Cellulosic material from leaf waste streams as food emulsifiers

Angelica Tamayo Tenorio

Costas Nikiforidis, Remko Boom & Atze Jan van der Goot

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STW
Nieuwe technologie
mogelijk maken

Purification of cellulose particles

WHAT? Using waste stream from leaves to improve valorisation
Better use of resources, produce more food

HOW? Mild purification of cellulose-rich particles, retaining natural complexes. Functionality as emulsifiers

CONCLUSION

- Cellulosic particles with surface active properties.
- Interfacial behaviour similar to solid particles.
- Opportunities to mix with other biopolymers

HIGHLIGHTS

- Mild treatment - polysaccharide/protein complexes
- Size and composition - interfacial behaviour
- Enhanced functionality

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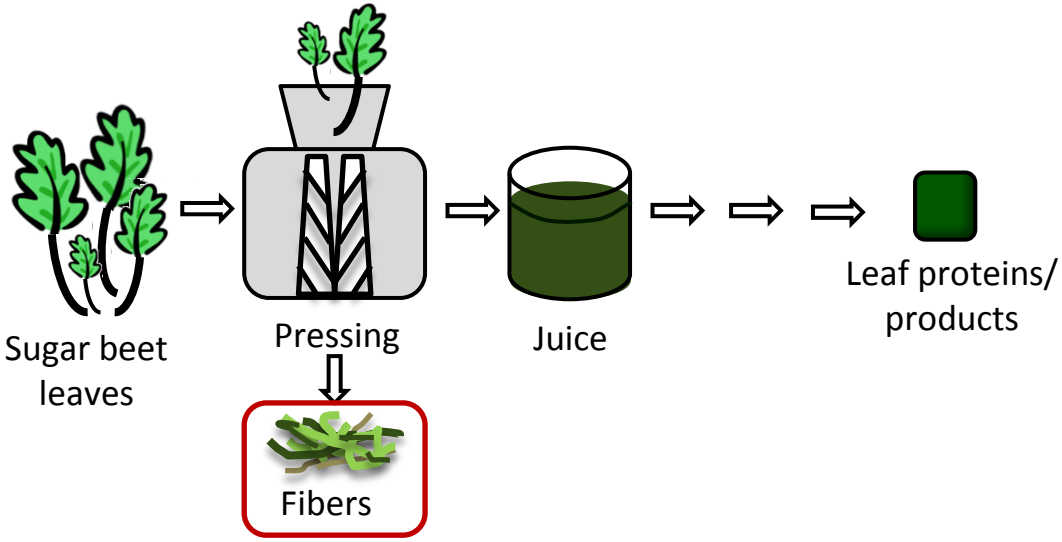
Raw material – leaf fibres



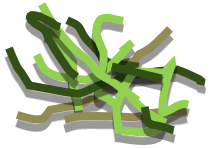
25-30% of the starting biomass

Mild processing to retain existing complexes!

Purification of leaf fibres

Aqueous purification

Fibres

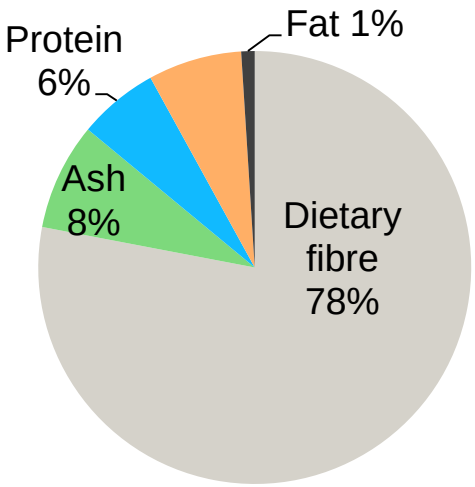


Washing
Freeze drying

Fine powder
(20 – 100 µm)

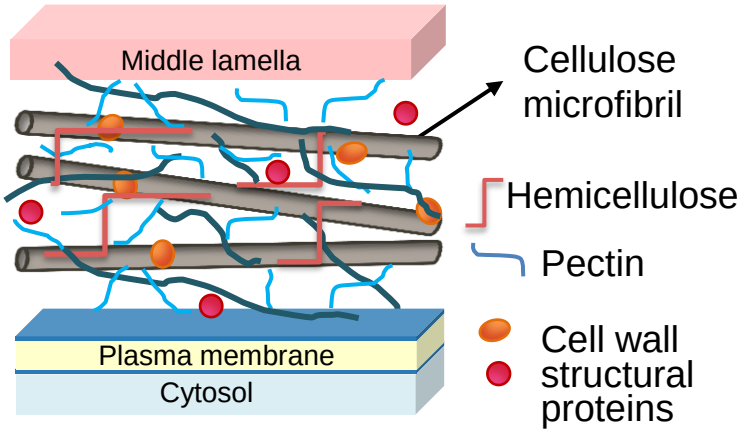
Air classification

Composition (dry base)



~82 % Insoluble:
cellulose,
hemicellulose
~18 % Soluble:
pectin

Cell wall structure



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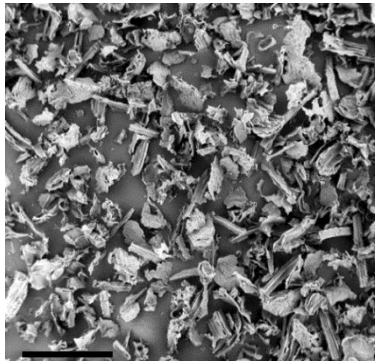
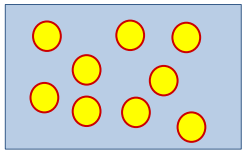
Characterisation of cellulose particles

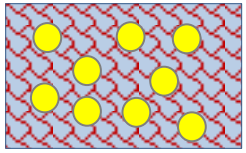
20-50 µm



50% of starting powder
+ Mouthfeel

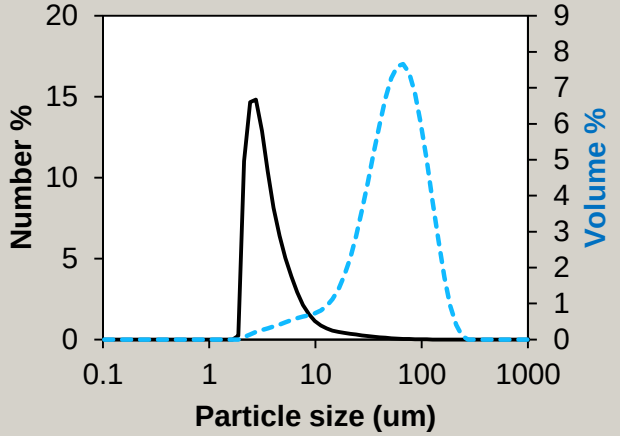


Emulsifier

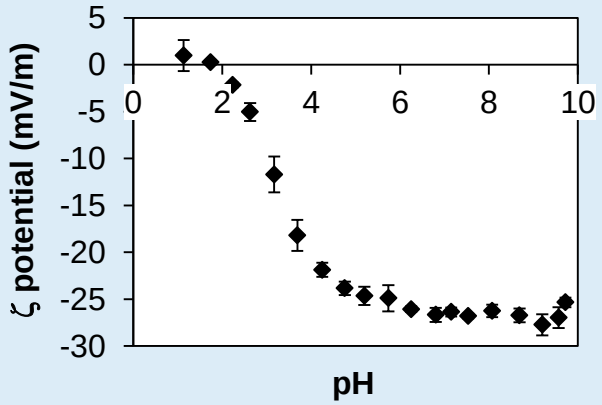


Thickener

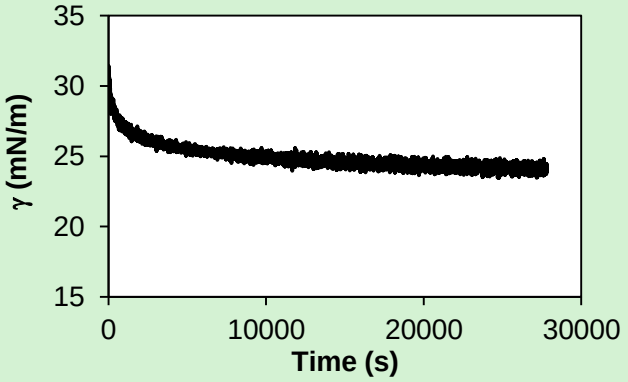
Particle size after homogenisation



Zeta-potential analysis



Dynamic interfacial tension



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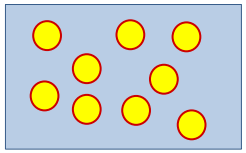
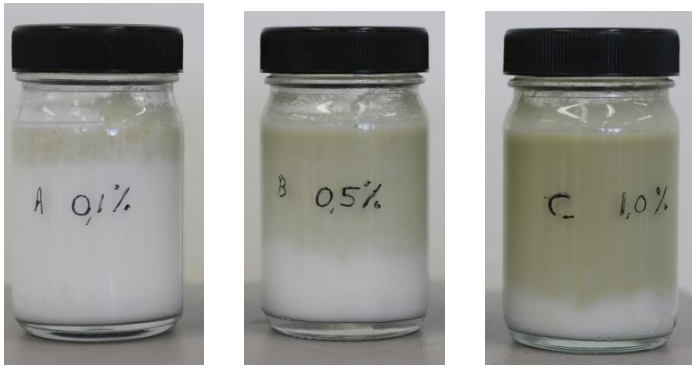
Cellulose particles as food emulsifiers



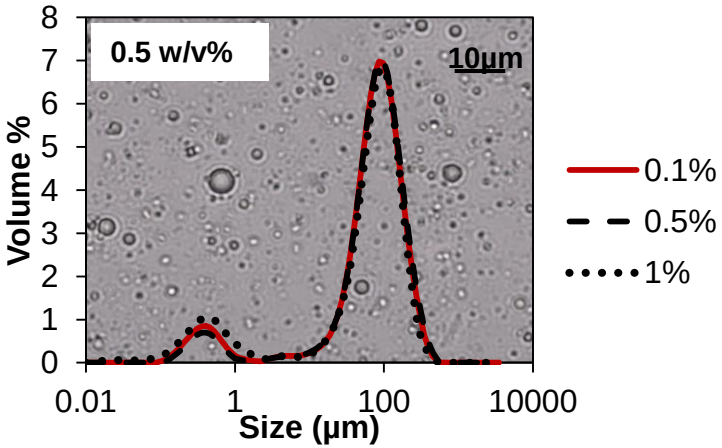
Emulsifier

Oil-in-water emulsions
10 % oil



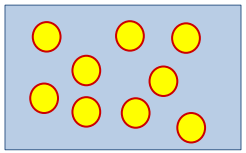
0.1 0.5 1.0

Fibre concentration wt% (db)



- Phase separation
- Stable against coalescence

Cellulose particles as food emulsifiers

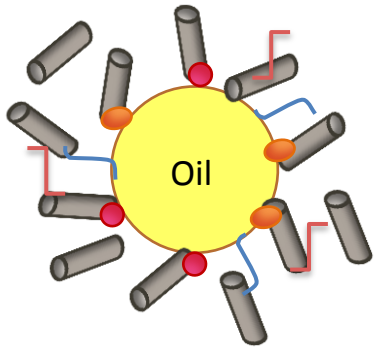


Emulsifier

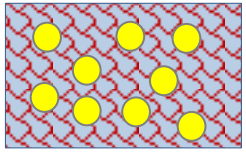
Cellulose particles

Dietary fibres

Proteins



+ SPI •

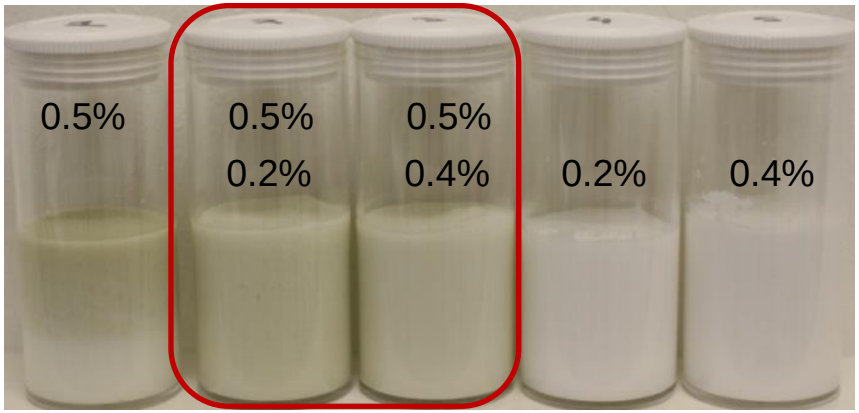


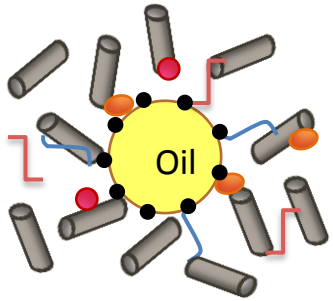
Thickener

Combined effect of proteins and cellulose particles:

- Soy protein isolate (SPI)

  Food Matrix





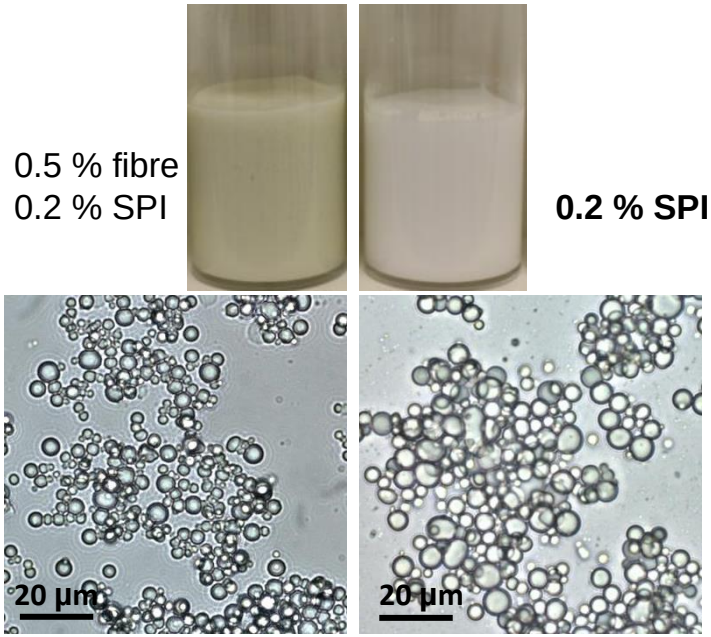
Emulsion characterisation

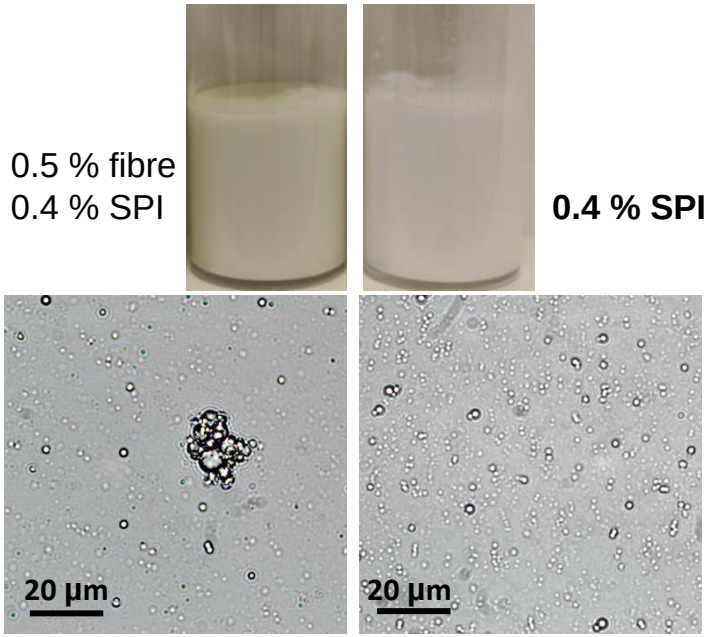
Main role of SPI

- Flexible to stabilise the interface

Cellulose particles

- Stabilisation of continuous phase





Complexation of biopolymers

Attractive interactions, hydrophobic domains

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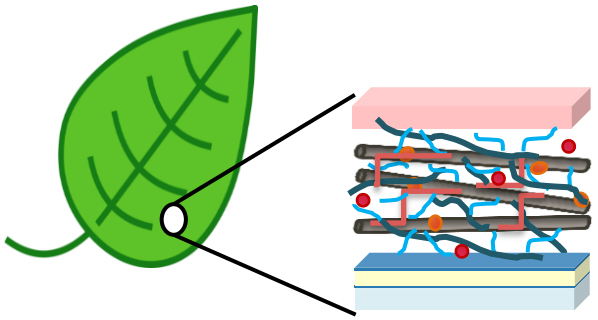
CONCLUSION

- Cellulosic particles with surface active properties.
- Interfacial behaviour similar to solid particles.
- Opportunities to mix with other biopolymers

Role of proteins attached to the cellulosic material

Product with added value

Benefit from nature's architecture



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Thank you!

Angelica Tamayo T.
angelica.tamayotenorio@wur.nl

Acknowledgments:
Jarno Gieteling and Thirea Peters

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