



Send the report to SNS-secretary Mimmi Blomquist (SNS@slu.se)


## ANNUAL STATUS REPORT for PROJECT

YEAR: 2016

Please notice that the size of text sections in the form can be adjusted if needed.  
The length of the report should not exceed 3 pages. **Supplementary information can be attached**

1. Project titel	Valorization of wood biorefinery products into novel functional hydrocolloids (WOOD-PRO)
2. Project leader (name, address, telephone, e-mail)	Docent Kirsi S. Mikkonen, PhD, Department of Food and Environmental Sciences, P.O. Box 66, 00014 University of Helsinki (UHe), Finland tel: +358-50-3185744, email: kirsi.s.mikkonen@helsinki.fi
3. Duration	1.1.2016–31.12.2018
4. Project status	Does the project develop according to the plans? Please describe: The project develops according to the plans. Wood celluloses and hemicelluloses are characterized as emulsifiers and gel matrices.  Does the project deviate from the plans? Please explain: No.

<p>5. Activities during the reporting year</p>	<p>Four different topics were investigated: 1) nanofibrillation of cellulose and fibrillation efficiency when switchable ionic liquid is used as pretreatment, 2) xylan-lignin (XL) based hydrogels reinforced with cellulose nanofibers, 3) improving dispersion of different types of nanocelluloses in biodegradable polymers using in-situ polymerization and 4) characterization of nanocelluloses and hemicelluloses as hydrocolloids and emulsifiers.</p> <p>Different qualities of nanocelluloses were produced and characterized. Doctoral student Ragnhild Aaen from PFI/NTNU made a research visit of two months (2016) at UHe. Emulsions stabilized with nanocelluloses, galactoglucomannans, and xylans were studied. Functional polysaccharide-oil ratios for efficient stabilization of emulsions were determined. The experimental work done at PFI, NTNU and UHe is the basis for a planned joint publication.</p>
<p>6. Results achieved during the reporting year</p>	<p>We showed that switchable ionic liquids can improve the fibrillation efficiency of bleached wood pulp. In the hydrogels, the addition of cellulose nanofibres to xylan-lignin (XL) in combination with a crosslinking agent, formed favourable three-dimensional network structures with high swelling ratio. The XL nanofiber hydrogels displayed more than seven times higher compressive strength compared to hydrogels without nanofibers.</p> <p>Furthermore, we showed that in-situ polymerization of PVAc polymer in presence of cellulose nanocrystals can improve their dispersion in the polymer matrix.</p> <p>Charged nanocelluloses were able to stabilize oil-in-water emulsions of low oil content at very low concentrations. The galactoglucomannans and xylans show promising results both for the physical and the oxidative stability of emulsions.</p>
<p>7. Publishing and communication during the reporting year (International scientific peer reviewed journals, other scientific publications, short communications, web etc.)</p>	<p>Presentations/ publications:</p> <p>Berglund Linn et al. Nanofibrillation of switchable ionic liquid pretreated wood pulp, Poster presentation at Marcus Wallenberg Price Ceremony, October 2016.</p> <p>Geng et al. Cellulose based nanocomposites with outstanding dispersion produced by in-situ polymerization, Oral presentation at the ACS National spring meeting, March 2016, San Diego, USA.</p> <p>Mikkonen Kirsi et al. Spruce galactoglucomannans act as multifunctional natural emulsion stabilizers, Oral presentation at the 13th International Hydrocolloids Conference, May 2016, Guelph, Canada.</p> <p>Mikkonen Kirsi. Hemicelluloses – nature-made precursors for next generation functional materials, Oral presentation at the 6th Avancell Conference, October 2016, Stockholm, Sweden.</p> <p>Mikkonen Kirsi et al. Hexanal-releasing polysaccharide aerogels for extending the shelf-life of fruit, Oral presentation at the 3rd International Seminar on Aerogels, September 2016, Sophia Antipolis, France.</p>

	<p>Mikkonen Kirsi et al. Spruce galactoglucomannans stabilize emulsions efficiently by multiple mechanisms, Oral presentation at the I&amp;S WORKSHOP - Insights and strategies towards a bio-based economy, November 2016, Montevideo, Uruguay.</p> <p>Berglund Linn et al. Switchable ionic liquids enable efficient nanofibrillation of wood pulp, manuscript submitted to Cellulose.</p>
<p>10. Short economic report (overview) of the reporting year</p>	<p>UHe: Personnel costs 86,597.5 SEK Travel costs 1,644.9 SEK Other expenses 928.9 SEK <b>Total (UHe) 89,171.3 SEK</b></p> <p>LTU: Travel 13,238.1 SEK Consumables 14,273.6 SEK <b>Total (LTU) 27,511.7 SEK</b></p> <p>PFI: Personnel costs: 50,228.9 SEK Travel costs: 5,666.4 SEK Consumables: 3,522.5 SEK <b>Total (PFI): 59,417.8 SEK</b></p> <p><b>Total (WOOD-PRO): 176,100.8 SEK</b></p> <p>The remaining funding from the 2016 budget will be used during years 2017 and 2018.</p>
<p>11. Date and signature</p>	<p>Date: 28.2.2017</p> <p>Signature of project leader: </p>