Electronic Supplementary Material (ESI) for Polymer Chemistry.

Cellulose Nanocrystal-Reinforced Poly(5-triethoxysilyl-2-norbornene) Composites

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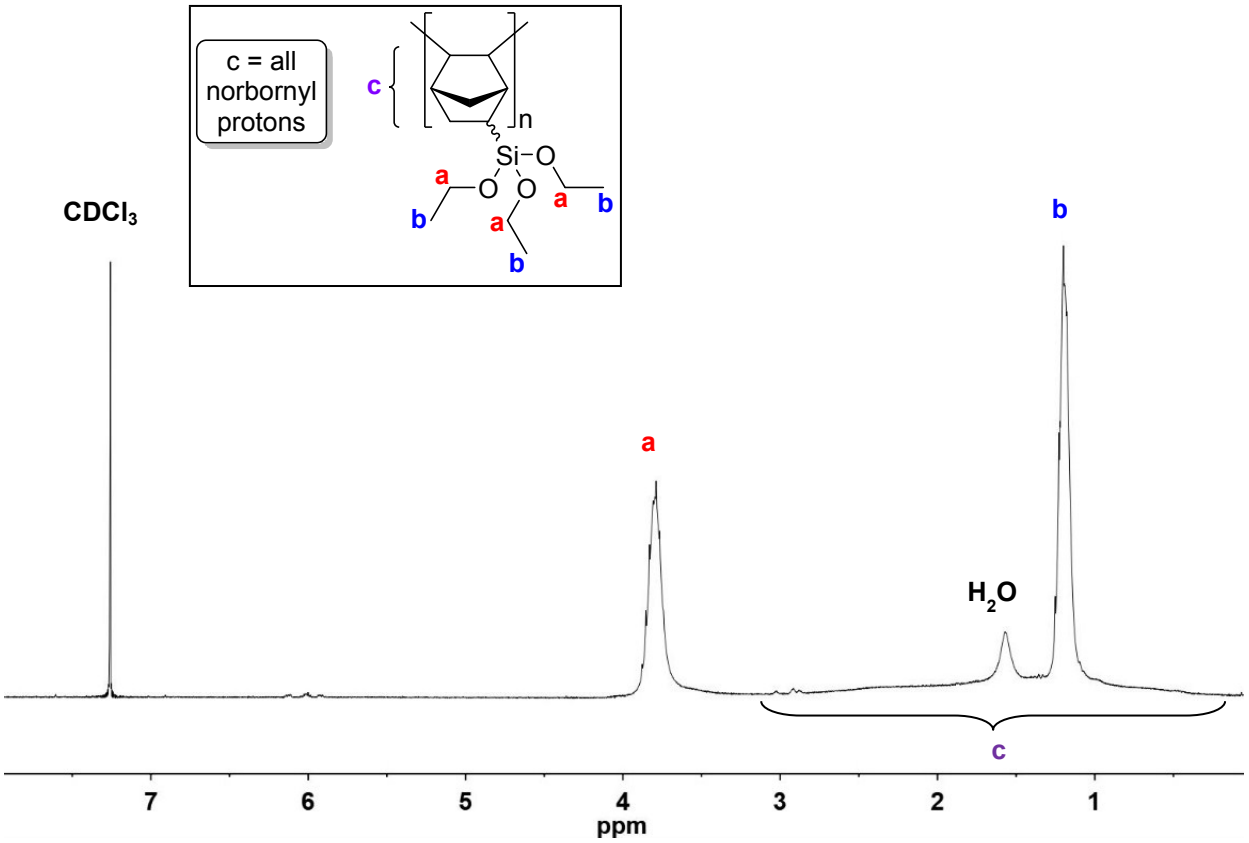
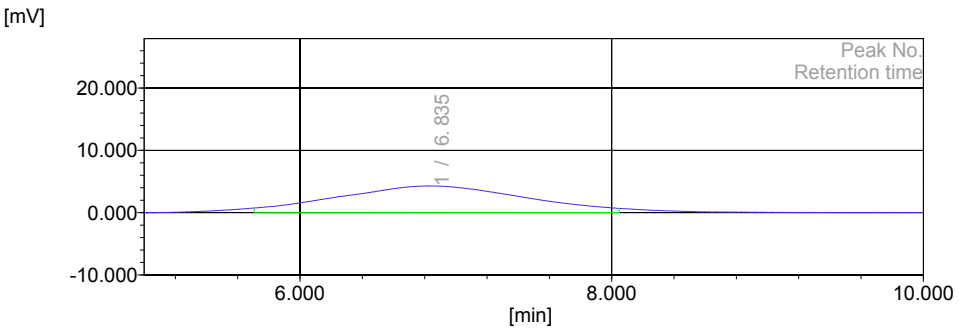


Figure S1. ^{1}H-NMR spectrum of poly(triethoxysilylnorbornene) (PTESN).



Result of molecular weight calculation (RI)

Peak 1 Valley Peak

	[min]	[mV]	[mol]		
				Mn	226,911
Peak start	5.707	0.738	4,150,389	Mw	494,593
Peak top	6.835	4.306	316,334	Mz	1,132,687
Peak end	8.048	0.679	50,665	Mz+1	2,005,407
				Mv	494,593
Height [mV]			4.309	Mp	304,931
Area [mV*sec]			358.240	Mz/Mw	2.290
Area% [%]			100.000	Mw/Mn	2.180
[eta]			494592.63357	Mz+1/Mw	4.055

Figure S2. GPC of poly(triethoxysilylnorbornene) (PTESN).

Table S1. DMA data at various temperatures.

Temperature (°C)	Storage Modulus (MPa)					
	0-CNC	1-CNC	5-CNC	10-CNC	15-CNC	20-CNC
25	400 ± 100	300 ± 100	510 ± 90	900 ± 300	1100 ± 300	1200 ± 200
50	400 ± 100	300 ± 100	510 ± 80	900 ± 300	1100 ± 300	1100 ± 200
100	320 ± 70	300 ± 100	460 ± 50	822 ± 200	900 ± 200	900 ± 200
200	310 ± 3	210 ± 90	320 ± 10	570 ± 80	520 ± 100	600 ±100
300	174 ± 4	120 ± 40	170 ± 20	230 ± 40	170 ± 30	200 ±30

Table S2. Tensile data

Sample	Young's Modulus (MPa)	Maximum Tensile Stress (MPa)	Strain at break (%)	Toughness kJ m^{-3}
PTESN	540 ± 50	12 ± 4	5 ± 2	230 ± 70
1-CNC-PTESN	600 ± 200	15 ± 4	3 ± 2	310 ± 260
5-CNC-PTESN	700 ± 100	12.0 ± 0.7	2.1 ± 0.4	140 ± 30
10-CNC-PTESN	840 ± 70	13 ± 1	1.9 ± 0.2	130 ± 20
15-CNC-PTESN	820 ± 70	10 ± 2	1.6 ± 0.2	80 ± 20
20-CNC-PTESN	970 ± 80	12 ± 1	1.5 ± 0.2	80 ± 30

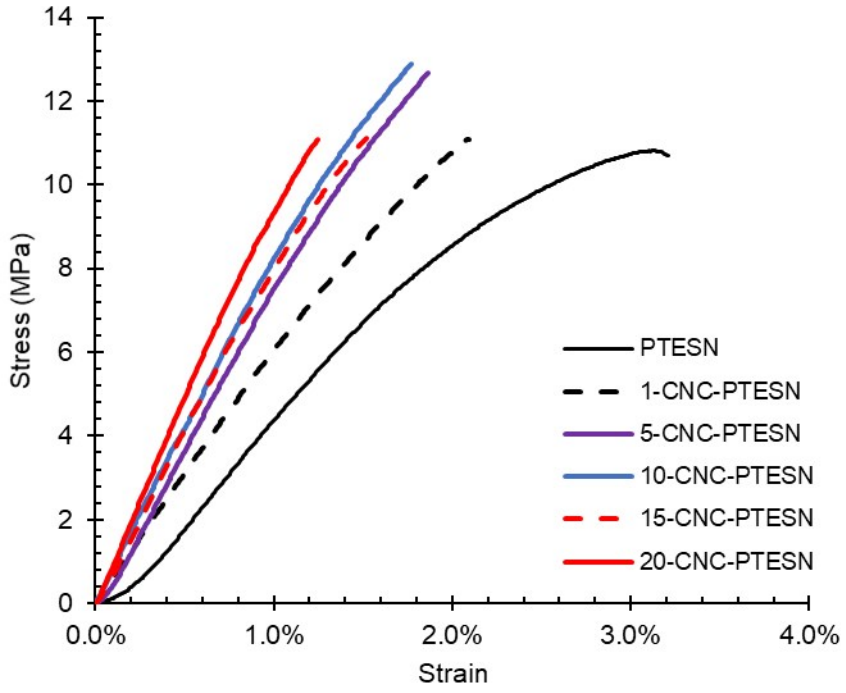


Figure S3: Representative tensile plots from PTESN CNC composites.

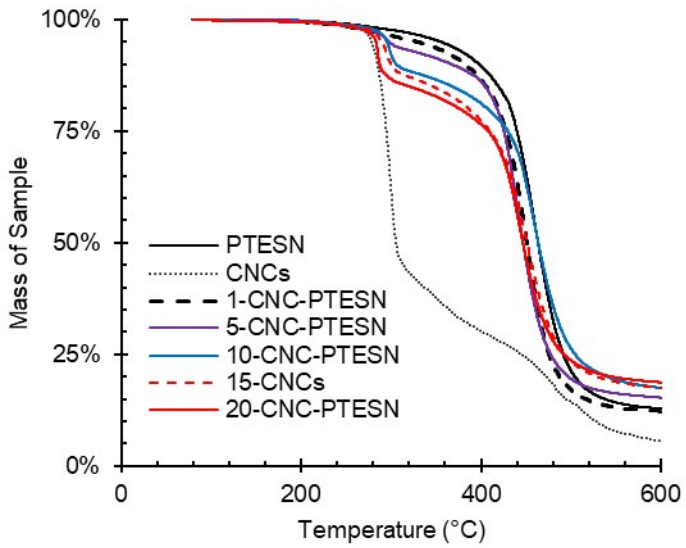


Figure S4: Thermogravimetric data for PTESN, 1-CNC-PTESN, 5-CNC-PTESN, 10-CNC-PTESN, 15-CNC-PTESN, and 20-CNC-PTESN.

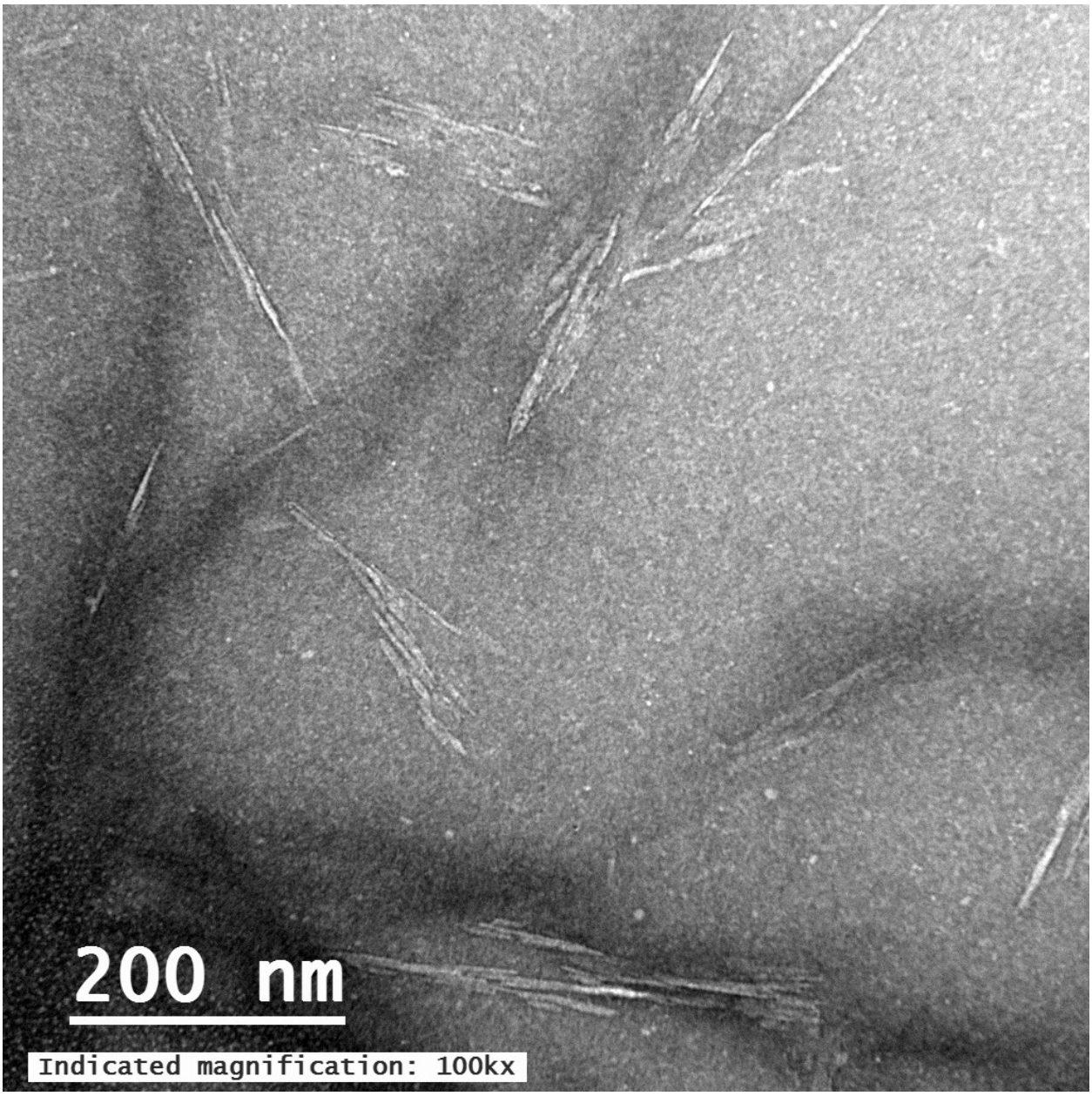


Figure S5: TEM Micrograph of University of Maine CNCs. CNCs have dimensions of 90 ± 40 and 7 ± 2. Image was taken on JEOL 2100 TEM. Photo credit Rose Roberts and Kelly Stinson Bagby.