

Electronic Supplementary Information

Biomimetic adsorption of zwitterionic-xyloglucan block copolymers to CNF: Towards tailored super-absorbing cellulose materials

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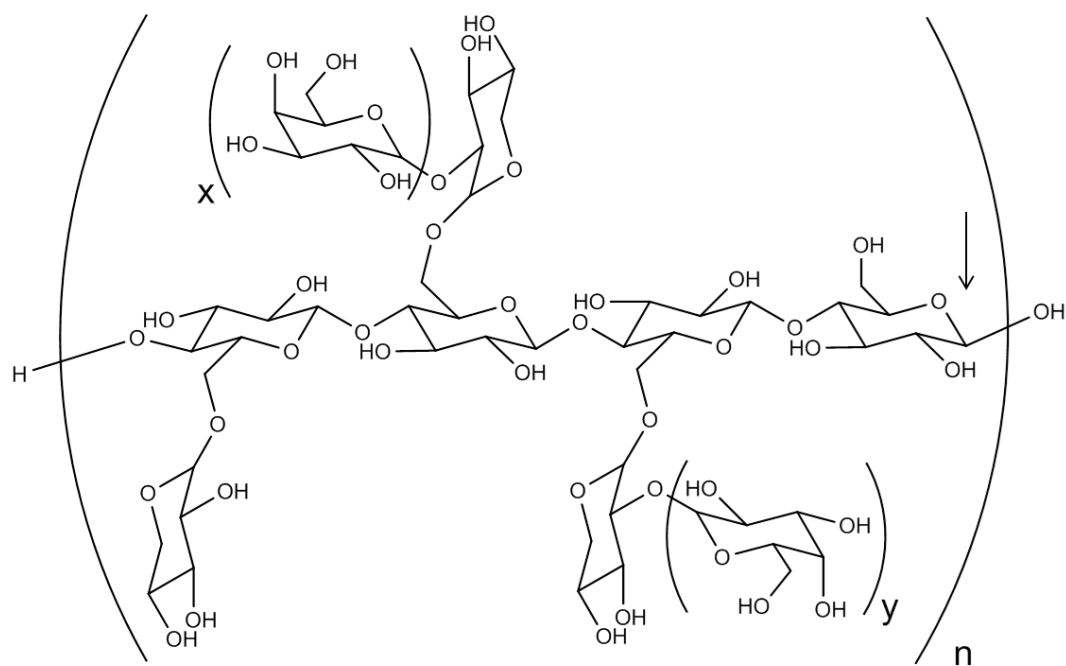


Figure S1 The structure of XXXG-type xyloglucans. Tamarind seed xyloglucan is comprised of XXXG ($x = 0$, $y = 0$), XLXG ($x = 1$, $y = 0$), XXLXG ($x = 0$, $y = 1$), and XLLG ($x = 1$, $y = 1$). The arrow indicates the reducing chain end.

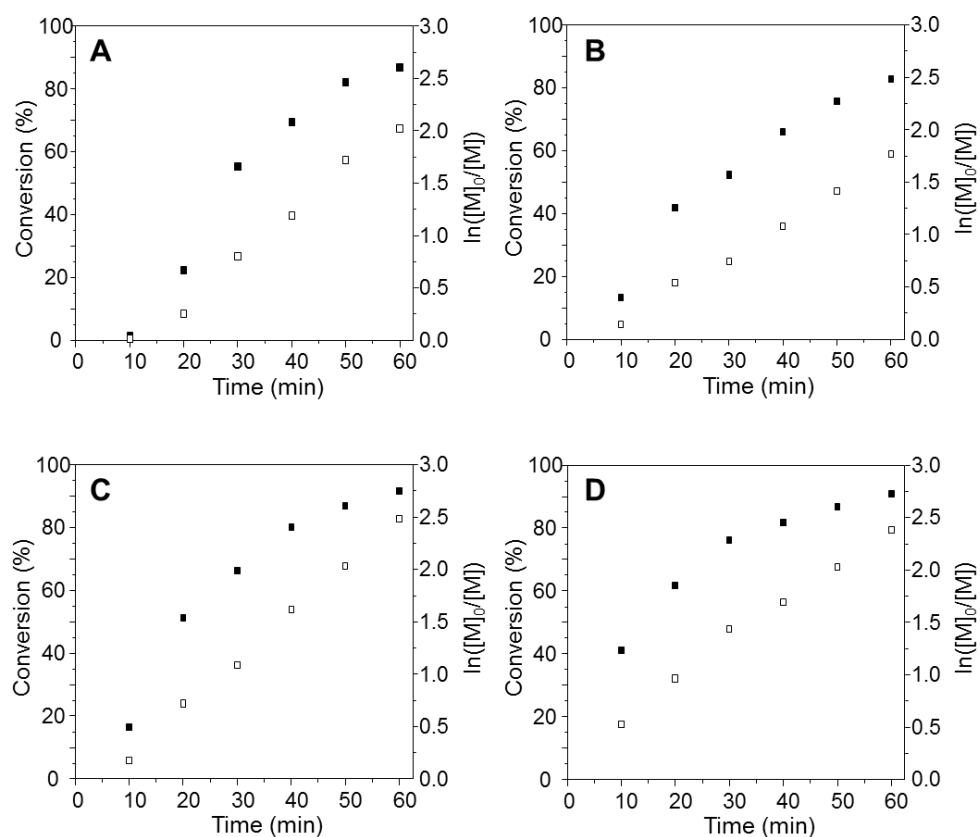


Figure S2 Kinetic experiments for the polymers in this study; A) PSBMA₂₆₆, B) PSBMA₇₁₀, C) XG-*b*-PSBMA₂₆₆ and D) XG-*b*-PSBMA₇₁₀, conversion vs. time (filled squares) and $\ln([M]_0/[M])$ vs. time (empty squares)

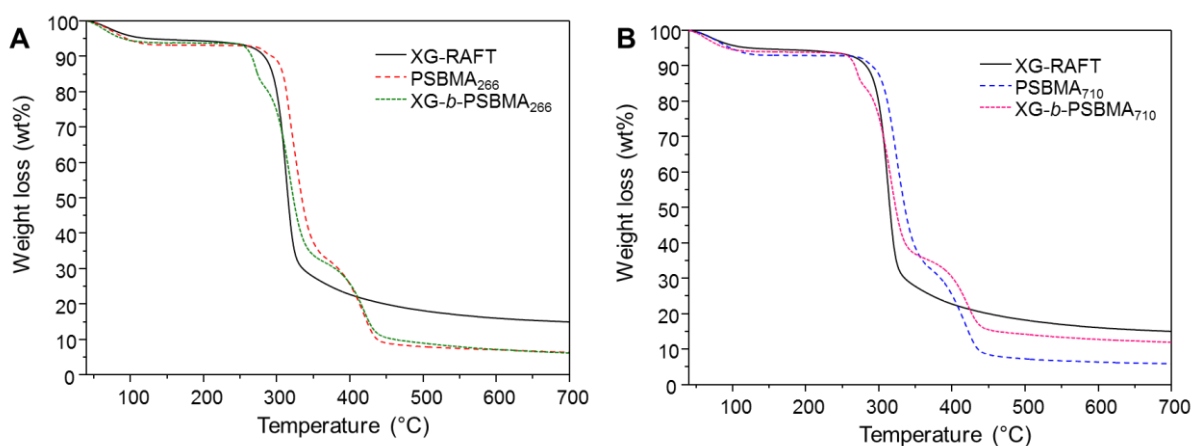


Figure S3 Thermogravimetric weight loss curves for XG-RAFT, PSBMA_n and XG-*b*-PSBMA_n samples, A) $n = 266$, B) $n = 710$.

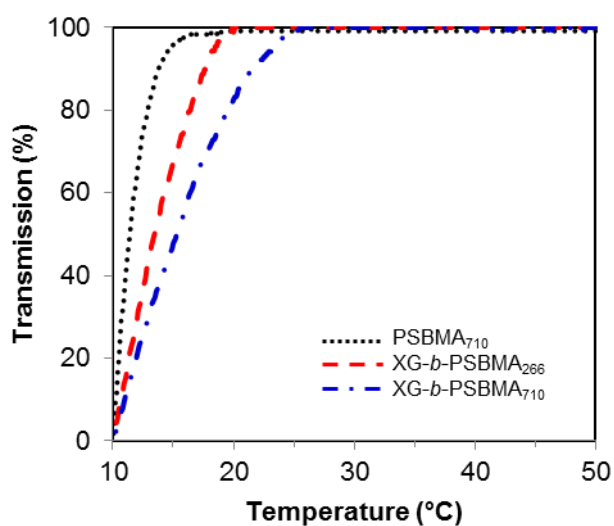


Figure S4 Turbidity curves for samples; PSBMA₇₁₀, XG-*b*-PSBMA₂₆₆ and XG-*b*-PSBMA₇₁₀, for the cooling step ($1\text{ }^{\circ}\text{C min}^{-1}$) at a concentration of 5 mg mL^{-1} in MilliQ water

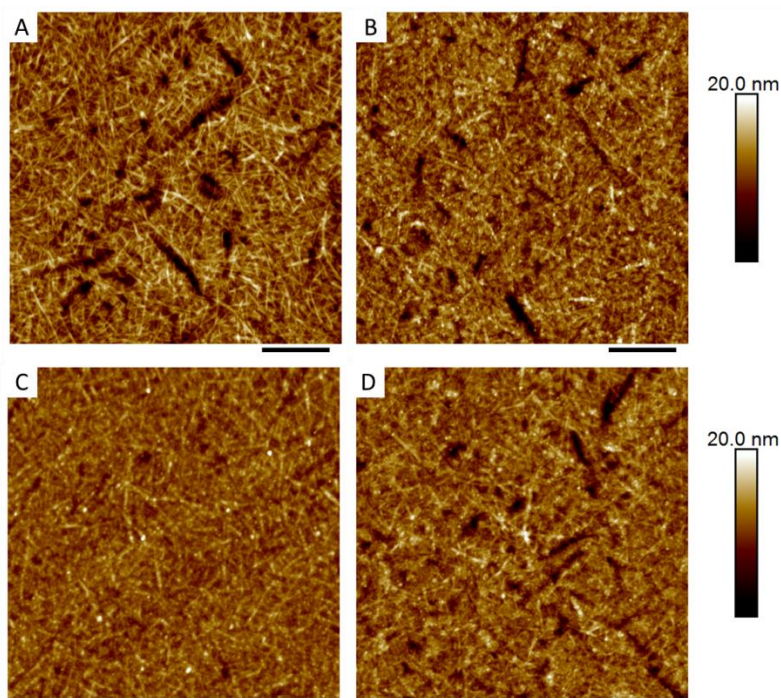


Figure S5 Atomic force microscopy height images of the QCM-D crystal surfaces after *in situ* adsorption experiments. A) PSBMA₂₆₆, B) XG-*b*-PSBMA₂₆₆, C) PSBMA₇₁₀ and D) XG-*b*-PSBMA₇₁₀. Images are 2 μm x 2 μm, scale bars = 400 nm.

Table S1 Compression test data for CNF composite films after swelling for 120 h in deionized water at 60 °C.

Sample	Compressive strength (MPa)	Compressive strain (%)
CNF Ref	0.386 ± 0.050	57.5 ± 10.5
CNF/XG- <i>b</i> -PSBMA ₇₁₀	0.060 ± 0.003	38.1 ± 5.0
CNF/PSBMA ₇₁₀	0.093 ± 0.011	41.6 ± 3.6

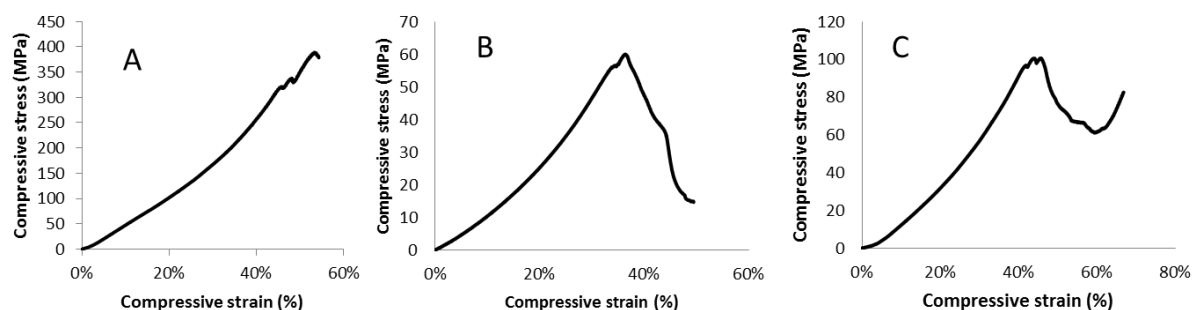


Figure S6 Compression tests of CNF composite films swollen for 120 h at 60 °C and compressed in swollen state, CNF Reference (A), CNF/XG-*b*-PSBMA₇₁₀ (B) and CNF/PSBMA₇₁₀ (C). Compression testing performed with strain rate 10%/min.