Supporting Information

Nanomechanics of Pectin-Linked β-Lactoglobulin Nanofibril Bundles

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Fig S1: Cross-sectioning of individual fibrils imaged in air. Note the red freehand lines in the upper right quadrant of images, which are the paths along which height was traced.

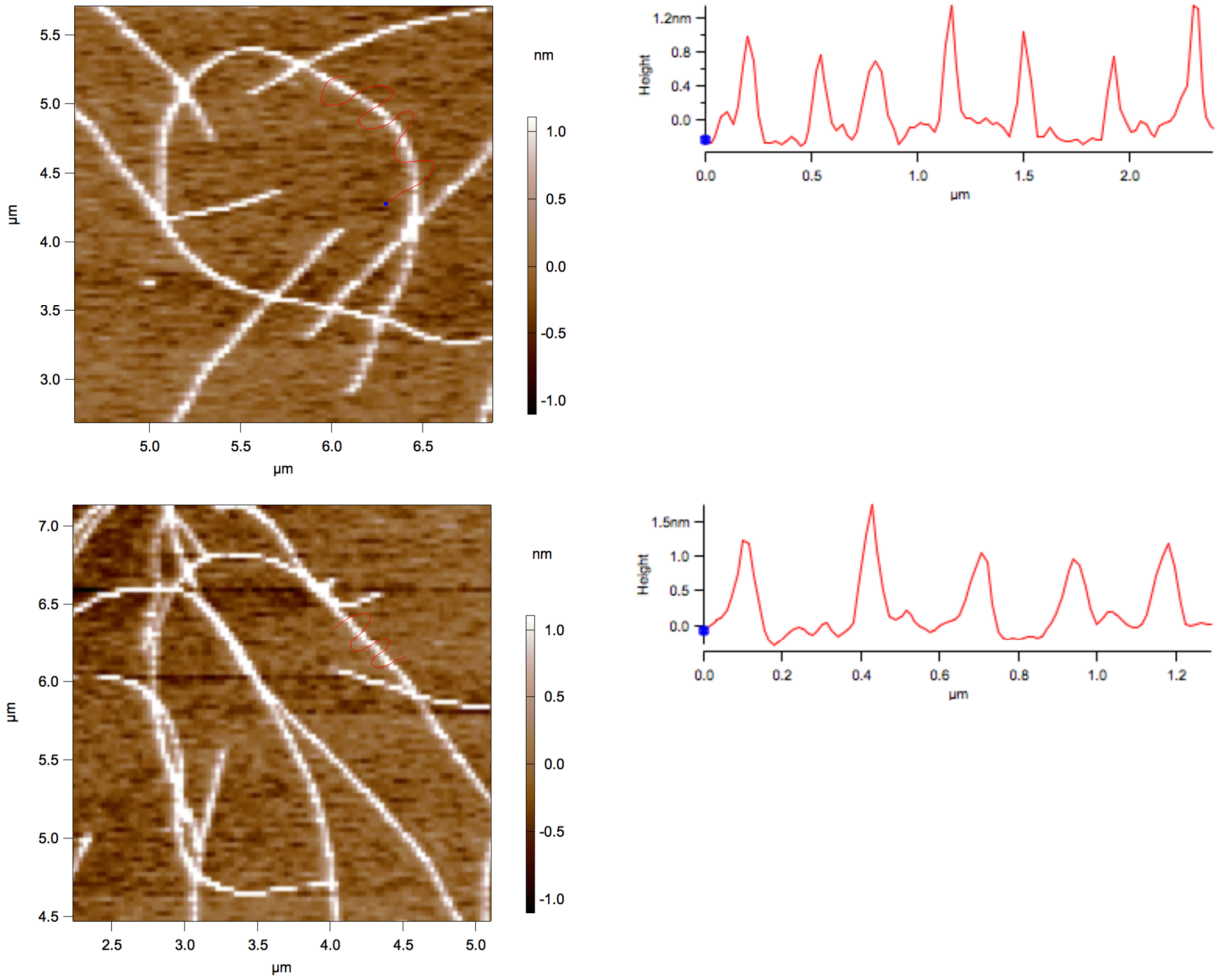


Fig S2. Montage of phase images showing a nanofibril bundles.

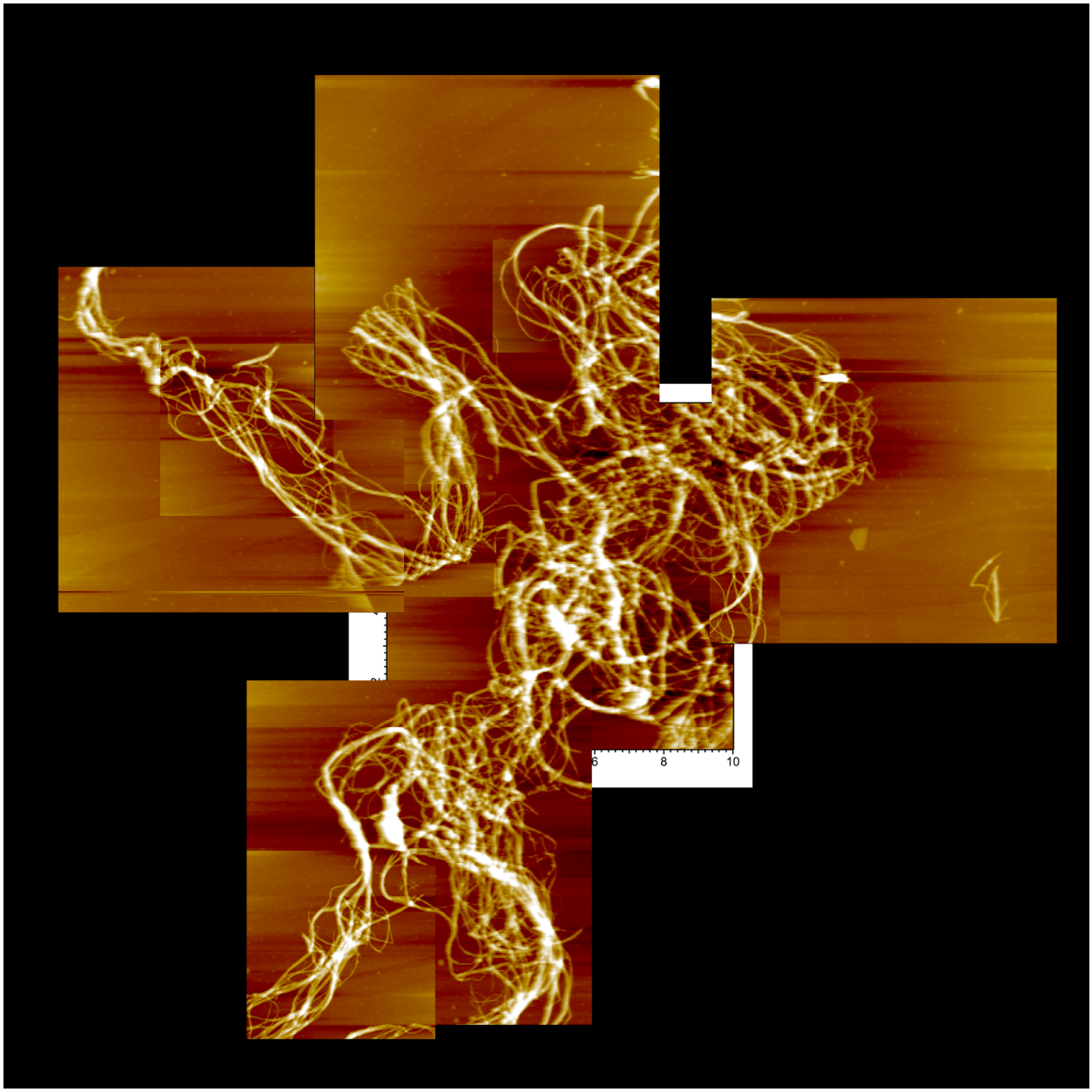


Fig S3. Montage of phase images showing a nanofibril bundles.

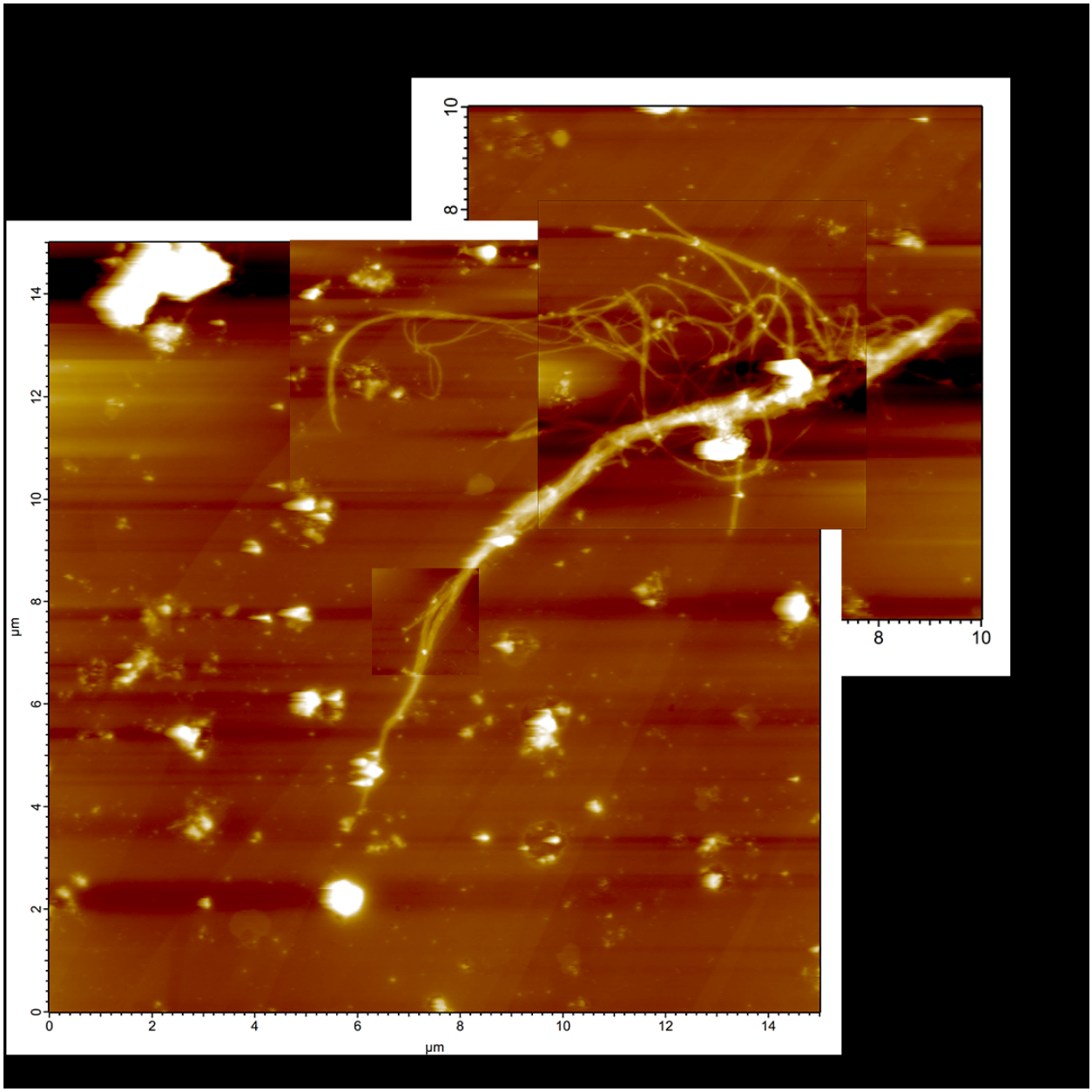
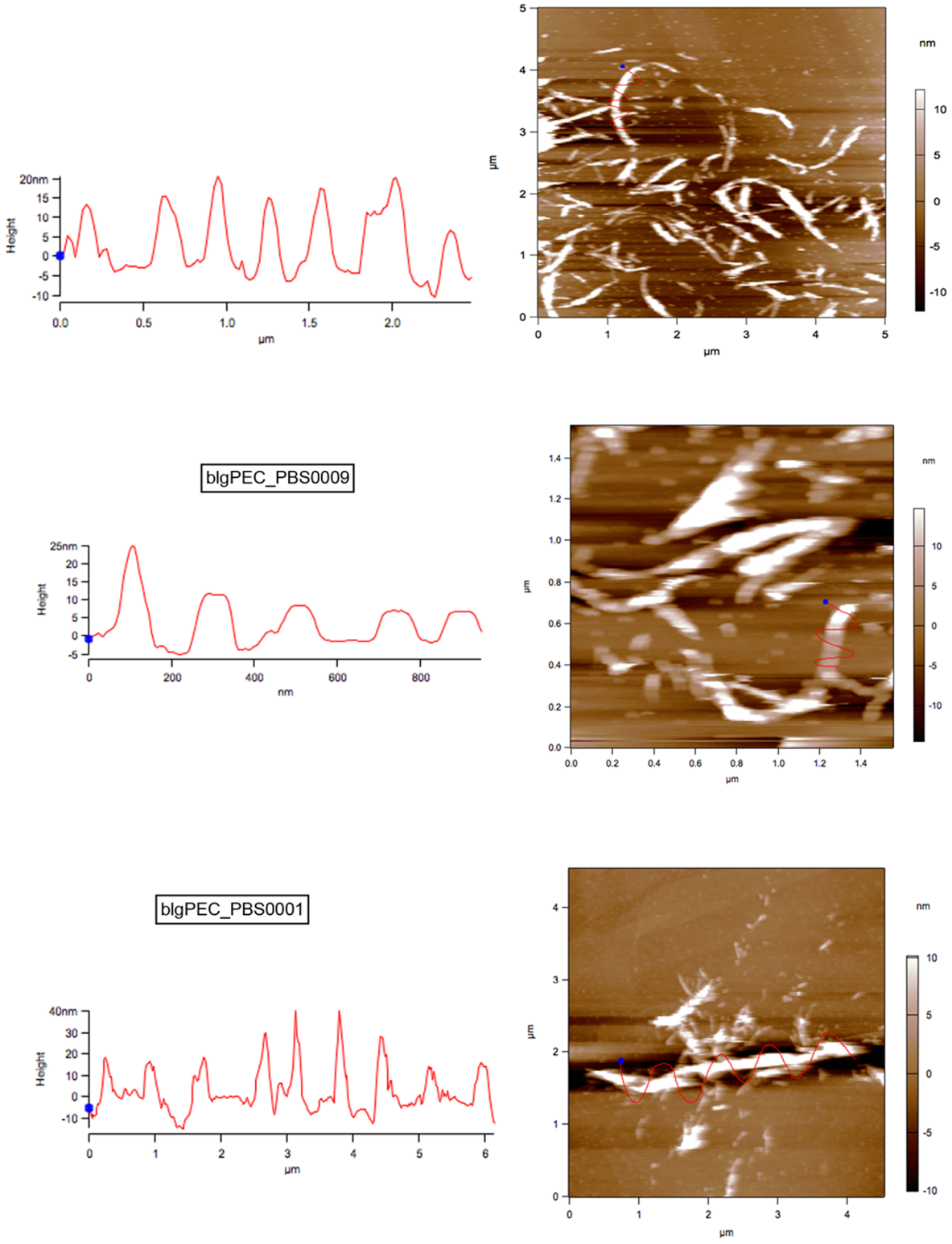


Fig S4: Cross-sections of pectin-nanofibril bundles imaged in PBS buffer.



Calculating overlap height between layers of hexagonal close-packed fibrils, where *d* is fibril diameter and *r/2* is fibril cross-sectional radius:

Fig S5A.

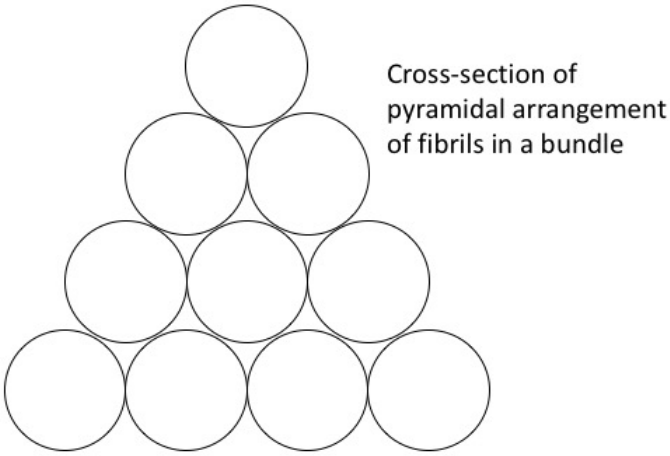


Fig S5B.

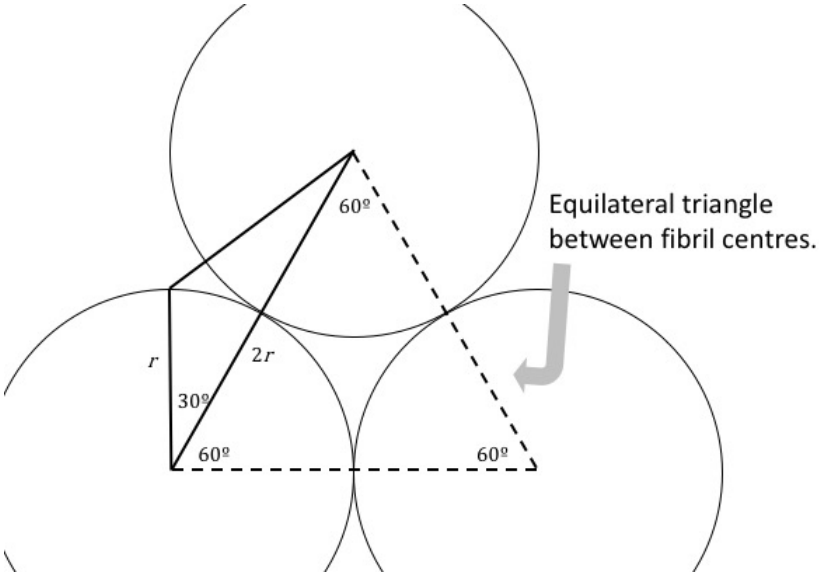


Fig S5C.

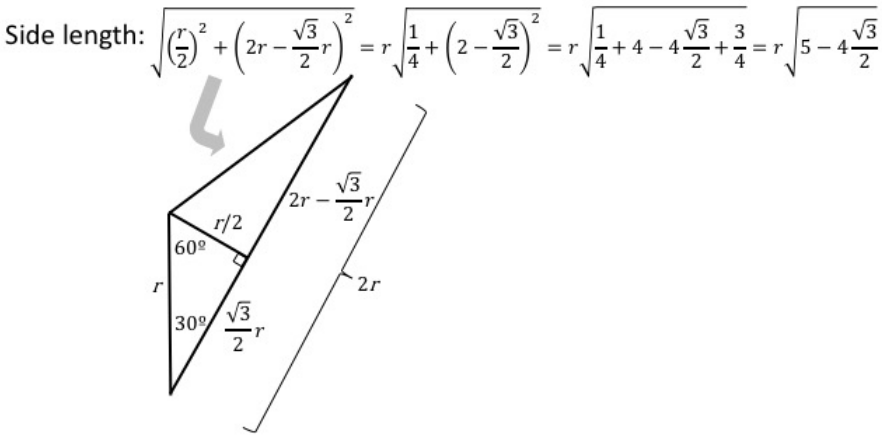
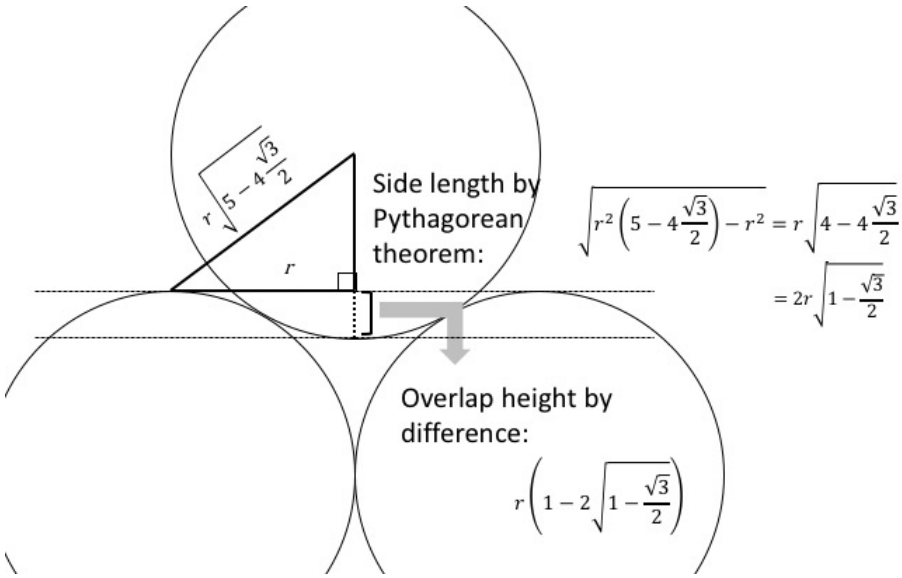


Fig S5D.



Overlap height is

$$r\left(1-2\sqrt{1-\frac{\sqrt{3}}{2}}\right) = 0.2679 \times r$$

Effective height of an overlapped layer:

$$2r-r\left(1-2\sqrt{1-\frac{\sqrt{3}}{2}}\right) = r\left(1+2\sqrt{1-\frac{\sqrt{3}}{2}}\right)$$

Effective height: reparameterising with $r = d/2$:

$$\frac{d}{2}\left(1 + 2\sqrt{1 - \frac{\sqrt{3}}{2}}\right) = 0.866d$$

Total height h of a cross-section of N layers of pyramidally-arranged fibrils:

$$h = d + (N - 1) \cdot \frac{d}{2}\left(1 + 2\sqrt{1 - \frac{\sqrt{3}}{2}}\right)$$

Solving for N:

$$(N - 1)\left(1 + 2\sqrt{1 - \frac{\sqrt{3}}{2}}\right) = \frac{2(h - d)}{d}$$

$$N = \frac{2(h - d)}{d\left(1 + 2\sqrt{1 - \frac{\sqrt{3}}{2}}\right)} + 1$$

Fig S6: AFM images illustrating the morphology of wormlike fibrils.

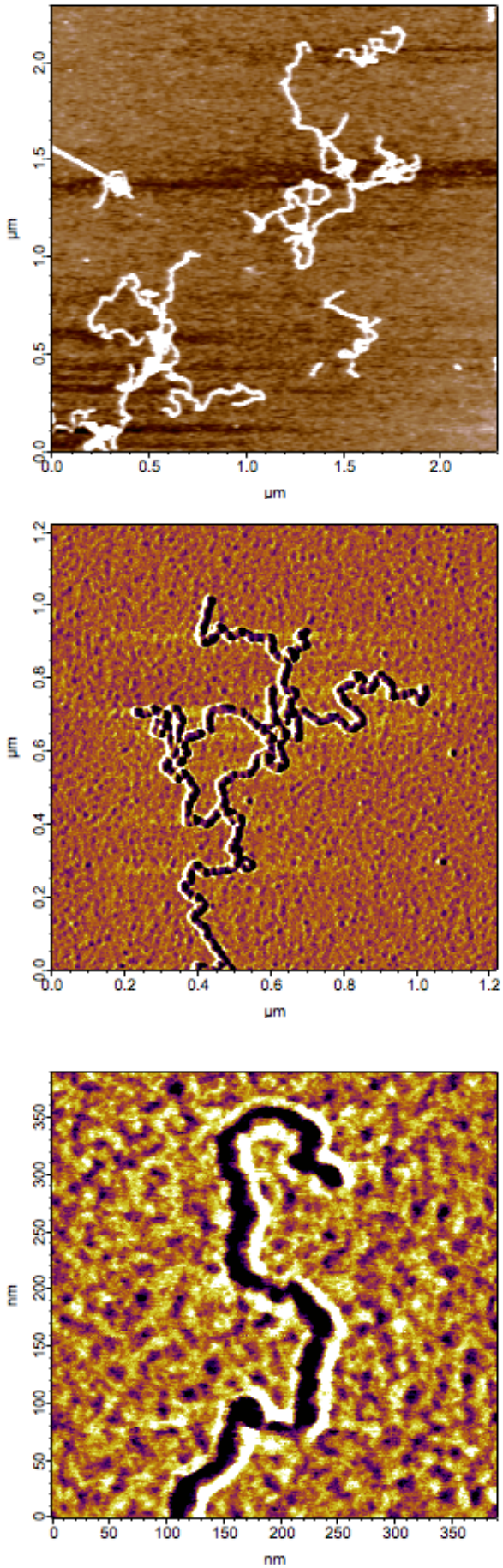


Fig S7. Example of fitting the worm-like chain (WLC) model to a nonlinear hitch observed for a pectin-nanofibril bundle.