

Supporting Information

Bio-based Cellulose Nanofibril-Oil Composite Films for Active edible Barriers

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Figure S1. Photographs of CNF-stabilized Pickering emulsions with different oil concentrations a) Reference (CNF, 0.05wt%); b) 0.01wt% oil; c) 0.016 wt% oil; d) 0.025 wt% oil; e) 0.05 wt% oil; f) 0.24 wt% oil and g) 0.33 wt% oil. All emulsions contain 0.05wt% CNF.

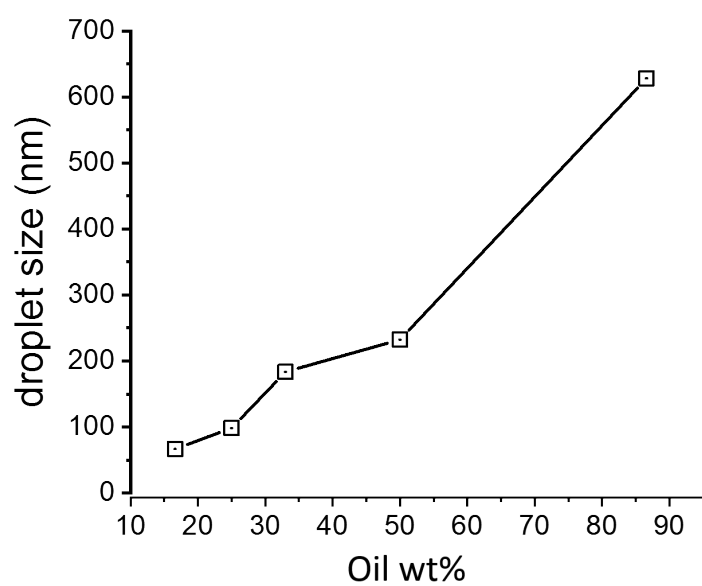


Figure S2. Droplet size as function of oil content in CNF-stabilized Pickering emulsions.

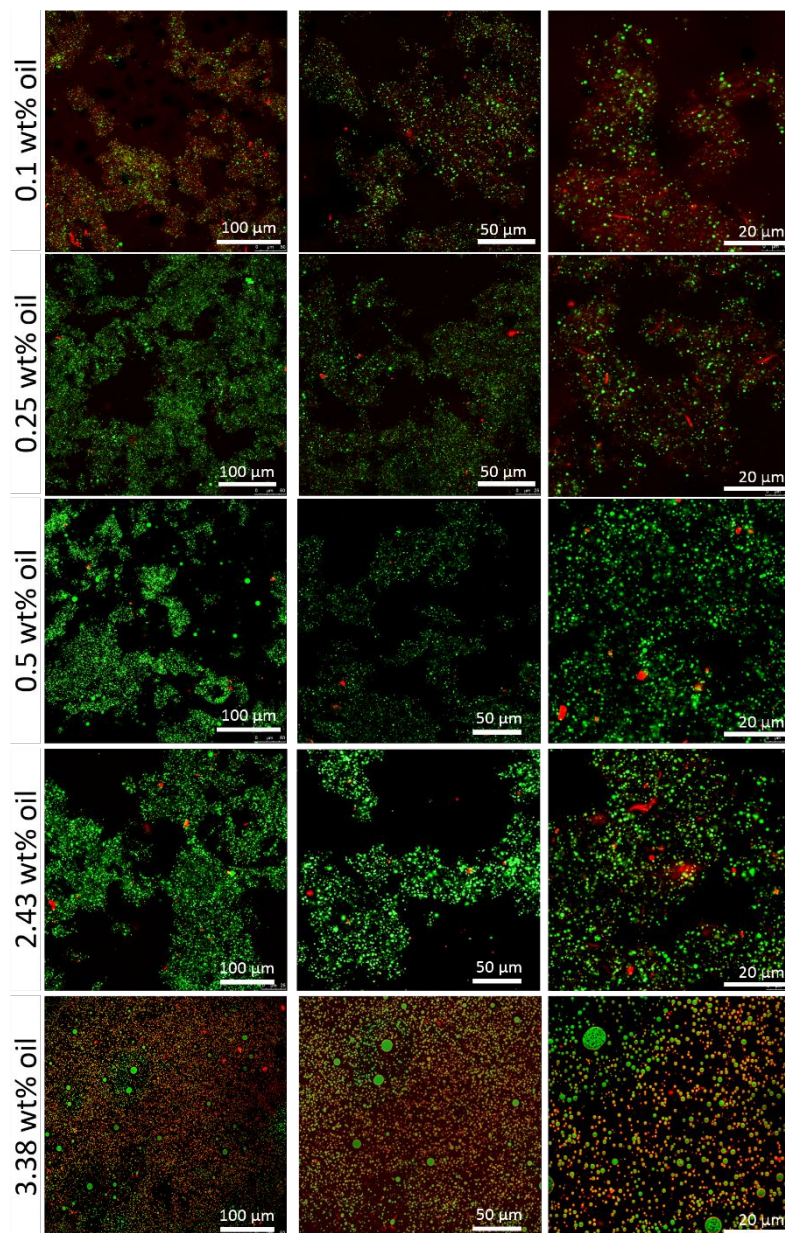


Figure S3. Confocal microscopy image of CNF-stabilized Pickering emulsions. All emulsions contain 0.5 wt% CNF.

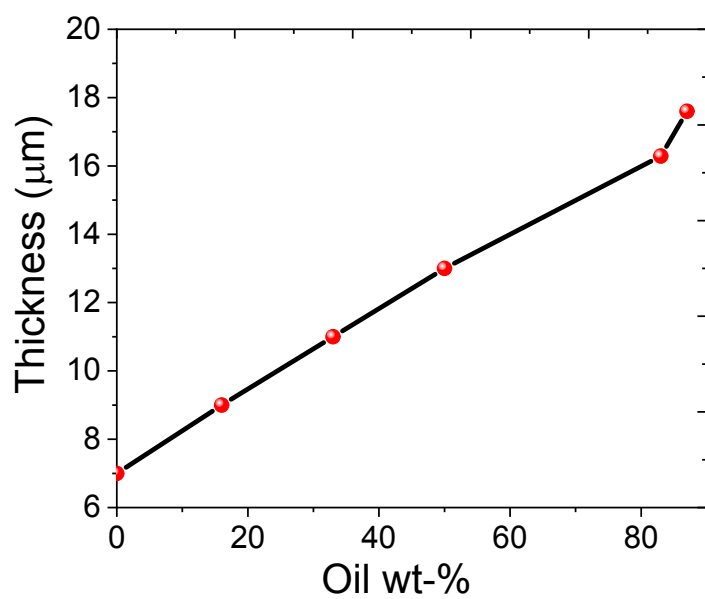


Figure S4. Measured thickness of composite films as a function of oil content.

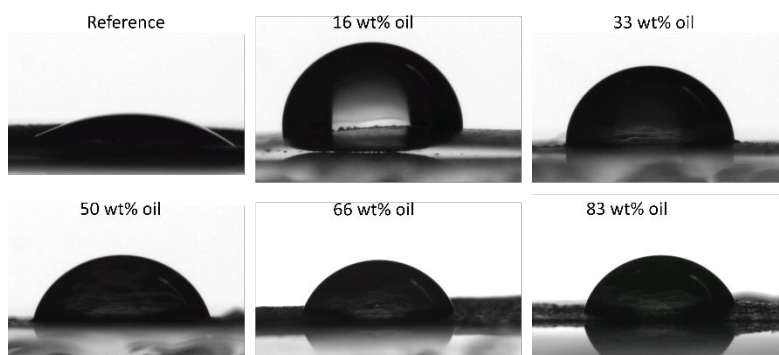


Figure S5. Contact angle measurement of composite films with different oil loadings (taken after 2 seconds after droplet deposition).

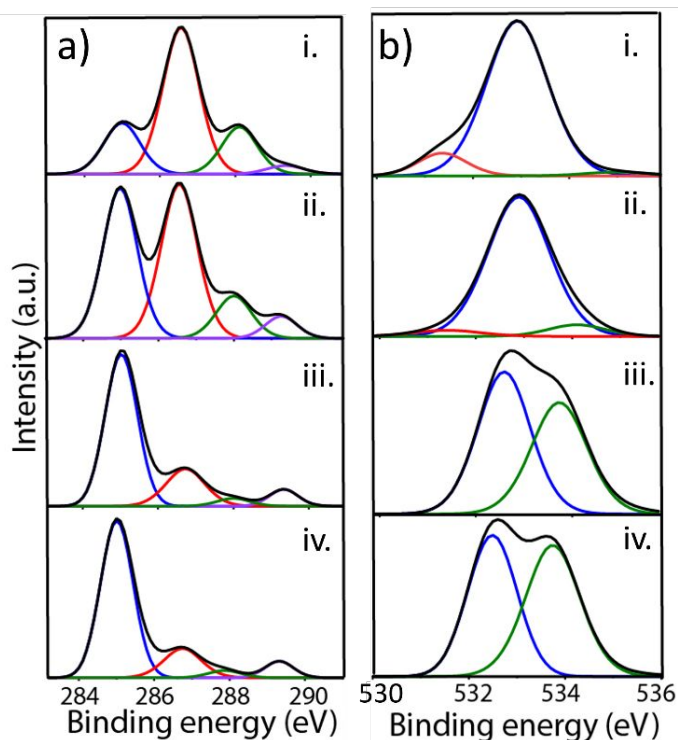


Figure S6. XPS spectra of composite films. a) High-resolution C1s spectra and b) high-resolution O1s spectra: i. Reference; ii. 16 wt% oil; iii. 50 wt% oil and iv. 83 wt% oil.

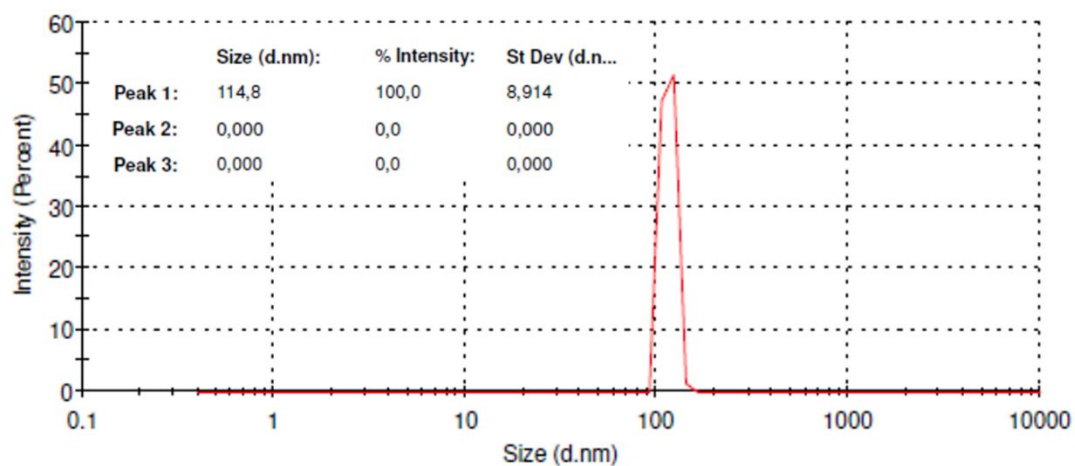


Figure S7. Oil size distribution determined by Dynamic light scattering of emulsion with 0.016 wt% oil content before preparing composite film (0.05 wt% of CNF).

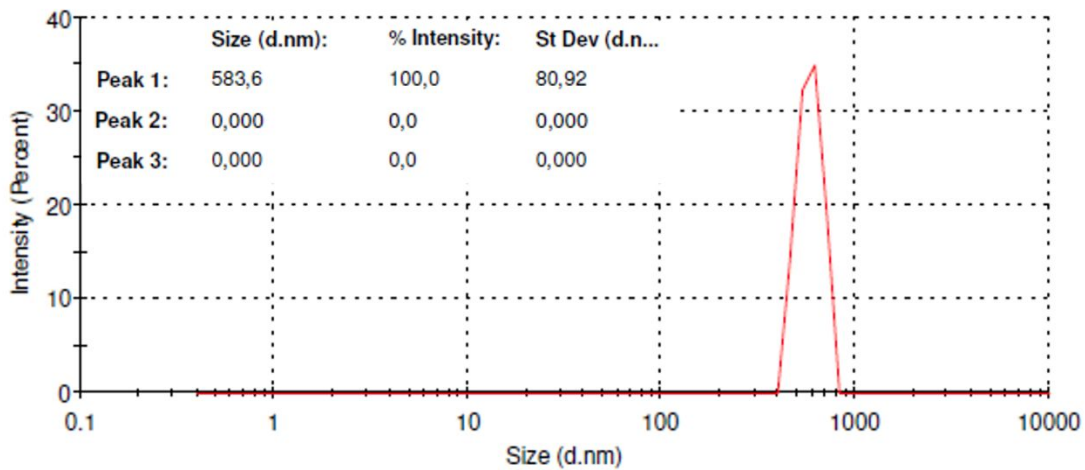


Figure S8. Droplet size distribution of emulsion obtained after redispersion of composite film as determined by dynamic light scattering. The film was prepared using emulsion with 0.16 wt% oil and 0.5 wt% CNFs.

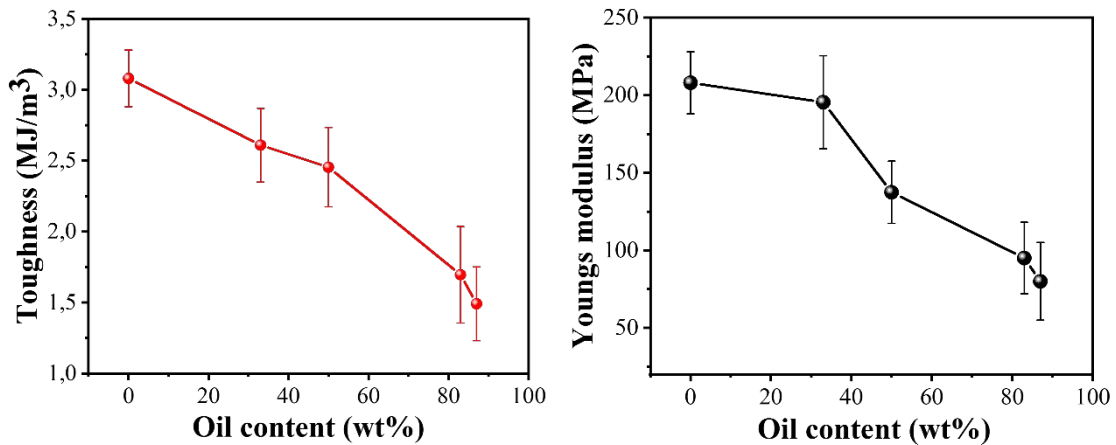


Figure S9. Toughness and Young's modulus of the composite films as a function of oil content.



Figure S10. Photographs of CNF-stabilized Pickering emulsions with different oil concentrations loaded with curcumin (5.5×10^{-6} wt% in oil phase): a) 0.1 wt% oil; b) 0.0166

wt% oil; c) 0.025 wt% oil; d) 0.05 wt% oil; e) 0.1 wt% oil; f) 0.24 wt% oil and g) 0.34 wt% oil. All emulsions contain 0.05 wt% CNFs.

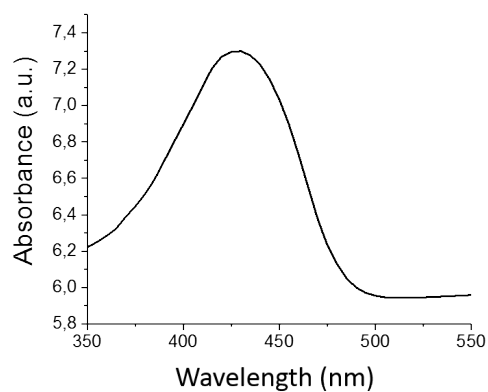


Figure S11. UV-VIS spectra of soybean oil loaded with curcumin (5.5×10^{-6} wt%).

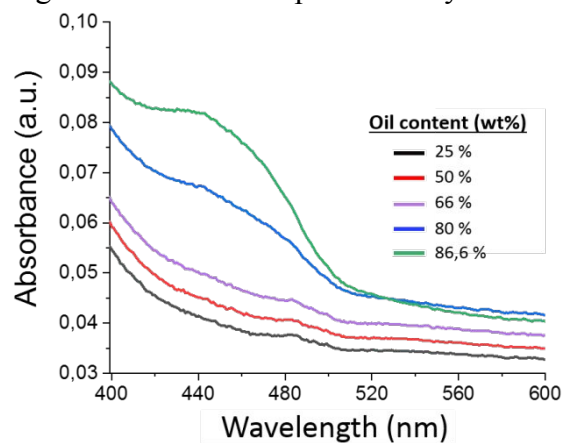


Figure S12. UV-vis spectra of composite films loaded with curcumin.

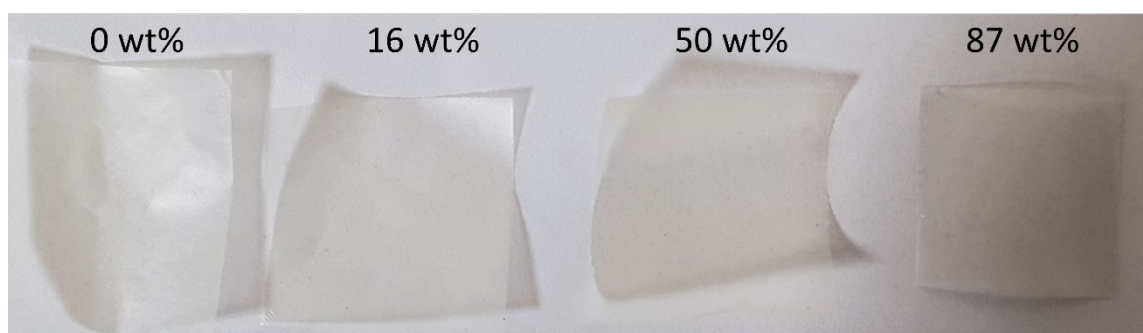


Figure S13. Photograph of composite films with different oil concentrations.

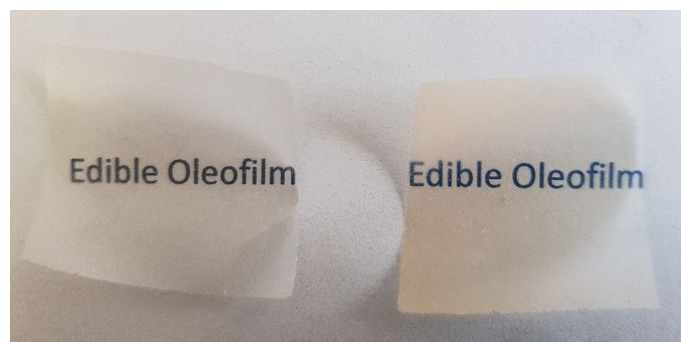


Figure S14. Photograph of a film loaded with curcumin (right side) proving the homogenous distribution of the bioactive compound