Electronic Supplementary Information

Effect of Cellulose Nanocrystal Polymorphs on Mechanical, Barrier and Thermal Properties of Poly(lactic acid) based bionanocomposites

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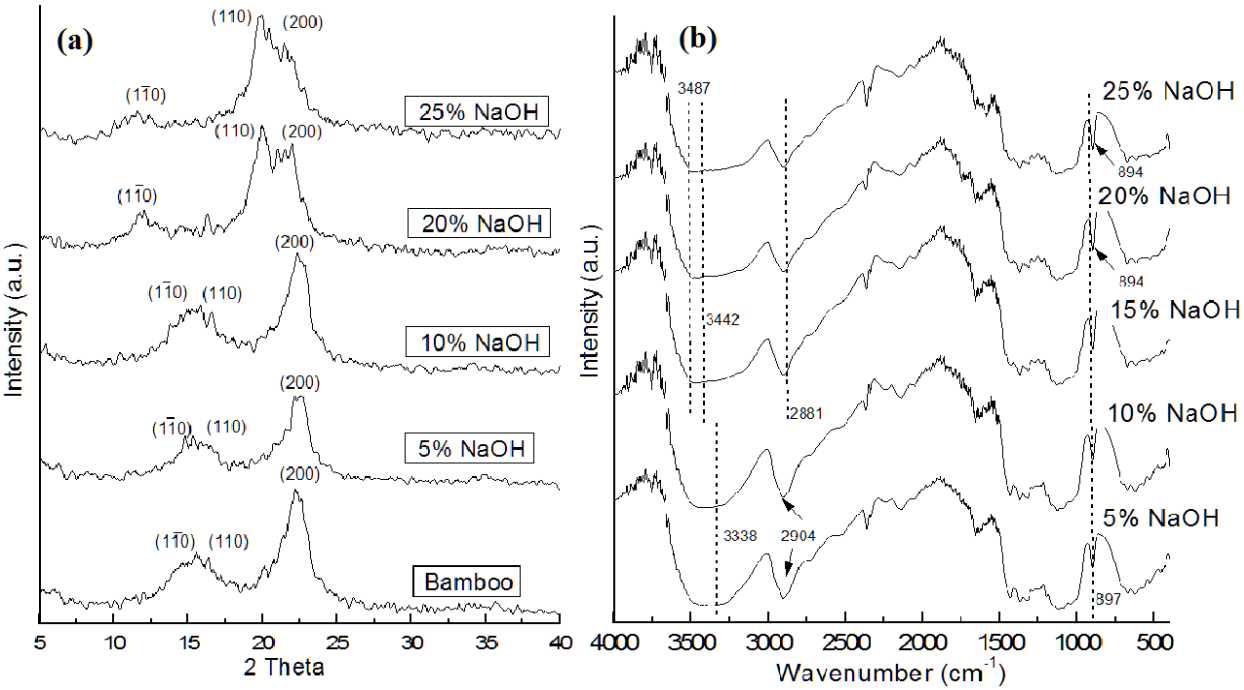

Figure S1: (a) XRD spectra of the pretreated bamboo pulp at 5-25wt % NaOH concentration. (b) FTIR spectra of the pretreated bamboo pulp at 5-25wt % of NaOH concentrations.

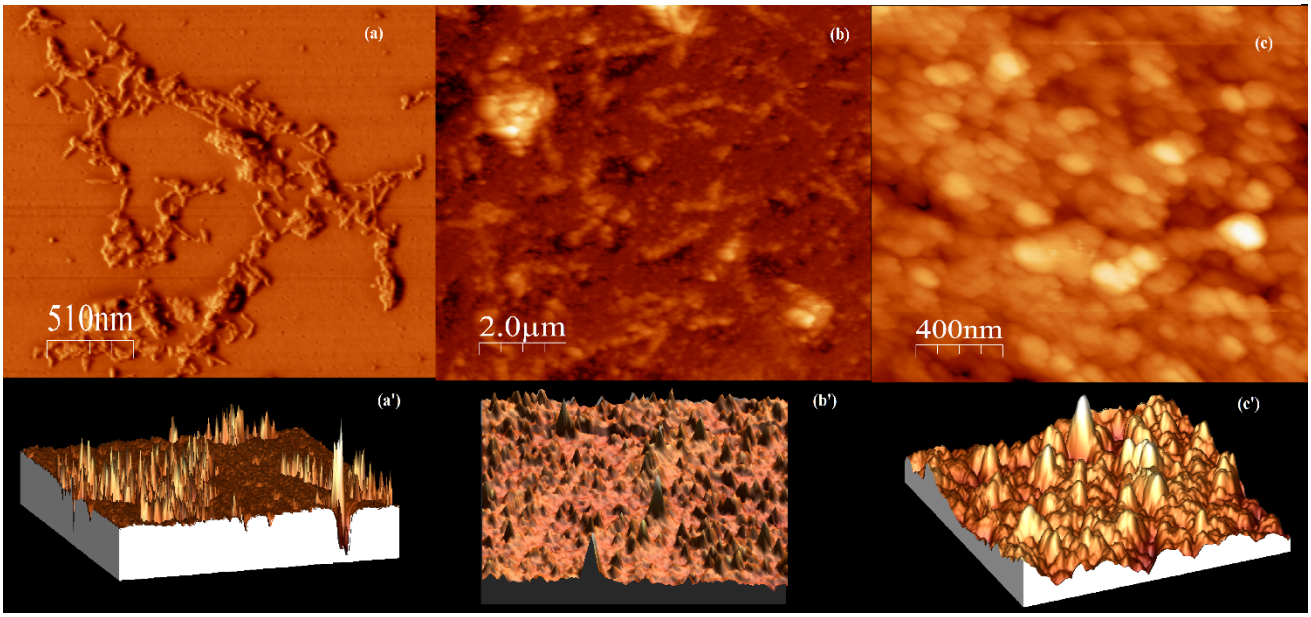

Figure S2: AFM micrographs for (a) CNC I, (b) CNC II and (c) CNC: I→II. Height profile along the z-axis (x 25 times) corresponding to (a') CNC I (b') CNC II and (c') CNC: I→II

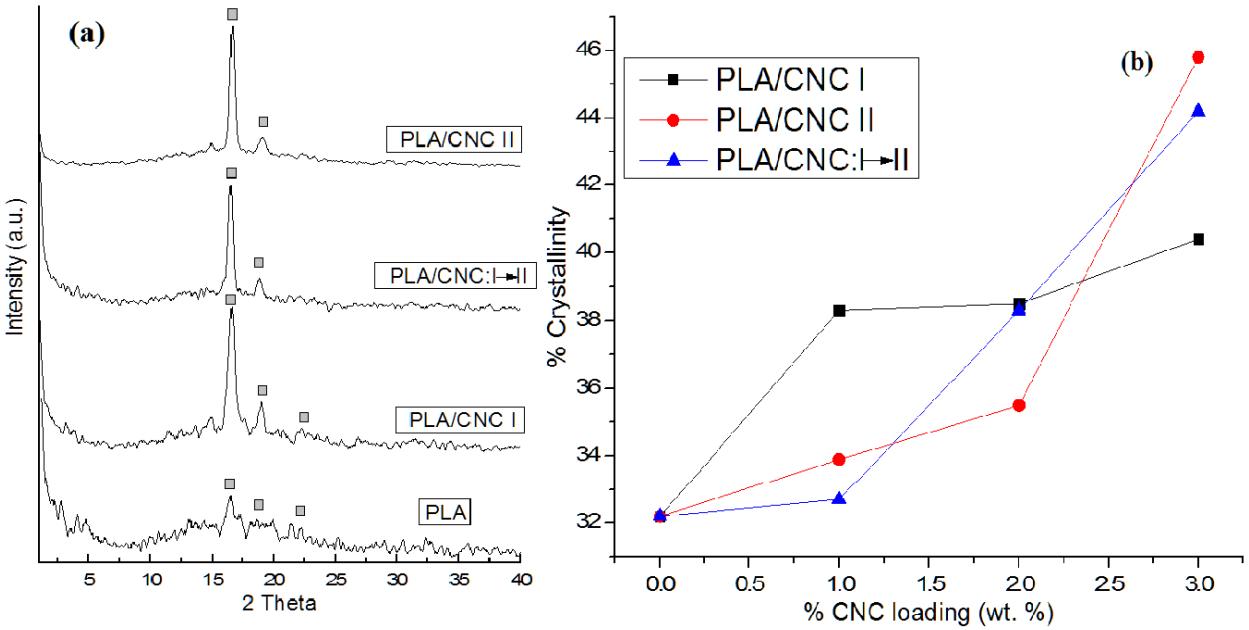

Figure S3: (a) Comparison of XRD spectra for different PLA/CNC polymorphs films at 1wt % CNC loading. (b) The percentage change in crystallinity of PLA/CNC composites at different wt % of CNC loadings.

Table S1: Properties of the different CNC polymorphs CNC I, CNC II and CNC: I→II.

Cellulose Polymorph Type	CNC I	CNC II	CNC:I→II
Dimension (Length/Dia.) (nm)	610/19	824/34	583/100
Aspect Ratio	~33	~25	~6
Onset Degradation Temperature (°C)	123	191	175
Peak Degradation Temperature (°C)	481	471	196
Residual Mass (%)	2.226	4.595	2.470
Alpha (%)	88.5	83.0	12.5
Crystallinity Index (C.I.)	81%	77%	70%
d-spacing for the plane (200) (nm)	0.409	0.403	0.394