

Man-made textile fibres from pectin

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Supplementary Information

Rheological analysis of spinning dope

Dissolved pectin was studied using a stress-controlled rheometer Nova (Rheologica Instruments AB, Sweden), equipped with a concentric cylinder geometry and measurement system for Elevated Temperature Cell (ETC) with C 40/4 cone (diameter = 40 mm). Before analysis, the sample was filtered through a 20 μm mesh filter on a centrifuge (10 min/ 7000 rpm). To determine the linear viscoelastic regimes, stress sweeps were performed in the range from 10^{-4} to 10^2 Pa at a frequency of 1 Hz. Then, the frequency sweeps in the range from 10^{-2} to 10^2 Hz were executed in the linear viscoelastic regimes to determine the values of complex viscosity and dynamic moduli. The measurements were performed at the following temperatures: 23, 30, 40, 50, and 60 $^{\circ}\text{C}$. Samples were secured with silicon oil, to minimise the drying effect during the analysis. The results of the conducted analysis are presented below, in Figure S-1.

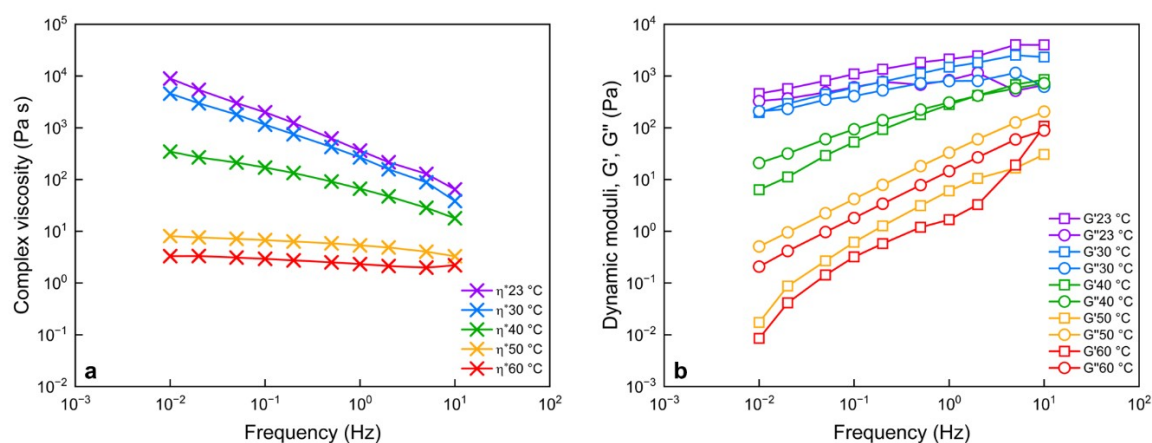


Figure S- 1. The summary of rheological properties, i.e., a) complex viscosities and b) dynamic moduli of 6 % (w/w) 33% DM pectin dope dissolved at pH 3 and analysed at the range of temperatures.

Spinning process

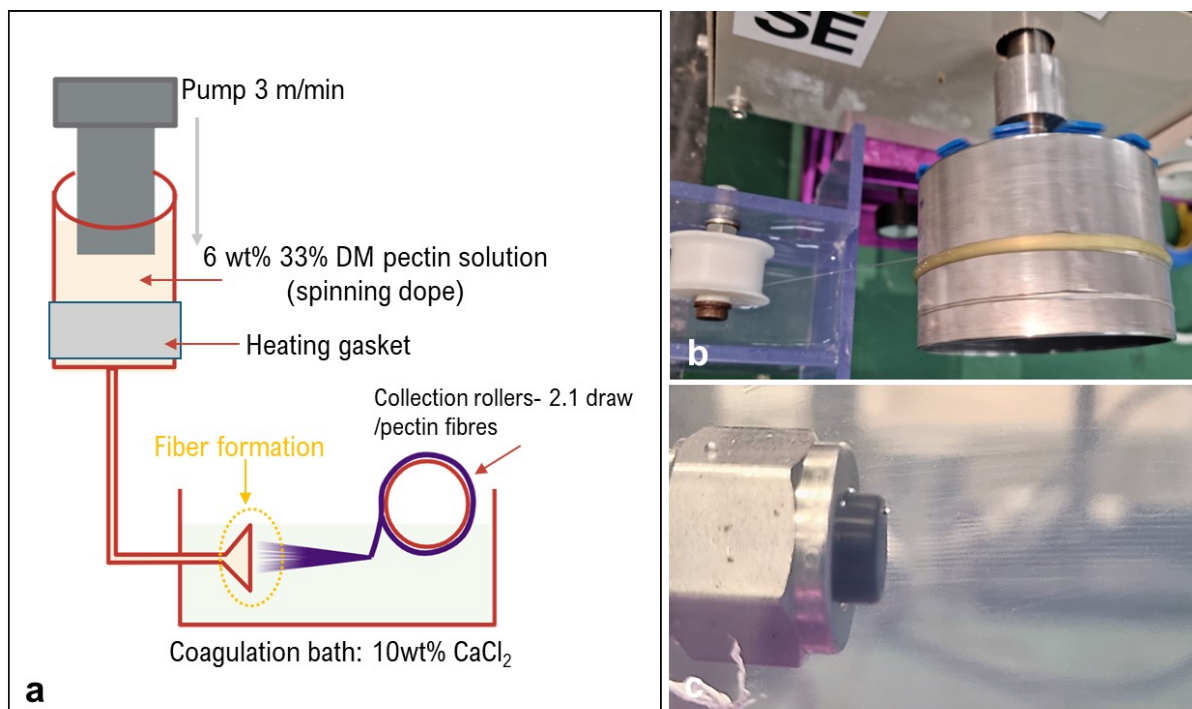


Figure S- 2. a) Sketch of wet spinning set-up to produce pectin fibres; b) picture of pick-up roller with pectin fibres collected from coagulation bath; c) picture of spinneret in the coagulation bath (extruded fibers are transparent; no clogging on spinneret surface).

EtOH washed fibre



Figure S- 3. Picture of fused pectin fibre, spun from 6 % (w/w) 33% DM dope dissolved at pH 3, after washing with EtOH and drying (no conditioning).

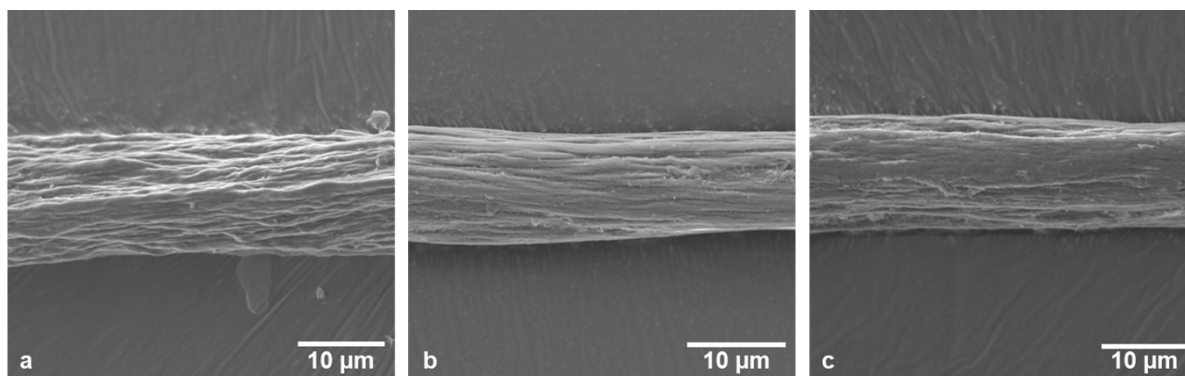
Morphology of washed fibres

Figure S- 4. SEM assessment of the morphology of fibres spun from 6 % (w/w) 33% DM pectin dope dissolved at pH 3 and washed with a) dH₂O, b) EtOH/H₂O (2:1, w/w), and c) EtOH. All fibres were conditioned with 0.17% commercial surfactant.

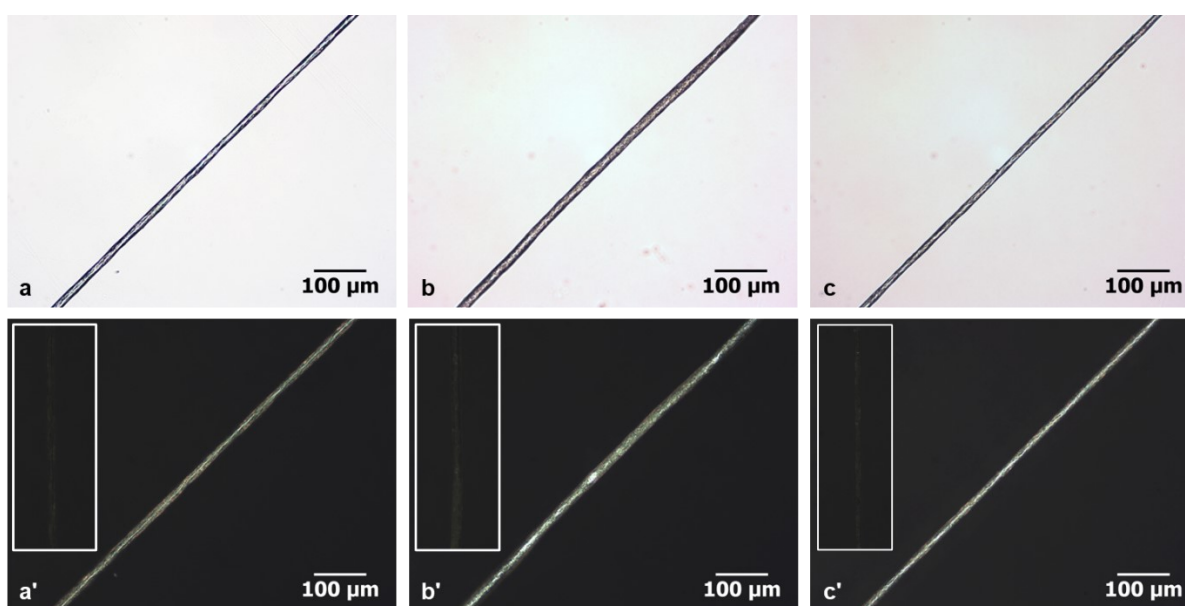
Orientation of washed fibres

Figure S- 5. POM pictures to assess the orientation of fibres of fibres spun from 6 % (w/w) 33% DM pectin dope dissolved at pH 3 and washed with a/a') dH₂O, b/b') EtOH/H₂O (2:1, w/w), and c/c') EtOH. All fibres were conditioned with 0.17% commercial surfactant.