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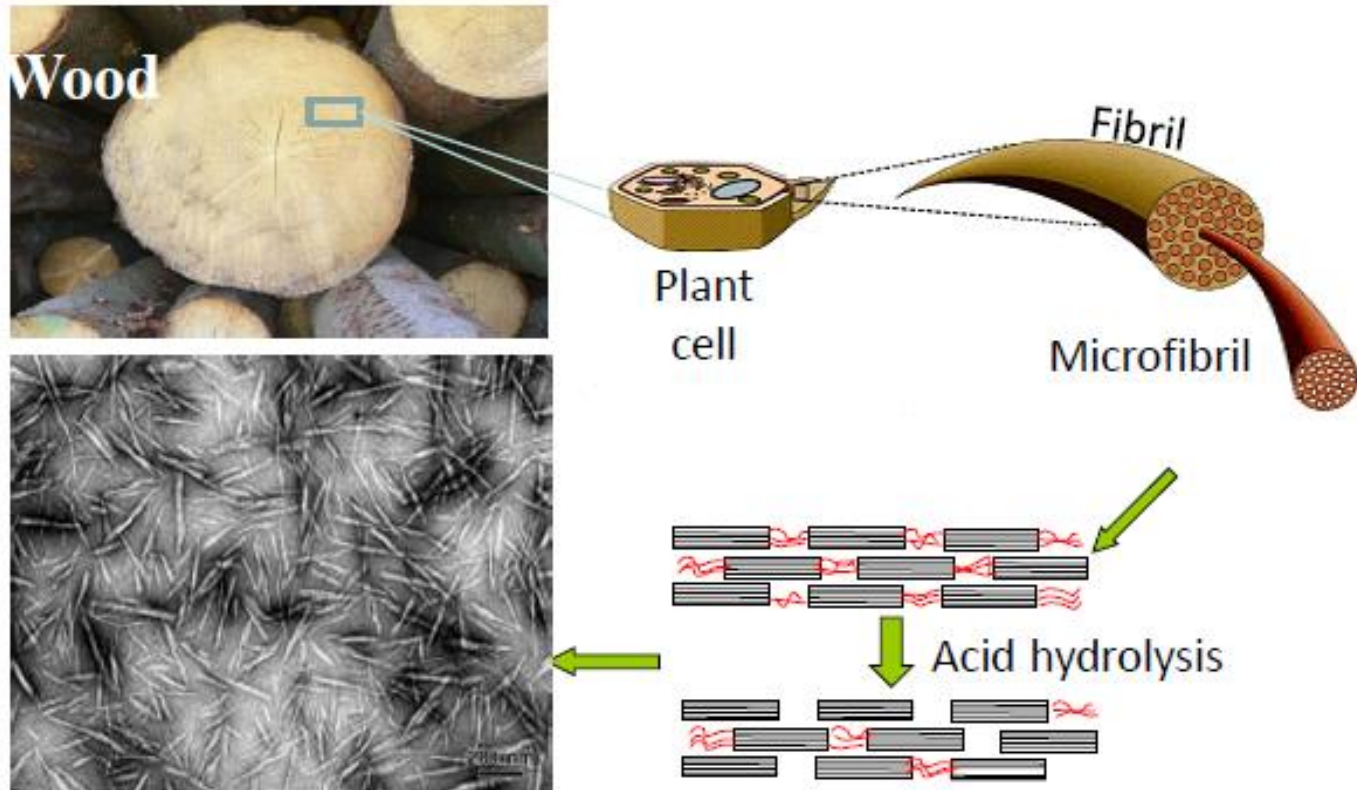
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Cellulose is a semi-crystalline polymer with amorphous and crystalline regions. Nanocrystals can be obtained by acid hydrolysis of the amorphous parts.

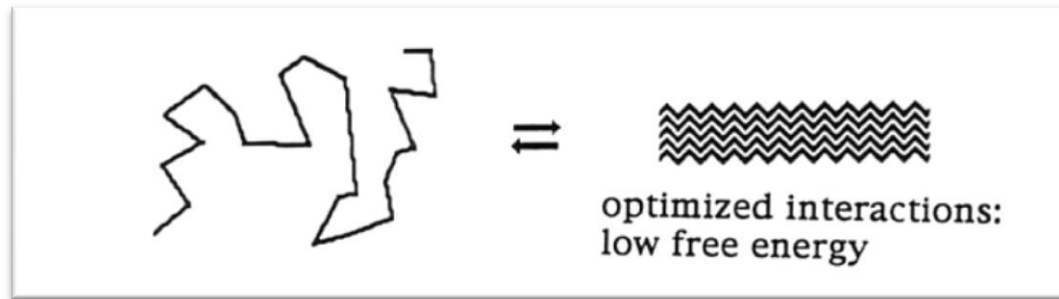


G. Siqueira, J. Bras, A. Dufresne, *Biomacromolecules* 2009, 10, 425-432. M. A. S. Azizi Samir, F. Alloin, A. Dufresne, *Biomacromolecules* 2005, 6, 612-626. S. Beck-Candanedo, M. Roman, D. G. Gray, *Biomacromolecules* 2005, 6, 1048-1054. M. M. de Souza Lima, R. Borsali, *Macromol. Rapid Commun.* 2004, 25, 771-787.

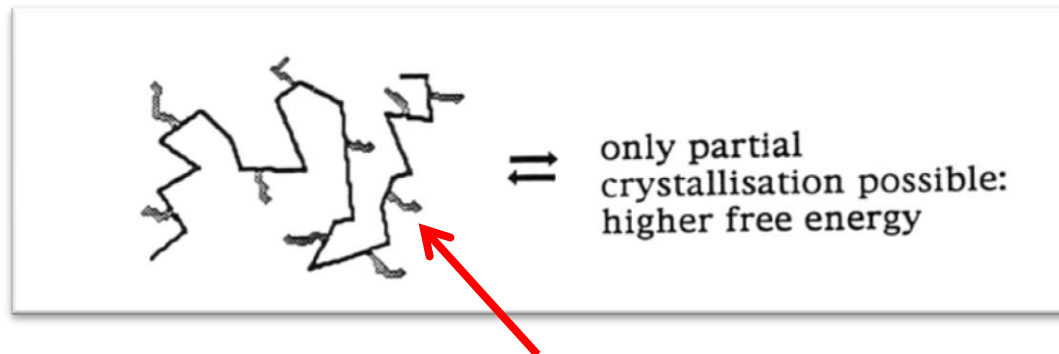
Derivatization increases solubility

Q: Why certain polymers may have a low solubility even if there is a favorable interaction with the solvent?

A: Low energy of the crystalline state

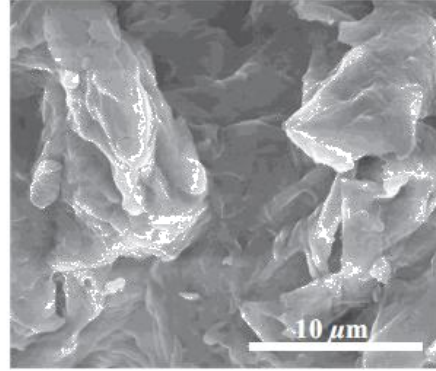
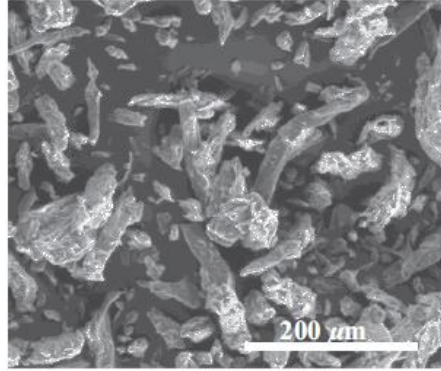


Vs.

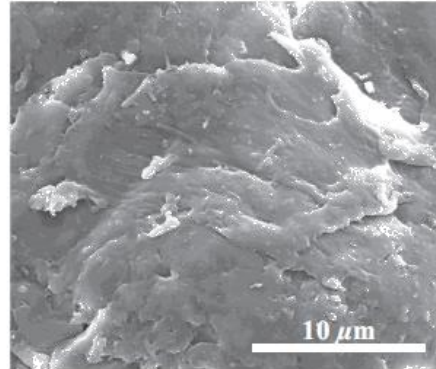
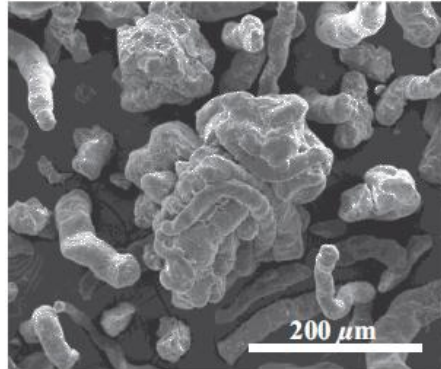


Derivatization doesn't allow a perfect packing \longrightarrow Higher solubility

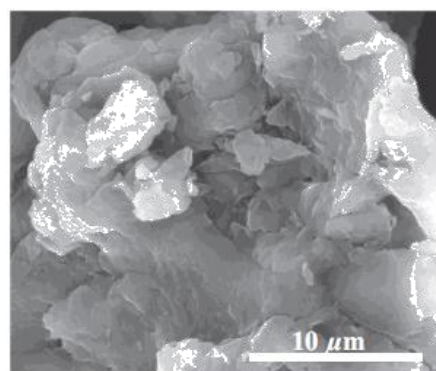
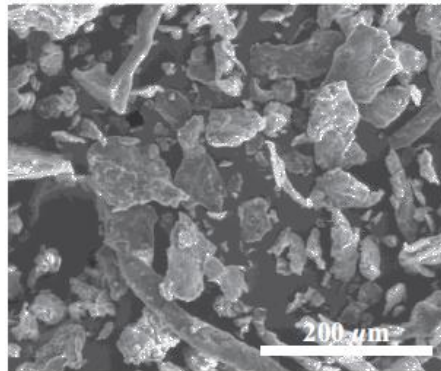
SEM characterization: starting materials



MCC

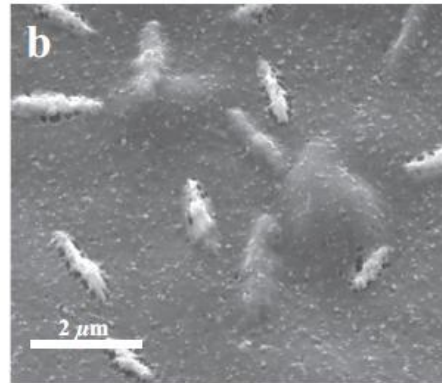
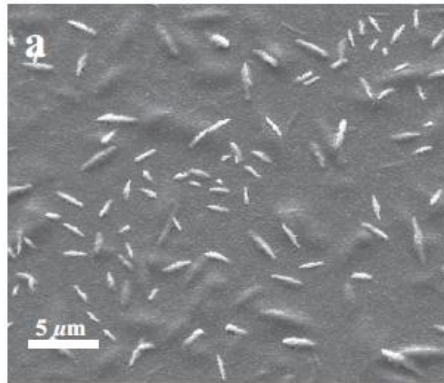


CMC

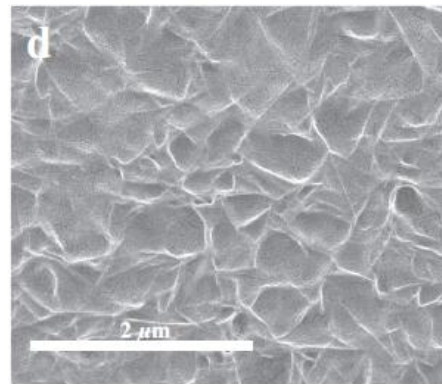
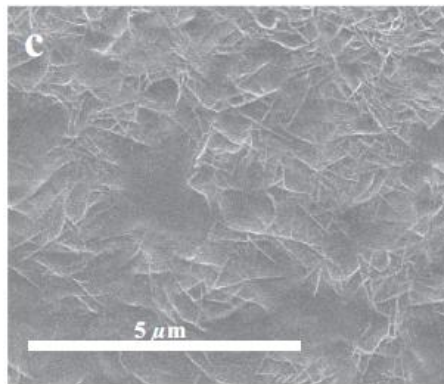


HPMC

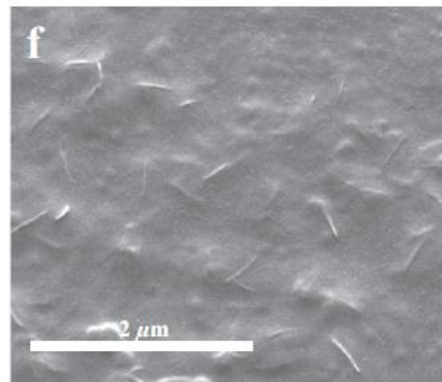
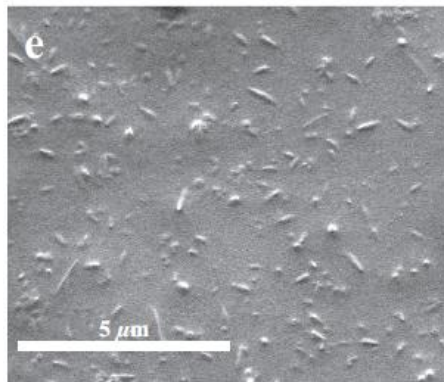
SEM characterization: extracted CNCs



CNCs MCC

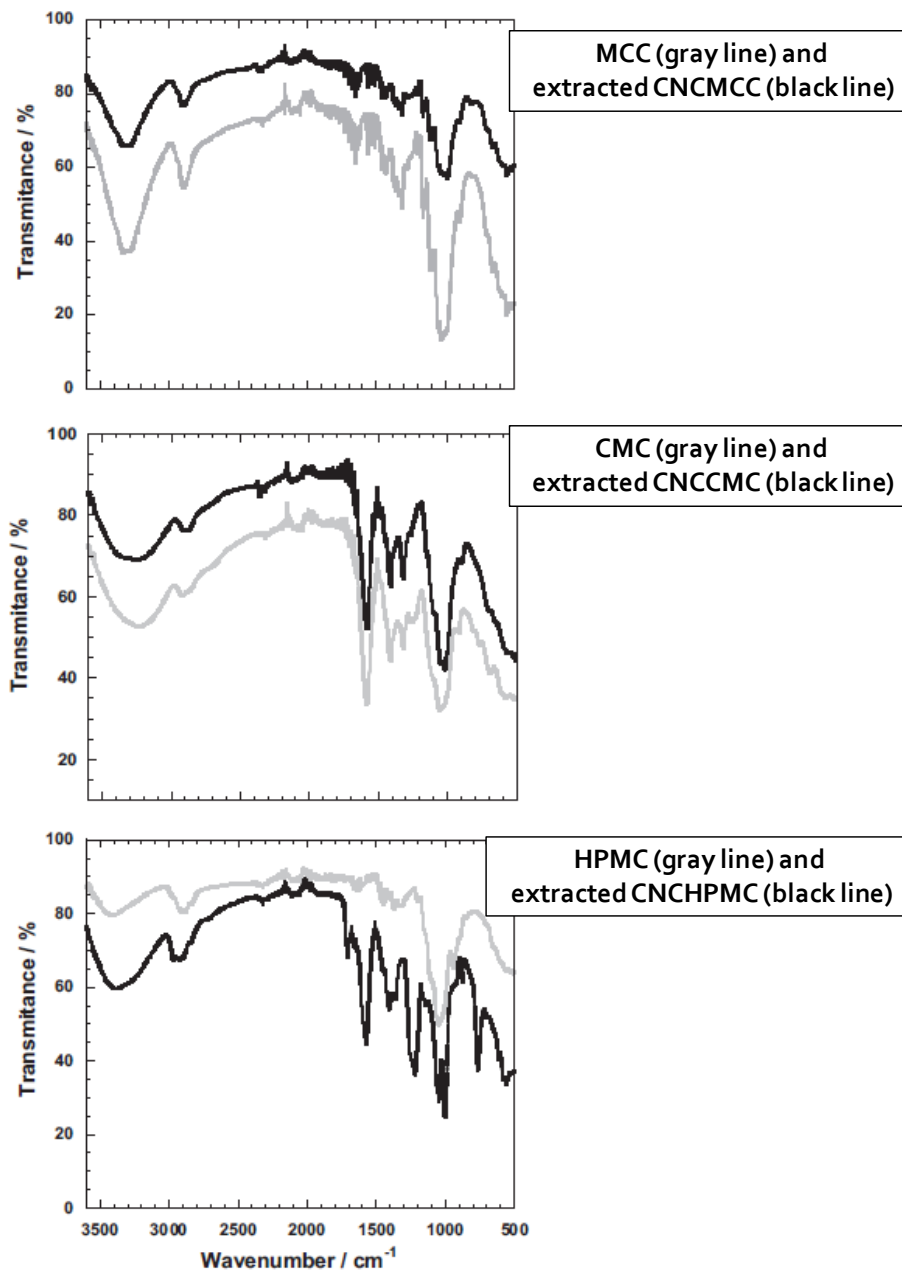


CNCs CMC

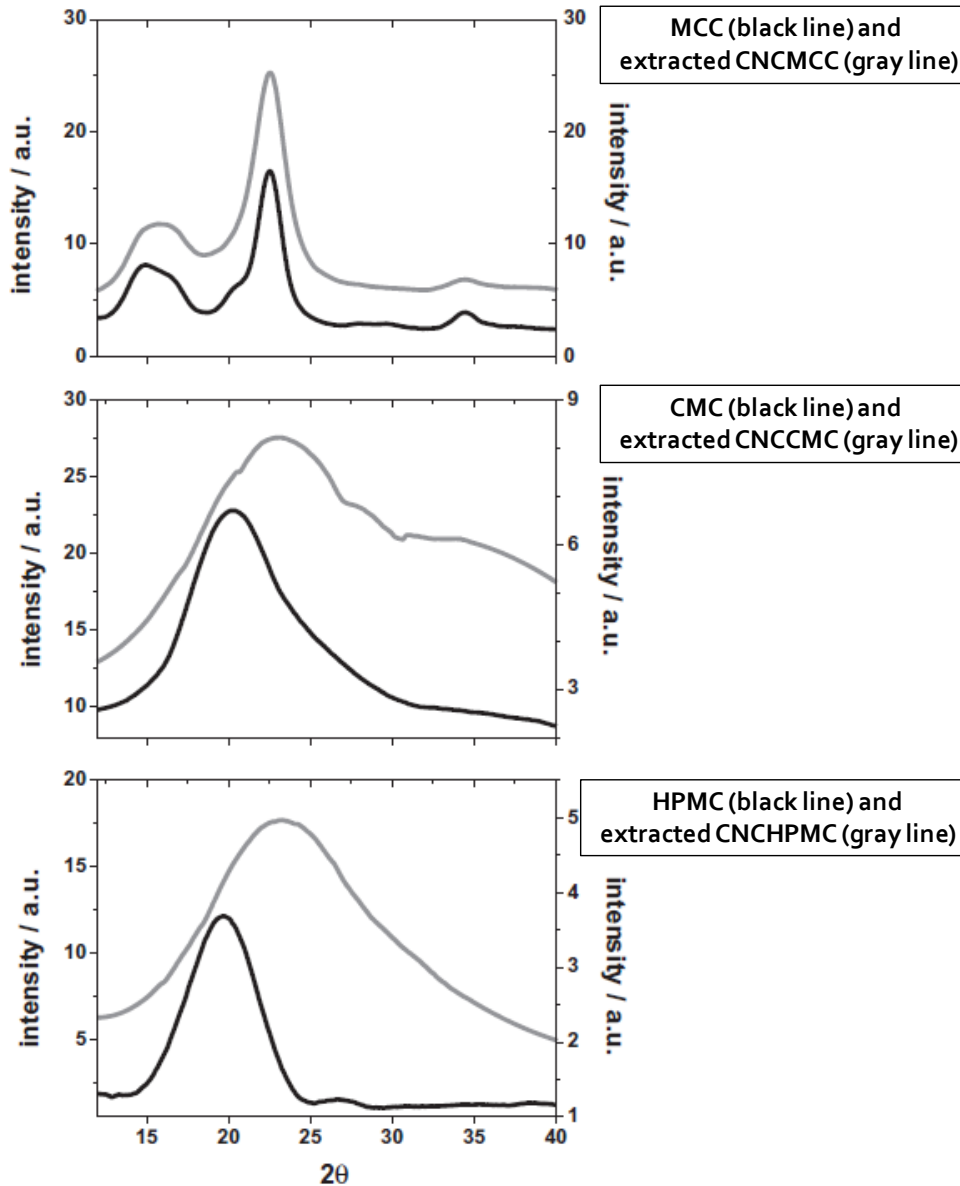


CNCs HPMC

FTIR characterization



X-ray characterization



Conclusions

- Cellulose derivatives were found to be highly crystalline indicating an unusual extraction of CNCs;
- The average size of the CNCs extracted from HPMC and CMC was found to be smaller (and with lower zeta potential) than the ones extracted from microcrystalline cellulose MCC);
- The estimated crystallinity indices show that the extracted material is more crystalline than the native one;
- Native cellulose derivatives were found to be of cellulose II type. The extracted CNCs from the cellulose derivatives show a crystalline organization of cellulose I type; starting material has a small fraction of cellulose I (masked in the diffraction spectra by the main cellulose II diffraction pattern).

Acknowledgements

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