

Supplementary Information for:

3D printing of cellulose nanocrystals based composites to build robust biomimetic scaffolds for bone tissue engineering

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FTIR spectroscopy of PLA and PLA/CNCx filaments

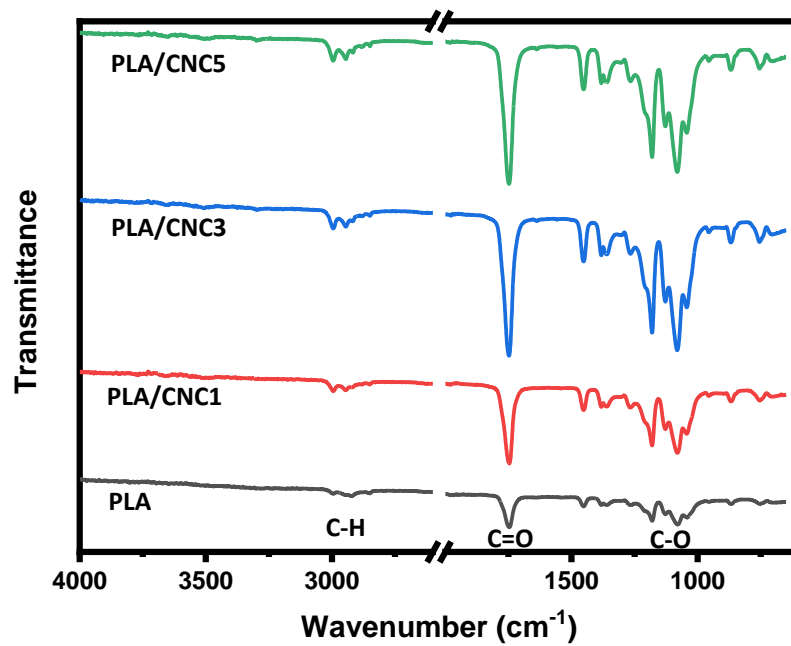


Figure S1. FTIR spectra of PLA and PLA/CNCx composite filaments.

Thermal analysis of PLA/CNCx composites and their constituents

The thermal characteristics of CNC were examined based on the results of TGA and DTG shown in **Figure S2**. The CNC degradation kinetics observed on the TG curve shows three stages of weight loss in the temperature range of 25 to 800°C. Initially, from approximately 25 to 200°C, a slight weight loss of 3.78% observed is attributed to the drying step¹. The second weight loss is observed in the range of 200 to 400 °C, which could be related to the depolymerization or the breaking of the glycosidic bonds of the cellulose^{2,3,4}. The actual degradation starts around 250°C. The maximum temperature (Tmax= 370°C) of the peak clearly observed on the derived profile can be assigned to the maximum degradation temperature of the synthesized nanocellulose.

From the results of the TG & DTG analyses, it is evident that CNC is thermally stable and therefore can be used as a reinforcement in polymer matrices with operating temperatures below 370°C.

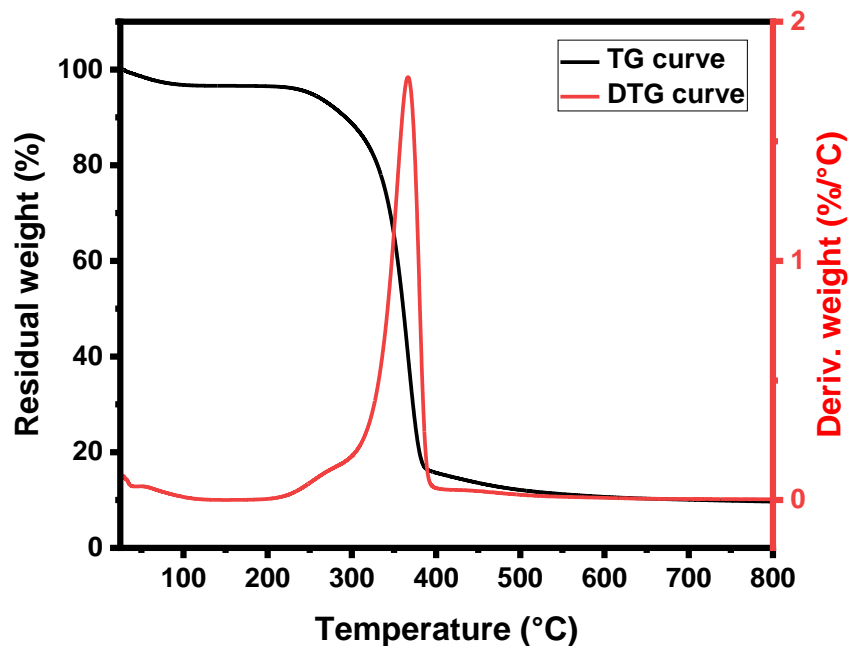


Figure S2. Thermal analysis of CNC.

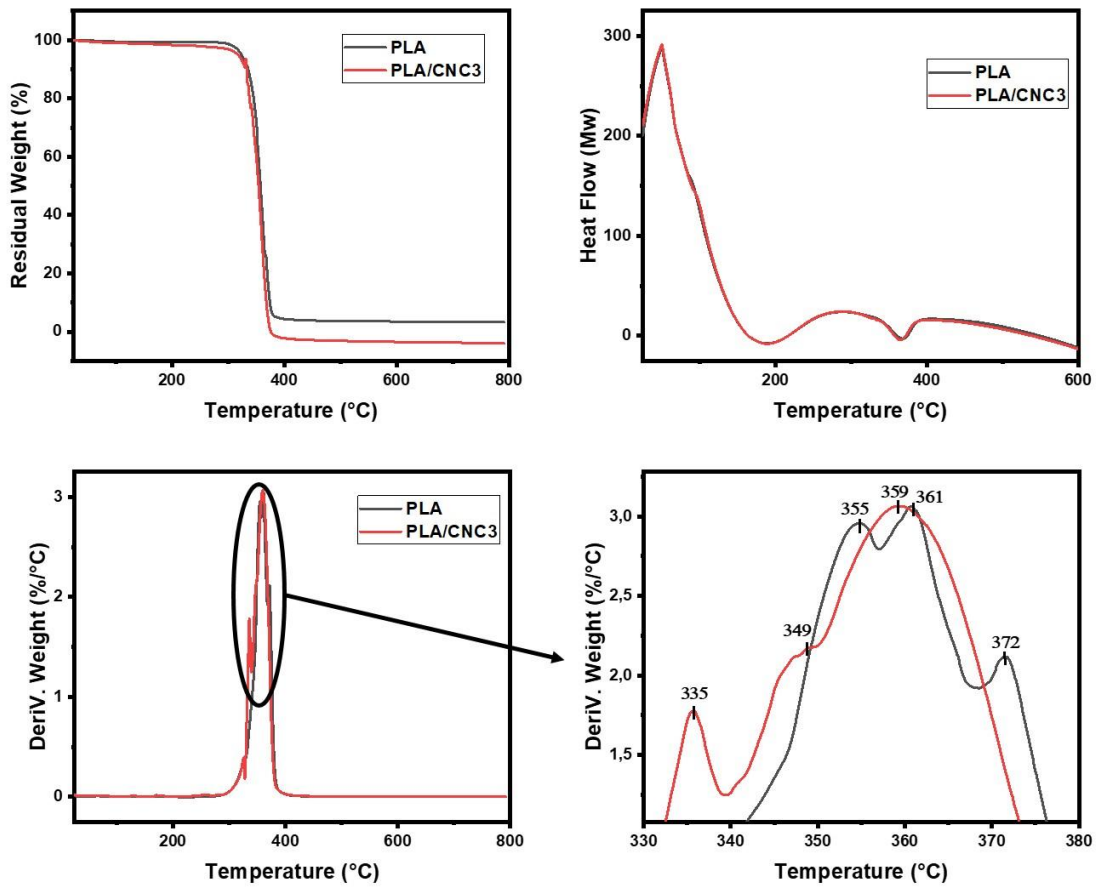


Figure S3. Thermal analysis of 3D printed PLA and PLA/CNC3.

Contact angle measurements of PLA and PLA/CNC3

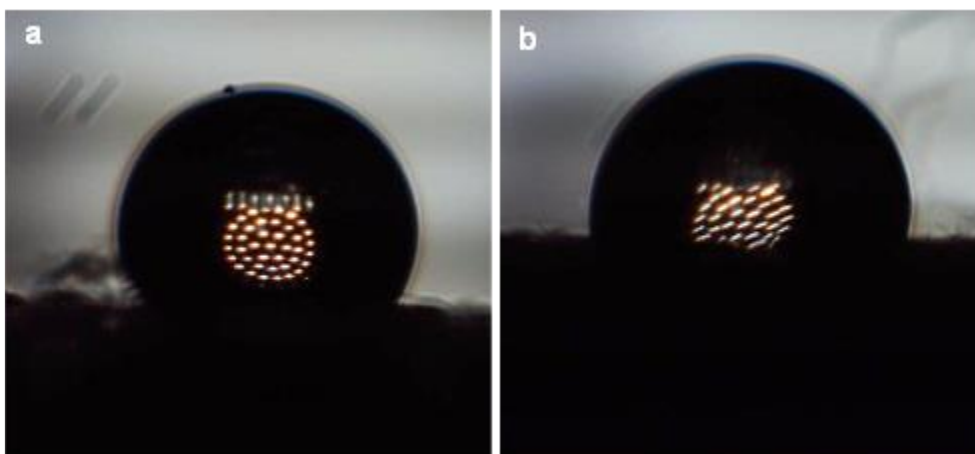


Figure S4. Contact angle images of water on (a) PLA and (b) PLA/CNC3.

Experimental section

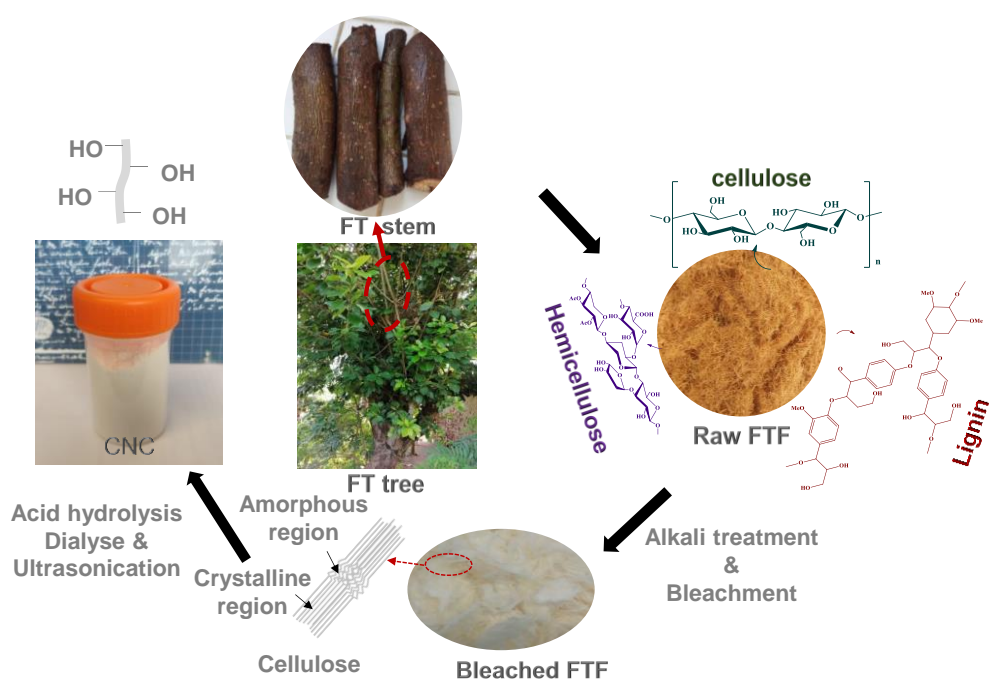


Figure S5. Synthesis of cellulose nanocrystals from *Ficus thonningii* (FT) stem.

References

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