

NANOCELLULOSE DEWATERING AND MODIFICATION

Invention: Novel method to dewater and chemically modify nanocellulose.

Application: Modified cellulose-based materials for several applications.

Unmet need: Low water contents with cost-efficient solution with subsequent chemical modification.

IP Status: PCT/FI2016/050615, continued in EP, JP and US.

Project phase: Proven in laboratory scale, research on chemical modification.



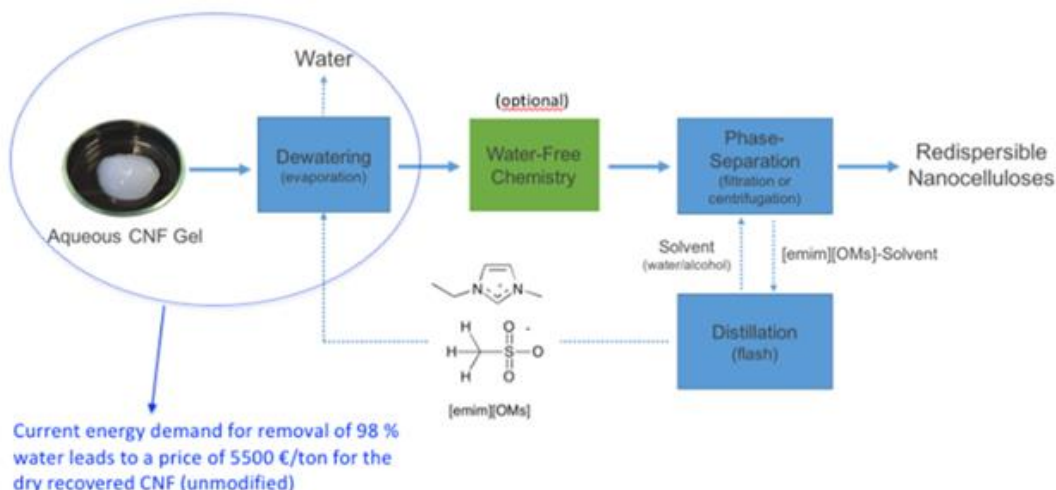
Currently dewatering of nanocellulose requires methods, such as freeze-drying or spray-drying, that are process-intensive. They require a lot of energy, which makes them costly solutions, or they do not achieve very low water contents, which complicates chemical modification. In addition, hazardous exchange solvents with reproductive toxicity are often applied. A major disadvantage of the current methods are that they do not provide low enough water contents for subsequent water-free chemical modification of the nanocellulose.

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A novel approach utilising only one ionic liquid (IL) solvent has been developed.

- The IL is non-volatile: easy water evaporation during the process.
- Highly-efficient water-free chemical modification in the same solvent without any extra steps allowing generation of novel nanocellulose-based materials.
- The IL stabilises the nanocellulose surface, thus, improving the modification efficiency.
- No dissolution of nanocellulose.
- Also applicable to other technical celluloses and hemicelluloses.
- Low-cost and toxicity ILs can be recycled in the process.
- Cost effective technology.
- Safe and green solvents.
- Ongoing studies on the modification of the nanocellulose: mechanistic studies, studies on the introduction of low-cost linking chemistry facilitating the introduction of wide functionality and materials properties.



Patents



Patents pending for the dewatering method and chemical modification of cellulose-based material.

Key Publication



Laaksonen, King et al. ChemSusChem, 2017

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