

SUPPORTING INFORMATION

Optically transparent and toughened Poly(methyl methacrylate) Composite Films with Acylated Cellulose Nanofiber

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Equation S1. Derivation of equations from EDX analysis.

Figure S1. Chemical equation of acylation process of CNF into CNFp.

Figure S2. ATR-IR spectra of (a) CNF, (b) CNFp (1 hour), (c) CNFp (2 hours), and (d) CNFp (4 hours).

Figure S3. Stress-strain curve from tensile test of PMMA composite films.

Equation S1. Derivation of equations from EDX analysis.

Assume 100% glucose units of CNF are modified into CNFp,

$$\text{CNFp} = \text{C}_{15}\text{H}_{22}\text{O}_8 \text{ (Mw} = 330 \text{ gmol}^{-1}\text{)}$$

Mass percentage (excluding H), C = 58.4%, O = 41.6%

A = Percent of CNF propionate (CNFp)

$$B = \text{Ratio of C:O} = \frac{C}{O}$$

$$B = \frac{C}{O} = \frac{\text{Mw of single C} [\text{No of C propionate (A)} + \text{No of C in CNF (100\% - A)}]}{\text{Mw of single O} [\text{No of O propionate (A)} + \text{No of O in CNF (100\% - A)}]}$$

$$B = \frac{C}{O} = \frac{12[15(A) + 6(100\% - A)]}{16[8(A) + 5(100\% - A)]}$$

Simplify A,

$$A = \frac{200(10B - 9)}{3(9 - 4B)} \text{ (Equation 1)}$$

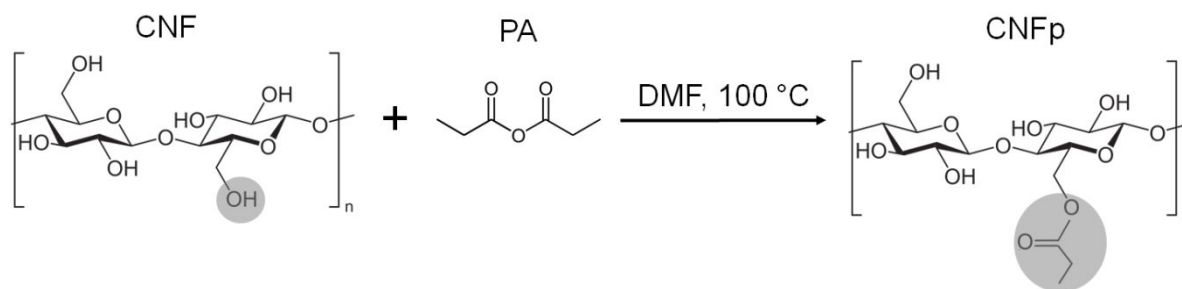


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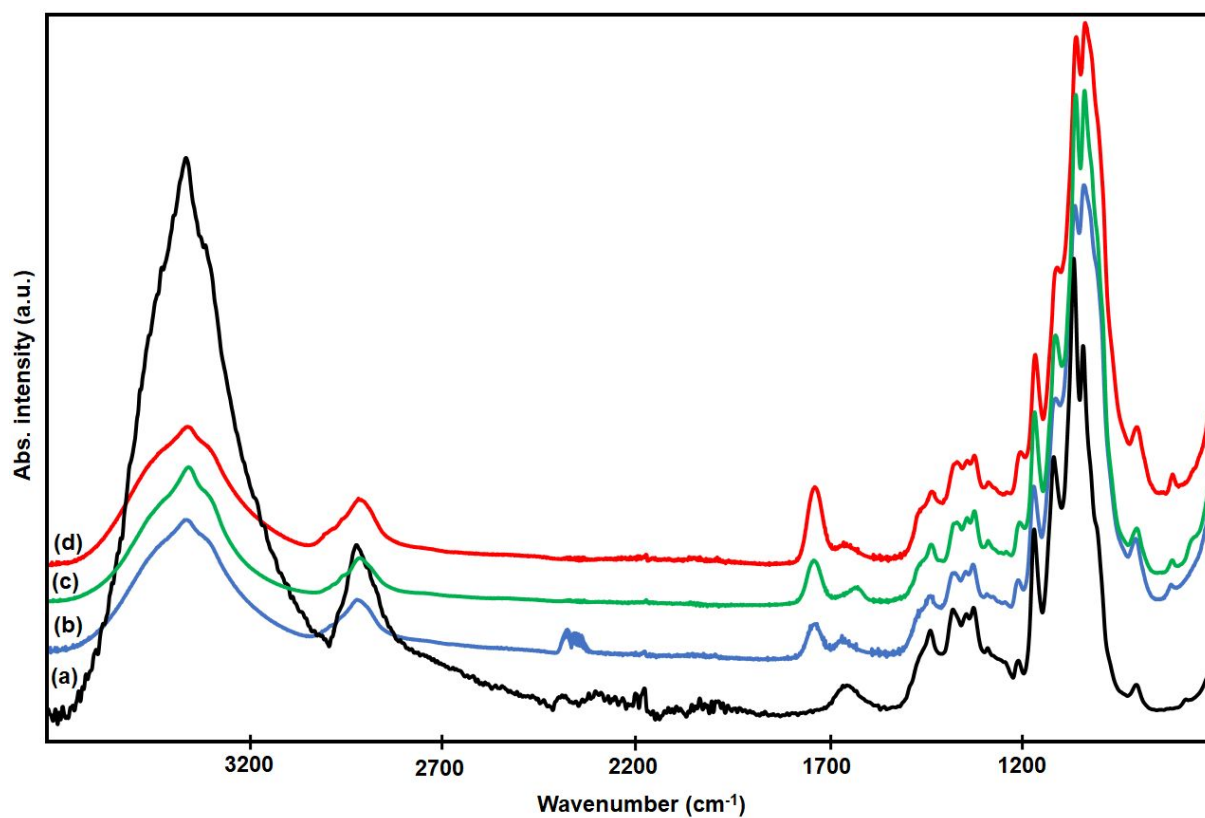


Figure S2. ATR-IR spectra of (a) CNF, (b) CNFp (1 hour), (c) CNFp (2 hours), and (d) CNFp (4 hours).

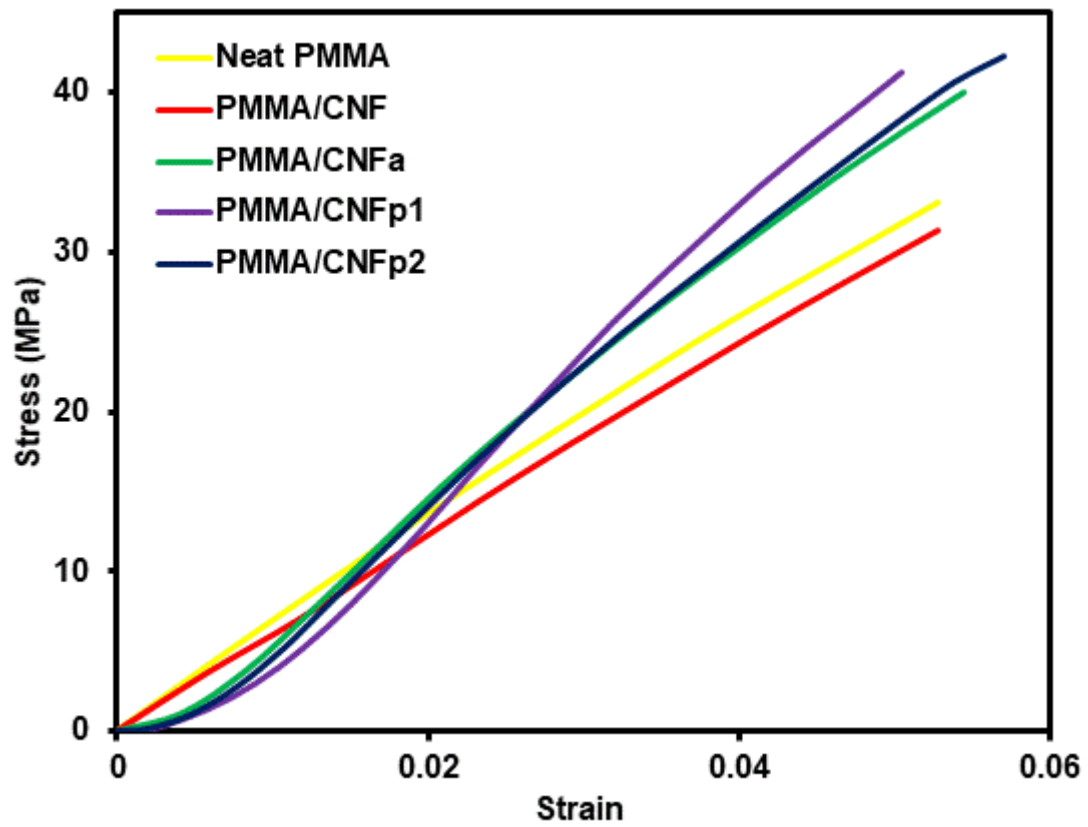


Figure S3. Stress-strain curves from tensile test of PMMA composite films.