

## LIST OF PUBLICATIONS and PATENTS

**Prof. STEFAN WILLFÖR (b. 1971)**

*Updated 15.4.2016*

### **A. Peer-reviewed scientific articles (157)**

1. Journal article (refereed), original research (147)
2. Review article, Literature review, Systematic review (6)
3. Book section, chapters in research books (4)

### **B. Non-reviewed scientific articles (*not included*)**

1. Non-refereed conference proceedings (110+)

### **C. Publications intended for professional communities**

1. Åbo Akademi reports (15, not included)
2. Others (6)

### **D. Theses**

### **E. Publications intended for the general public (1)**

### **F. Patents, patent applications, and invention disclosures (2+1+7)**

## A. Peer-reviewed scientific articles

### 1. Journal article (refereed), original research

5 other manuscripts currently submitted for peer-review, several under work.

1. Liu, J., Cheng, F., Grénman, H., Spoljaric, S., Seppälä, J., Eriksson, J.E., Willför, S., Xu, C. Development of nanocellulose scaffolds with tunable structures to support 3D cell culture. *Carbohydrate Polymers*, xxx (2016), xxx-xxx (Elsevier Ltd., ISSN: 0144-8617), accepted
2. Dönmez, I.E., Hemming, J., Willför, S., Bark extractives and suberin monomers from *Arbutus andrachne* and *Platanus orientalis*. *BioResources* x (2016) x, xxxx-xxxx (North Carolina State University, Dep. of Wood and Paper Science, ISSN: 1930-2126), accepted
3. Kleen, M., Pranovich, A., Willför, S., Statistical modeling of pressurized hot-water batch extraction to produce hemicelluloses with desired properties. *Holzforschung*, xx (2016) x, xxx-xxx (Walter de Gruyter GmbH, ISSN 0018-3830, ISSN (Online) 1437-434X), accepted
4. Raitanen, J.-E., Sundberg, A., Konn, Jonas, Smeds, A., Willför, S., Reactions between peracetic acid and lipophilic extractives – methodologies and implications in post bleaching of kraft pulps. *Holzforschung*, xx (2016) x, xxx-xxx (Walter de Gruyter GmbH, ISSN 0018-3830, ISSN (Online) 1437-434X), online first
5. Rinne, M., Kautto, O., Kuoppala, K., Ahvenjärvi, S., Kitunen, V., Ilvesniemi, H., Willför, S., Sormunen-Cristian, R. Digestion of wood-based hemicellulose extracts as screened by *in vitro* gas production method and verified *in vivo* using sheep. *Agricultural and Food Science* 25 (2016) 1, 13-21 (University of Helsinki, Department of Agricultural Sciences, ISSN: 1795-1895)
6. Nebreda, A.P., Grénman, H., Mäki-Arvela, P., Eränen, K., Hemming, J., Willför, S., Murzin, D.Yu., Salmi, T., Acid hydrolysis of *O*-acetyl-galactoglucomannan in a continuous tube reactor: a new approach to sugar monomer production. *Holzforschung*, 70 (2016) 3, 187-194 (Walter de Gruyter GmbH, ISSN 0018-3830, ISSN (Online) 1437-434X)
7. Ravanal, M.C., Pezoa-Conte, R., von Schoultz, S., Hemming, J., Salazar, O., Anugwom, I., Jogunola, O., Mäki-Arvela, P., Willför, S., Mikkola, J.-P., Lienqueo, M.E., Comparison of different types of pretreatment and enzymatic saccharification of *Macrocystis pyrifera* for the production of biofuel, *Algae Research* 13 (2016), 141–147, ISSN: 2211-9264
8. Krogell, J., Eränen, K., Pranovich, A., Willför, S., Utilizing active pH control for enhanced hot-water extraction of wood. *Nordic Pulp and Paper Research Journal* 31 (2016) 1, 4–13 (Mid Sweden University, ISSN: 0283-2631)
9. Pranovich, A., Holmbom, B., Willför, S., Two-stage hot-water extraction of galactoglucomannans from spruce wood. *Journal of Wood Chemistry and Technology* 36 (2016) 2, 140-156 (Taylor & Francis, ISSN: 0277-3813)
10. Korotkova, E.M., A.V. Pranovich, S.M. Willför, E.M. Sulman, Lignin isolation from spruce wood with low concentration alkali at high temperature. *Scientific and Technical Volga region Bulletin*, 6, 151-153 (2015). (ISSN 2079-5920, The article is in Russian with English abstract)

11. Korotkova, E., Pranovich, A., Wärnå, J., Salmi, T., Murzin, D., Willför, S., Lignin isolation from spruce wood with low concentration aqueous alkali at high temperature and pressure: Influence of hot-water pre-extraction. *Green Chemistry*, 17 (2015) 11, 5058-5068, (Royal Society of Chemistry, ISSN: 1463-9262)
12. Lopez, M., Simakova, O.A., Murzina, E.V., Willför, S.M., Prosvirin, I., Simakov, A., Murzin, D.Yu., Gold particle size effect in biomass-derived lignan hydroxymatairesinol oxidation over Au/Al<sub>2</sub>O<sub>3</sub> catalysts, *Applied Catalysis A: General*, 504 (2015), 248-255 (doi: 10.1016/j.apcata.2014.12.051) (Elsevier Ltd., ISSN: 0926-860X)
13. Dax, D., Soledad Chávez Bastidas, M., Honorato, C., Liu, J., Spoljaric, S., Seppälä, J., Mendonça, R.T., Xu, C., Willför, S., Sánchez, J., Tailor-made hemicellulose-based hydrogels reinforced with nanofibrillated cellulose. *Nordic Pulp and Paper Research Journal* 30 (2015) 3, 373–384 (Mid Sweden University, ISSN: 0283-2631)
14. Väisänen, E., Smeds, A., Fagerstedt, K., Teeri, T., Willför, S., Kärkönen, A., Coniferyl alcohol hinders the growth of tobacco BY-2 cells and *Nicotiana benthamiana* seedlings. *Planta* 242 (2015) 3, 747-760 (Springer, ISSN: 0032-0935 (Print) 1432-2048 (Online))
15. Pezoa-Conte, R., Leyton, A., Anugwom, I., von Schoultz, S., Paranko, J., Mäki-Arvela, P., Willför, S., Muszyński, M., Nowicki, J., Lienqueo, M.E., Mikkola, J.-P., Deconstruction of the green alga *Ulva rigida* in ionic liquids: closing the mass balance, *Algae Research* 12 (2015), 262–273, ISSN: 2211-9264
16. Li, B., Xu, W., Kronlund, D., Määttä, A., Liu, J., Smått, J.-H., Peltonen, J., Willför, S., Xindong, M., Xu, C., Cellulose nanocrystals prepared via formic acid hydrolysis followed by TEMPO-mediated oxidation. *Carbohydrate Polymers*, 133 (2015), 605-612 (Elsevier Ltd., ISSN: 0144-8617)
17. Rissanen, J.V., Grénman, H., Xu, C., Krogell, J., Willför, S., Murzin, D.Y., Salmi, T., Challenges in understanding the simultaneous aqueous extraction and hydrolysis of spruce hemicelluloses. *Cellulose Chemistry and Technology* 49 (2015) 5-6, 449-453 (Editura Academiei Romane, ISSN: 0576-9787)
18. Sumerskiy, I., Pranovich, A., Holmbom, B., Willför, S., Lignin and other aromatic substances released from spruce wood during pressurized hot-water extraction. Part 1: Extraction, fractionation and physico-chemical characterization, *Journal of Wood Chemistry and Technology* 35 (2015) 6, 387-397 (Taylor & Francis, ISSN: 0277-3813)
19. Sumerskiy, I., Pranovich, A., Holmbom, B., Willför, S., Lignin and other aromatic substances released from spruce wood during pressurized hot-water extraction. Part 2: Structural characterization, *Journal of Wood Chemistry and Technology* 35 (2015) 6, 398-411 (Taylor & Francis, ISSN: 0277-3813)
20. Krogell, J., Eränen, K., Pranovich, A., Willför, S., In-line high-temperature pH control during hot-water extraction of wood. *Industrial Crops and Products* 67 (2015), 114-120 (Elsevier B.V., ISSN: 0926-6690)
21. Kisonen, V., Prakobna, K., Xu, C., Salminen, A., Mikkonen, K.S., Valtakari, D., Eklund, P., Seppälä, J., Tenkanen, M., Willför, S., Composite films of nanofibrillated cellulose and *O*-acetylglactoglucomanan (GGM) coated with succinic esters of GGM showing potential as

barrier material in food packaging, *Journal of Materials Science*, 50 (2015) 8, 3189-3199 (Springer, ISSN: 0022-2461 (Print) 1573-4803 (Online))

22. Kilpeläinen, P., Kitunen, V., Hemming, J., Pranovich, A., Ilvesniemi, H., Willför, S., Pressurized hot water flow-through extraction of birch sawdust – Effects of sawdust density and sawdust size. *Nordic Pulp and Paper Research Journal* 29 (2014) 4, 547–556 (Mid Sweden University, ISSN: 0283-2631)
23. Häärä, M., Konn, J., Vähäsalo, L., Lybeck, J., Sundberg, A., Willför, S., Flow cytometry as a tool to assess inhibitor performance for calcium oxalate scale control. *Nordic Pulp and Paper Research Journal* 29 (2014) 4, 663–672 (Mid Sweden University, ISSN: 0283-2631)
24. Korpinen, R., Kallioinen, M., Hemming, J., Pranovich, A., Mänttari, M., Willför, S., Comparative evaluation of various lignin determination methods on hemicellulose-rich fractions of spruce and birch obtained by pressurised hot-water extraction (PHWE) and subsequent ultrafiltration (UF). *Holzforschung*, 68 (2014) 8, 971-979 (Walter de Gruyter GmbH, ISSN 0018-3830, ISSN (Online) 1437-434X)
25. Kisonen, V., Xu, C., Bollström, R., Hartman, J., Rautkoski, H., Nurmi, M. Hemming, J., Eklund, P., Willför, S., *O*-acetyl galactoglucomannan esters for barrier coatings. *Cellulose* 21 (2014) 6, 4497-4509 (Springer, ISSN: 0969-0239)
26. Salmi, T., Murzin, D., Wärnä, J., Mäki-Arvela, P., Kusema, B., Holmbom, B., Willför, S., Hemicellulose hydrolysis in the presence of heterogeneous catalyst. *Topics in Catalysis* 57 (2014) 17-20, 1470-1475 Springer, ISSN: 1022-5528 (Print) 1572-9028 (Online))
27. Rissanen, J.V., Grénman, H., Xu, C., Willför, S., Murzin, D.Y., Salmi, T., Murzin, D., Wärnä, J., Mäki-Arvela, T., Obtaining spruce hemicelluloses of desired molar mass using pressurized hot water Extraction. *ChemSusChem* 7 (2014) 10, 2947-2953 (Wiley, ISSN: 1864-5631 (print), ISSN: 1864-564X (online))
28. Lindqvist, H., Bialczak, S., Willför, S., Sundberg, A., Functionalization of paper surfaces by modified galactoglucomannans. *Journal of Science & Technology for Forest Products and Processes* 3 (2014) 4, 6-12 (PAPTAC, ISSN: 1927-6311 (Print), 1927-632X (Online))
29. Dax, D., Chavez, M., Xu, C., Willför, S., Mendonca, R.T., Sánchez, J., Cationic hemicellulose-based hydrogels for arsenic and chromium removal from aqueous solutions. *Carbohydrate Polymers*, 111 (2014), 797-805 (Elsevier Ltd., ISSN: 0144-8617)
30. Liu, J., Korpinen, R., Mikkonen, K.S., Willför, S., Xu, C., Nanofibrillated cellulose originated from birch sawdust after sequential extractions: a promising polymeric material from waste to films. *Cellulose* 21 (2014) 4, 2587-2598 (Springer, ISSN: 0969-0239)
31. Krogell, J., Eränen, K., Granholm, K., Pranovich, A., Willför, S., High-temperature pH measuring during hot-water extraction of hemicelluloses from wood. *Industrial Crops and Products* 61 (2014), 9-15 (Elsevier B.V., ISSN: 0926-6690)
32. Khazraie Shoulaifar, T., DeMartini, N., Willför, S., Pranovich, A., Smeds, A.I., Virtanen, T.A.P., Maunu, S.-L., Verhoeff, F., Kiel, J., Jacop, H.A., Hupa, M., Impact of torrefaction on the chemical structure of birch wood. *Energy & Fuels*, 28 (2014) 6, 3863-3872 (Print Edition ISSN: 0887-0624, Web Edition ISSN: 1520-5029)

33. Lozhechnikova, A., Dax, D., Vartiainen, J., Willför, S., Xu, C., Österberg, M., Modification of nanofibrillated cellulose using amphiphilic block-structured galactoglucomannans. *Carbohydrate Polymers*, 110 (2014), 163-172 (Elsevier Ltd., ISSN: 0144-8617)
34. Mäki-Arvela, P., Mikkola, M., Hemming, J., Eränen, K. Willför, S., Murzin D.Yu., Heat treatment and chemical composition of fatty acids and rosin acids mixtures: Effect on their thermal properties and morphology. *Journal of the American Oil Chemist's Society*, 91 (2014) 6, 1035-1046 (Springer, ISSN: 0003-021X (print version) -ISSN: 1558-8588 (electronic version))
35. Kilpeläinen, P.O., Hautala, S.S., Byman O.O., Tanner, L.J., Korpinen, R.I., Lillandt, M.K-J., Pranovich, A.V., Kitunen, V.H., Willför, S.M., Ilvesniemi, H.S., Pressurized hot water flow-through extraction system scale up from laboratory to pilot scale. *Green Chemistry*, 16 (2014) 6, 3186-3194, (Royal Society of Chemistry, ISSN: 1463-9262)
36. Rissanen, J.V., Grénman, H., Willför, S., Murzin, D.Y., Salmi, T.O., Spruce hemicellulose for chemicals using aqueous extraction: Kinetics, mass transfer and modeling. *Industrial & Engineering Chemistry Research* 53 (2014) 15, 6341-6350 (ACS Publications, ISSN: 0888-5885)
37. Banerjee, P.N., Pranovich, A.P., Dax, D., Willför, S., Non-cellulosic heteropolysaccharides from sugarcane bagasse — Sequential extraction with pressurized hot water and alkaline peroxide at different temperatures. *Bioresource Technology* 155 (2014), 446-450 (Elsevier Ltd., ISSN: 0960-8524)
38. Häärä, M., Sundberg, A., Pranovich, A., Willför, S., Formation of oxalic acid in alkaline peroxide treatment of different wood components. *Holzforschung*, 68 (2014) 4, 393-400 (Walter de Gruyter GmbH, ISSN 0018-3830)
39. Faba, L., Kusema, B.T., Murzina, E.V., Tokarev, A., Kumar, N., Smeds, A., Diaz, E., Ordonez, S., Mäki-Arvela, P., Willför, S., Salmi, T., Murzin, D.Y., Hemicellulose hydrolysis and hydrolytic hydrogenation over proton- and metal modified beta zeolites. *Microporous and Mesoporous Materials*, 189 (2014), 189-199 (Elsevier Ltd., ISSN 1387-1811)
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41. Salmi, T., Murzin, D.Yu., Wärnå, J., Mäki-Arvela, P., Kusema, B., Holmbom, B., Willför, S., Kinetic modeling of hemicellulose hydrolysis in the presence of homogeneous and heterogeneous catalysts. *AIChE Journal* 60 (2014) 3, 1066-1077 (American Institute of Chemical Engineers Online ISSN: 1547-5905)
42. Leppänen, A.-S., Xu, C., Parikka, K., Eklund, P., Sjöholm, R., Brumer, H., Tenkanen, M., Willför, S., Targeted allylation and propargylation of galactose-containing polysaccharides in water. *Carbohydrate Polymers*, 100 (2014) 1, 46-54 (Elsevier Ltd., ISSN: 0144-8617)
43. Kisonen, V., Xu, Chunlin, V., Xu, C., Eklund, P., Lindqvist, H., Sundberg, A., Pranovich, A., Sinkkonen, J., Vilaplana, F., Willför, S., Cationised O-acetyl galactoglucomannans: synthesis and characterisation, *Carbohydrate Polymers* 99 (2014), 755-764 (Elsevier Ltd., ISSN: 0144-8617)

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46. Dax, D., Xu, C., Långvik, O., Hemming, J., Backman, P., Willför, S., Synthesis of SET-LRP-induced galactoglucomannan-diblock copolymers. *Journal of Polymer Science Part A: Polymer Chemistry* 51 (2013) 23, 5100-5110 (Wiley Periodicals, Inc., ISSN: 1099-0518)
47. Penttilä, P.A., Kilpeläinen, P., Tolonen, L., Suuronen, J.-P., Sixta, H., Willför, S., Serimaa, R., Effects of pressurized hot water extraction on the nanoscale structure of birch sawdust. *Cellulose* 20 (2013) 5, 2335-2347 (Springer, ISSN: 0969-0239)
48. Leppänen, A.-S., Xu, C., Eklund, P., Lucenius, J., Österberg, M., Willför, S., Targeted functionalization of spruce *O*-acetyl galactoglucomannans – 2,2,6,6-tertbutylpiperidin-1-oxyl-oxidation and carbodiimide-mediated amidation. *Journal of Applied Polymer Science*, 130 (2013) 5, 3122-3129 (WILEY-VCH Verlag GmbH & Co, ISSN: 1097-4628)
49. Fang, W., Hemming, J., Reunanen, M., Eklund, P., Conde, E., Poljanšek, I., Oven, P., Willför, S., Evaluation of selective extraction methods for recovery of polyphenols from pine. *Holzforschung*, 67 (2013) 8, 843-851 (Walter de Gruyter GmbH, ISSN 0018-3830)
50. Kilpeläinen, P., Kitunen, V., Pranovich, A., Ilvesniemi, H., Willför, S., Pressurized hot water flow-through extraction of birch sawdust with acetate pH buffer. *BioResources* 8 (2013) 4, 5202-5218 (North Carolina State University, Dep. of Wood and Paper Science, ISSN: 1930-2126)
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52. Conde, E., Hemming, J., Smeds, A., Moure, A., Díaz Reinoso, B., Willför, S., Domínguez, H., Parajó, J.C., Extraction of low-molar-mass phenolics and lipophilic compounds from *Pinus pinaster* wood with compressed CO<sub>2</sub>. *Journal of Supercritical Fluids*, 81 (2013), 193-199 (Elsevier B.V., ISSN: 0896-8446)
53. Leppänen, A.-S., Xu, C., Liu, J., Wang, X., Pesonen, M., Willför, S., Anionic polysaccharides as templates for synthesis of conducting polyaniline and as structural matrix for conducting biocomposites. *Macromolecular Rapid Communications*, 34 (2013) 13, 1056-1061 (WILEY-VCH Verlag GmbH & Co, ISSN: 1521-3927)
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**B. Non-reviewed scientific articles (*not included*)**

1. Non-refereed conference proceedings (110+)

**C. Publications intended for professional communities**

1. Åbo Akademi reports (15, not included)
2. Others (6)

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Additionally 7 recent (2011-2016) invention disclosures (non-public)