

Lignocellulosic nanofibers from Hesperaloe Funifera for papermaking: preliminary study

Eduardo Espinosa¹, Quim Tarrés², Albert Serra², Marc Delgado-Aguilar², Ana Moral³, Alejandro Rodríguez¹, Pere Mutjé²

¹ Chemical Engineering Department, University of Córdoba, Córdoba, (Spain).

²LEPAMAP group. Department of Chemical Engineering. University of Girona. Girona (Spain).

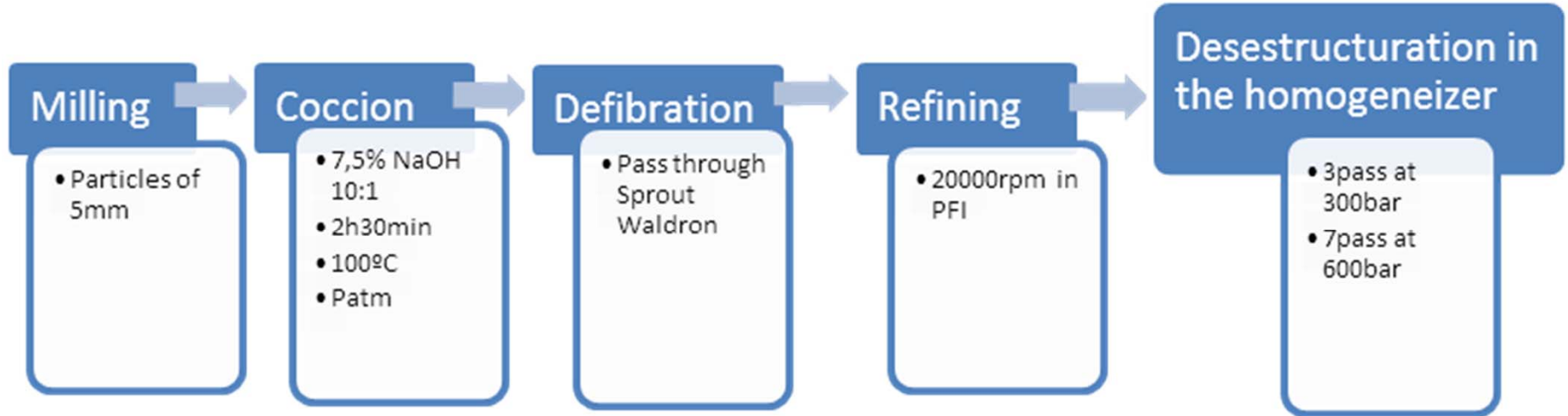
³Molecular Biology and Biochemical Engineering Department. University of Pablo Olavide. Sevilla (Spain).

Objective

- Investigate new cheaper process to obtain CNF.
- Use fibers with a high hemicellulose content like Hesperaloe (35.6%) because presented a good aptitude to be nanofibrilated through only mechanical pre-treatments.
- Compare to TEMPO-CNF the increase in properties when this LCNF are used to papermaking.

Methodology

The process to obtain LCNF without TEMPO pre-treatment is shown in the flowchart below:



Results

Properties	Hesperaloe LCNF	TEMPO 5mmol CNF
Cationic demand (ueq·g/g)	355.2	1238
Carboxyl content (ueq·g/g)	206.4	881
Specific surface (m²/g) *	72.5	173.9
Diameter (nm) *	34	14
Energetic Cost (€/kg) **	2.93	3.41
Chemical Cost (€/kg)***	0	154.8

(L)CNF	Breaking length increase (%)	Drainage rate (°SR)
Hesperaloe LCNF	89	24
Tempo 5mmol CNF	101	28

Conclusions

- We can obtain LCNF without chemical pre-treatment.
- This type of CNF is fifty times cheaper than TEMPO-CNF.
- When LCNF are used to papermaking the increased of mechanical properties is about 90%.