_{chitin}})/(\frac{\pi}{4}D^2 L) \qquad (S-2)$$

$$N_2 = 4\left(\frac{S_{ChN}}{S'}\right) = 4\frac{\pi DL}{ab} \qquad (S-3)$$

in here, $N_A = 6.02 \times 10^{23}$ mol^{-1} (Avogadro's number), $\rho_{chitin} = 1.425$ g/cm^{-3}, $w = 1$ g

The data of size of the unit cell of chitin (a, b) and density of chitin crystallites (ρ_{chitin}) were from following references:

1 G.L. Clark and A.F. Smith, *J. Phys. Chem.* 1936, **40**, 863.

2 J. Li, J.-F. Revol, E. Naranjo and R.H. Marchessault, *Int. J. Biol. Macromol.* 1996, **18**, 177.

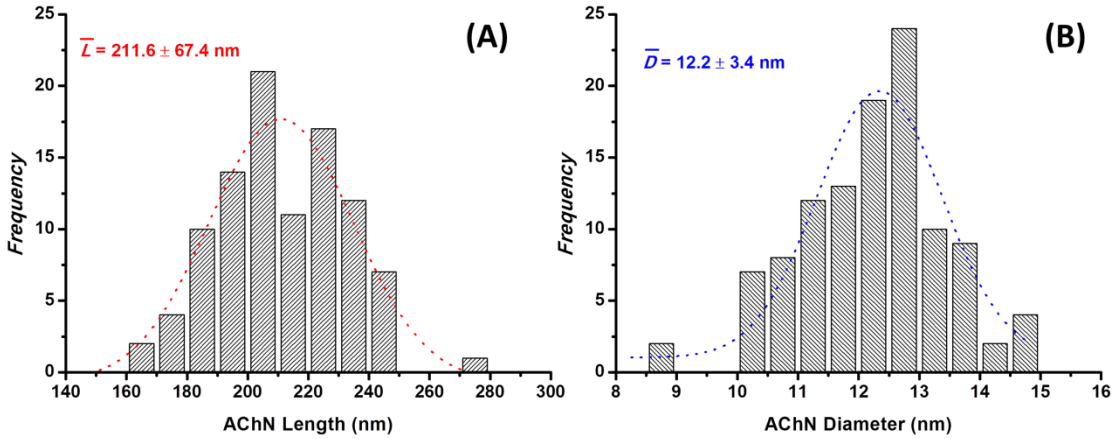


Figure S1. Size statistics for length (*L*, image A) and diameter (*D*, image B) of AChN from TEM images; dashed lines are Gaussian distribution fitting line according to the statistical data.

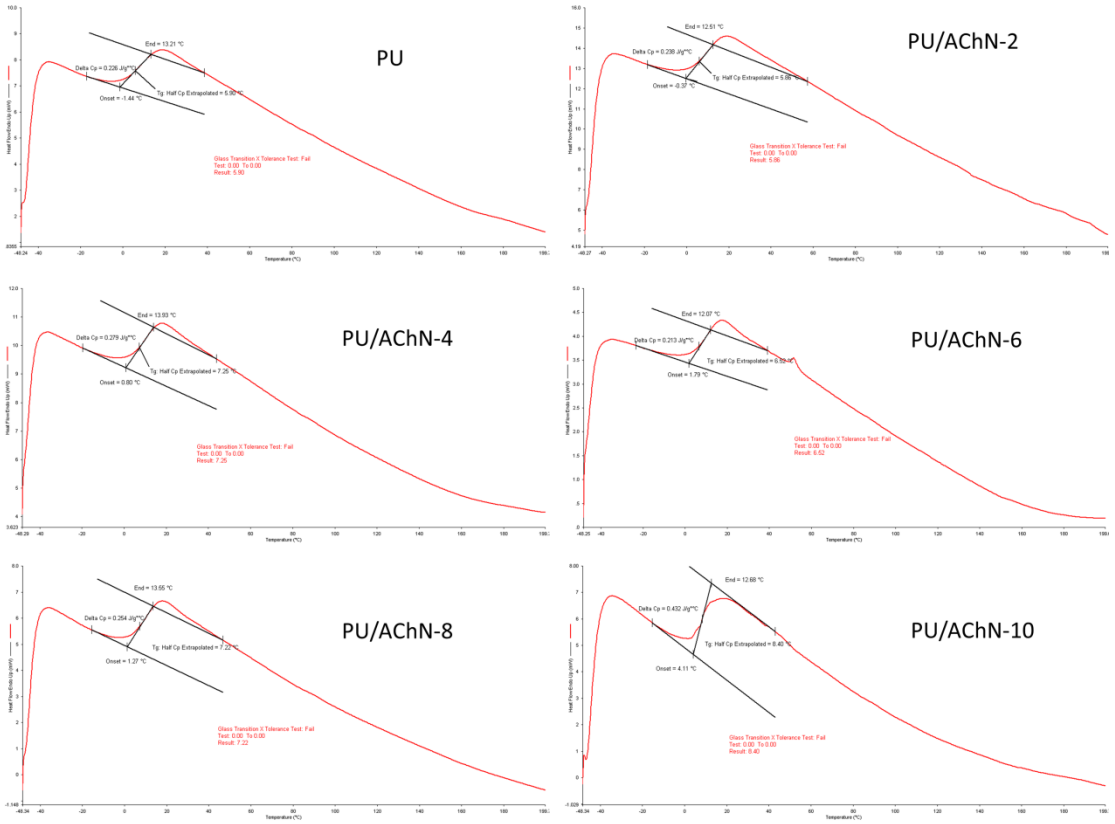


Figure S2. DSC thermograms of PU-based nanocomposites filled with various contents of AChN.

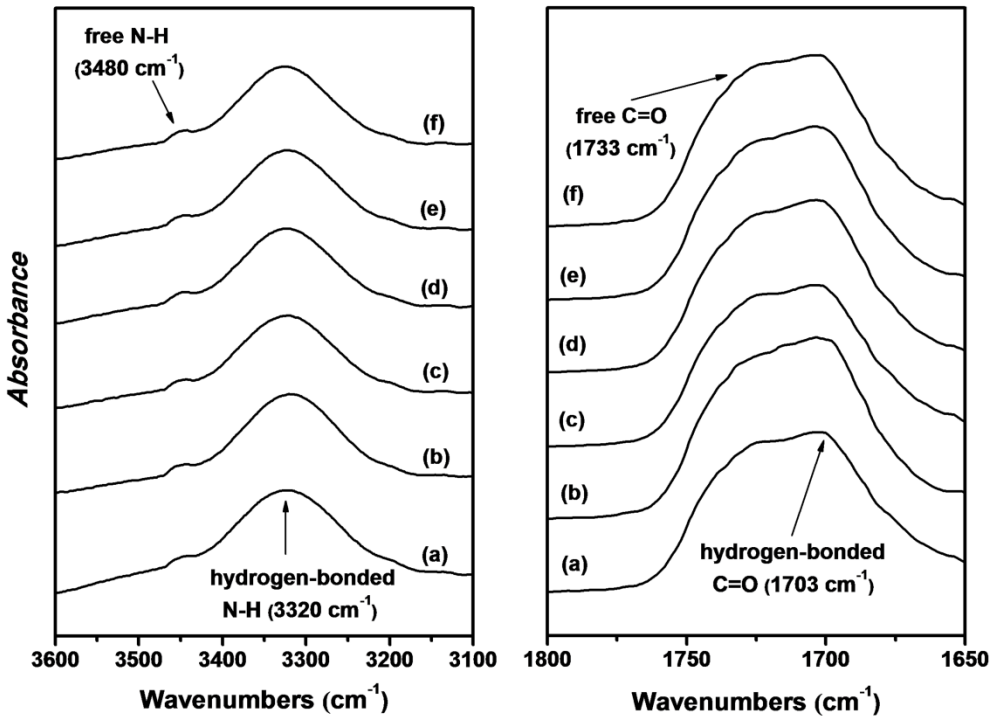


Figure S3. Amplified FTIR spectra of PU/AChN nanocomposites and neat PU material at the regions of 3600–3100 cm^{-1} and 1800–1650 cm^{-1}. (a) PU, (b) PU/AChN-2, (c) PU/AChN-4, (d) PU/AChN-6, (e) PU/AChN-8, (f) PU/AChN-10.