

Development of nanocellulose membranes (D2.3)

The deliverable D2.3 describes the development of charged nanocellulose-modified tight ultrafiltration membranes with tuneable performance.

What is the solution about?

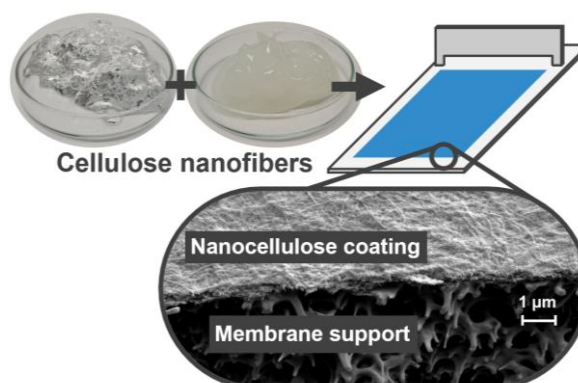
Nanocellulose-modified ultrafiltration membranes that can purify wastewater with size and charge-based selectivity were developed. The tuneability of these membranes was studied systemically so that they could be flexibly applied in the challenging industrial wastewaters of the R3VOLUTION project.

What challenges are addressed?

Nanocellulose-enabled membranes target the tradeoff between permeance and rejection. A membrane's permeance often decreases when its pore size is made smaller so that even the smallest particles and salts can be removed from water. This can lead to faster membrane fouling and shorter membrane lifetime. Nanocelluloses are a group of high-impact renewable materials that can tackle these issues via their inherently high surface area and favourable water interactions.

What is the innovation?

Nanocellulose-enabled membranes have tuneable performance in the ultrafiltration regime with permeances between 150 and 700 $\text{L m}^{-2} \text{ h}^{-1} \text{ MPa}^{-1}$. Molecular weight cut-offs are below 10 kDa and pore sizes between 5 and 15 nm, with 5 nm the most frequent pore size. Depending on the membrane type, 90% rejection of 5 nm particles or SO_4^{2-} can be achieved. Membranes withstand 20 bar filtration pressures and have a wide pH tolerance.



Contact for further information:

Link to peer-reviewed publication:

<https://www.sciencedirect.com/science/article/pii/S1383586626038116?via%3Dihub>

Alexey Khakalo: alexey.khakalo@vtt.fi

VTT Technical Research Centre of Finland Ltd

