18th International Symposium on Wood, Fibre and Pulp Chemistry (ISWFPC)
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1 Introduction

The biannual ISWFPC gathered researchers from academia and industry from all over the world. In three parallel sessions 93 oral presentations and three plenary lectures were held. During the whole conference about 150 posters were available, some of them (about 15) were last minute posters, meaning that no extended abstracts are available for these.

The oral presentations were divided into the following topics: Analytical (9), Biotechnology (3), Wood (6), Fibres (4), Biorefinery (12), Pulping (6), Bleaching (4), Paper (5), Materials (22), Cellulose (11), Lignin (11). The distribution between the topics reveals that the central topics concerned processes and products in the wood plant biorefinery area, in particular the conversion of cellulose into non-traditional products. For the plenary lectures no abstracts are available, but for more details the oral presentations as well as of the posters the extended abstracts of the conference can be recommended. The Programme is found at the end of this report and copies of the abstracts can be ordered from Innventia Information Centre, library@innventia.com.

A brief overview of mainly the oral presentations and plenary lectures are given below. As mentioned, the lignin presentations were few and in general not of high quality.

2 Biorefinery

In a plenary lecture "*Biorefinery products for chemical intermediates - An Industry Perspective*" by Kindler, BASF, Germany, it was emphasised that there is enough renewables to substitute the oil. The forecast by BASF is that the 2nd generation (non-edible) biomass
such as wood, switch grass, straw can, and will play an important role to provide raw materials for fuel and chemicals through lignocellulose biorefineries. He stressed the importance for the involved industries to define the interface between the biomass providers and chemical industries; a "Verbund" is needed between the two. What determines the potential is the cost per performance. In the costs one can distinguish the raw material cost, production costs and also the logistics – the location of the biomass and how to solve the transportation required. The performance is needed to be compatible with those of existing petrochemical products and platform chemicals. The much higher O/C ratio and molecular mass of lignocellulosics compared to the naphta fraction needs to be overcome by catalytic cracking of the former. In this

context, the development of hydrothermally stable catalysts able to selectively degrade C-O bonds is needed. Obviously, BASFs vision is a new provider of building blocks to produce similar polymers e.g. polyesters as today. In summary, Kindler stressed the importance of biodegradability of new developed products and hoped for an open dialog with players along the whole value chain (1+1>2!).

The potential of bio-films based on modified xylan was presented by Quaresma, University of Aveiro, in "*Modification of xylan from E. globulus kraft pulp for packaging applications*". The xylan was isolated from bleached eucalypt pulp, partially carboxymethylated (DS = 0.2) and then modified with adipic acid dihydrazide (ADH). The bifunctional ADH function as a soft segment in the crosslinking with the carboxyxylan, by formation of an amide linkage between the carboxyl group and amine group. The formed film are more elastic and improved grease and water barrier properties compared to the parent carboxymethyl xylan.

3 Analytical

Detection of lignin-carbohydrate bonds still fascinates analytical chemists. In a presentation by del Río (IRNAS-CSC, Seville) "*Isolation and Chemical Composition of Lignin- Carbohydrate Complexes from Non-Woody Plants*" the LCC-isolation protocol developed by other groups (Lawoko et al., 20013 and Li et al., 2011; Du et al., 2013) for hardwood and softwood were applied to abaca and sisal, and evaluated with derivatization followed by reductive cleavage (DFRC) degradation. Two fractions: glucan-lignin (GL) and xylan-lignin (XL) were quantitatively obtained. Just as it has been reported for woody plants, a higher yield was obtained for the GL fractions for the two studied annuals. The GL fractions were enriched in glucan and depleted in lignin and the XL fractions where enriched in both xylan and lignin while depleted in glucan. The lignins in both sisal and abaca are known to be acetylated at the gamma-carbon of the side chain. The used DFRC degradation method makes it possible to demonstrate the presence of ester-linkages, by GC/MS. By comparing the ion chromatograms of degradation products from the GL and the XL fractions with the corresponding MWL preparation, it could be shown that the acetyl groups are cleaved during the LCC preparation, probably due to the used tetrabutylammonium hydroxide (TBAH). From the MWL it was found that sisal contained acetylated structures in both syringyl (80%) and guaiacyl (48%) units, whereas the main part of the syringyl units (84%) were acetylated in contrast to the small fraction of acetylated guaiacyl units (4%). The composition of GL and XL differed between the two plant sources regarding the lignin structure. The S/G ratio of the XL fraction of sisal and abaca were considerably higher (2.8 and 3.4, respectively) than the corresponding MWL (1.4) whereas that of the GL fractions were

slightly lower than the MWL. The conclusion is that the LCC isolation protocol is not applicable to samples with acetylated structures (lignin or carbohydrate derived) such as annual plants.

4 Materials

The group around Sixta at the Aalto University, Finland is one of the leading research groups on regenerated cellulose. In a plenary lecture, Sixta gave an historical expose of the development of regenerated cellulose fibres, "*Textiles from Regenerated Cellulose*". The viscose process is by far the most common process for regenerated cellulose fibres. The global production 2014 was distributed between the viscose (4.8 Miot), acetate derivative (1
Miot) and Lyocell (0.2 Miot), and the overall production shows a steep seadily growth for cellulose fibres. The most common spinning technique is the wet-spinning process, but for Lyocell fibres the air-gap spinning, rendering in an improved molecular orientation, is used.

Various solvents to prepare the cellulose containing dope has been tested in different processes e.g.; NaOH/ carbondisulphide (viscose), Cu(NH)2(OH)2 (cupro), carbamate, NaOH/ZnO (Biocelsol), NaOH:urea/7:12 (NaOH-Urea). The development of the original viscose process was towards high tenacity fibres with wet modulus strength, required a retardation of the coagulation process. Besides of a high wet modulus, the developed Modal fibres have attractive properties like decreased shrinking, fibrillation and improved tenacity. The Lyocell process uses N-Methylmorpholine N-oxide (NMMO) as solvent. Lenzing are the sole producer of this fibres and a fourth plant will start up in the near future. Compared to the viscose process, it is simpler and environmentally friendly. The cross sectipn of the fibres are smaller as compared to modal and viscose fibres. The crystallites of Lyocell fibres are longer and thinner, show less clustering, more anisotropic and have elongated voids as compared to viscose fibres. In spite of being an excellent solvent witch can be regenerated, the drawback
of the NMMO solvent is its instability; it is sensitive to acids, releases formaldehyde and has an autocatalytic decomposition. 1-ethyl-3-methyl-imidazolium acetate (EmimAc) is another
good solvent for cellulose and has been used extensively. To the drawback is counted the limited thermal stability and that it, like all ionic liquids (ILs), tends to accumulate ash. An alternative IL is 1,5-diaza-bicyclo[4.3.0]non-5-enium (DBNH) acetate, which is stable up to
80 °C and more tolerant to water, up to 5% water besides the water in the pulp fibres. Compared to the NMMO process, higher cellulose concentration of the dope and the dissolution and spinning can be performed at lower temperature. The milder

conditions decrease the degradation with a beneficial effect on yield as well as on the strength properties. Needless to say, the father of the process is named Herbert Sixta.

In a presentation by Nypelö, BOKU, Austria, atomic force microscopy (AFM) and strength- barrier analysis was used to study, the "Interaction of cellulose nanofibrils (CNF) and modified hemicelluloses in films" have been studied (a cooperation between BOKU and VTT). CNF was combined with hydroxypropylated hemicelluloses derived from softwood and hardwood, respectively, and sorbitol as a plasticizer. The degree of substitution (DS) of the hemicelluloses ranged between 0.28-0.73. The composition of CNF and hemicellulose/sorbitol was 70:30, thus the latter were held constant independent of additive. Compared to when neat sorbitol was added to the CNF, the oxygen transmission was increased and the transparency increased by addition of the modified hemicelluloses. It was found that the DS as well as source of hemicellulose influenced the transmission; hardwood hemicellulose and low DS rendered in films of highest transmission. By replacing the sorbitol with hemicelluloses, in particular softwood derived, the tensile strength was improved whereas the strain was slightly reduced. AFM adhesion mapping, i.e. measuring the adhesion between the AFM tip and sample surface, revealed that an even distribution of additives (the chemical composition), within the film matrix has a positive impact on the physical nature of the films. When the hemicelluloses were partly replaced with sorbitol, an improvement of the distribution of the additives was observed. It should be noted that the AFM is a surface characterisation method, meaning that the cross sectional distribution of the additives cannot be studied with this technique.

A procedure to prepare templates for functional membranes using TEMPO oxidized cellulose nanofibrils (TCNF) and poly(vinyl alcohol) (PVA) was presented by Hakalahti, VTT ("*Cellulose nanofibril films as templates for functional membranes*"). The mechanical properties of the produced water stable films could be tuned by adjusting the degree of hydrolysis as well as amount of PVA; the PVA could act as a crosslinker or a softening agent depending on concentration. The surface carboxyl groups of the films give an ion capturing property to the films. In addition, the attachment of stimuli-responsive polymers is possible, as exemplified with grafting of the thermo-responsive poly(N-isopropyl-acrylamide) (PNIPAM) onto the film.

There is a great interest in using nanocellulose and functionalized nanocellulose as reinforcing components in construction materials such as films, fibres, aerogels and in composites. The main drawback is the poor compatibility with non-polar polymers and solvents. To overcome this obstacle, the cellulose have been surface modified with polymers or functionalised e.g. by alkylation. Another approach was presented by Zhang, Georg-August Univ. Göttingen, in "*Stimuli-Responsive Films from Cellulose-Based Organogel Nanoparticles*". Surface- stearolylated cellulose nanoparticles (SS-CNPs) was produced with a DS = 1.3, while preserving the

crystalline core of the cellulose particle. The SS-CNP suspensions showed a thermo-reversible gelation behaviour;; at low temperature (4 °C) it became a viscoelastic gel and when the temperature increased (25 °C) the sample regressed to its initial state. Films
with a solvent-switchable surface wettability were made by solvent casting of SS-CNP dispersed in THF. Rhodamine is a photo stable fluorescent dye used in biomedical sensing and imaging. By incorporation of (2-stearoyl aminoethyl) rhodamine B the SS-CNP films became UV- and temperature responsive with switchable colours and correlated fluorescence. After illumination at 365 nm 30 min the colour switched to magenta and an increase in the absorption at 560 nm, and the colour faded when treated at 135 °C for 60 min along with declining Abs_{560}. The SS-CNP films also showed a responsive shape-memory behaviour, which was nicely illustrated by a film of the film. Shortly, a stable spiral form can be obtained either by treating the film in water at elevated temperature or soaking it in THF. An external force was used to straighten the shape. After cooling or evaporation of the THF, SS-CNP film reverted to the spiral form. The original flat form could be recovered when kept under THF atmosphere for a couple of secs. Due to the biocompatible nature of cellulose, the SS-CNP films were suggested for versatile biomedical applications.

Carbon dots (CDs) is a new type of materials with sizes below 10 nm. They are biocompatible materials with stable photoluminescence. In a nice presentation "*Luminescent biohybrid nanomaterials from nanocellulose and carbon dots (CDs)*", Ilari, Aalto University described how carboxylated cellulose nanofibrils (CNF) and cellulose nanocrystals (CNC) can be modified with luminescent, water dispersible CDs. Aminated carbon dots (NH_2-CD) were made and attached to carboxymethylated CNF or TEMPO oxidised CNC, respectively.
An amide constitutes the covalent bond, and was possible to achieve in aqueous media after activation of the carboxyl group by EDC/NHS (N-(3-dimethylaminopropyl)-N'-ethylcarbodiimide hydrochloride/ N-hydroxysuccinimide). The process was followed in detail and materials like hydrogels and nanopaper was made. Transparent, smooth and fluorescent nanomaterials were produced. Potential areas for use are biosensing, bioimaging, energy conversion and anti-counterfeit applications.

5 Lignins

John Ralph, University of Wisconsin, presented a review on gene manipulation studies aiming to control the lignin type in plants, "*Designer lignins*". One of the driving forces is to increase the susceptibility for pulping; it is much easier to delignify plants rich in syringyl groups (S- lignin) compared to those with guaiacyl lignin (G-lignin). It has been shown that the yield
after pulping a polar mutant having 100% syringyl units is 87%, i.e. considerably higher than the original plant which also consists of G-lignin besides of some

hydroxypropyl type (H- lignin). The challenge is to add genes to introduce S-units in pine wood normally lacking S- lignin, so far 8 % S has been successfully introduced. Ralph stressed that S-lignin actually already exists in a few softwood species – this was something he repeated for all examples of gene modification: this is not something completely new, Mother Nature has already done it! Introduction of tricin, a flavanoide monomer, present in annuals, at the end of lignin during the polymerisation is another way to facilitate the degradation of lignin. In real samples tricine units have been identified, likely taking part in the lignification as a nucleation site.
Something Ralph call "zip-lignins" is another way to increase the ease of delignification. This is done by introducing ester linages which is susceptibility towards alkaline degradation, and will thus speed up the delignification process.

"*Preparation and characterization of stimuli-responsive lignins*" was presented by Crestini, Univ. of Rome. pH- and light sensitive lignins were made by grafting benzene onto the phenol groups of lignin followed by diazocoupling, thereby creating diazobenzene structures. The modified lignins showed change in absorption upon radiation as well as pH-induced change in colour. Thermally-reversible gels were produced from lignins having furan or maleimide groups as chain ends. The etherification of phenols and aliphatic alcohol groups with maleimide was not completed when stopped after 60 minutes, whereas the introduction of furan groups was complete. The combination of these end groups enabled formation of crosslinks and gel state when increasing the temperature to 70 °C, whereas the liquid state was regained upon further increase to 120 °C. This work had been conducted in cooperation between Univ. of Rome and KTH.

In a poster "*Purification of Technical Lignins with Ionic Liquids*", it was stated that ionic liquids (ILs) are suitable for selective isolation of purified technical lignin components with antioxidant activity. The conclusions were based on results using three different technical lignins (HKL from the LignoBoost process, soda lignin from alder wood and the residue from the ethanol production, respectively) were tested and two types of ILs based on 1-Butyl-3- methylimidazolium (Bmim): [Bmim]Cl and [Bmim]Me_2PO_4, of which the latter showed to be the preferred solvent for the purpose. The study, presented by Lauberts, was made in cooperation between the Univ. of Latvia, the Latvian State Institute of Wood Chemistry and KTH.

6 Fibres

Deep eutectic solvents (DES) are defined as a system that consists of at least two components that form a eutectic mixture with lower melting point than any of the individual components. It has been used for studies on cellulose dissolution, functionalization and for pre-treatment. Tenhunen, VTT, presented how choline chloride:urea/1:2 can be used for as swelling agent and rheology modifier for making

cellulose dope solutions in "*Process for Spinning Wood- based Pulp Filaments from Deep Eutectic Solvent Dope*". Bleached softwood kraft pulp and the DES were mixed at 100 °C overnight, before poly(acrylic acid) (PAA) was added. The gel-like dope was extruded and coagulated in ethanol. After drying, the fibres were exposed to heat induced esterification to crosslink the cellulose and the PAA, contributing to improved water stability. Since the cellulose was not exposed to dissolution-regeneration the cellulose I structure was retained in the obtained fibres. The benefit of the suggested process is that all components/chemicals are potentially* biobased and can be recovered and/or re-used. The DEA was recovered by evaporation of the ethanol in the coagulation bath. The process show high potential for up-scaled production of high-performance cellulose fibre yarns for textile and composites etc.

One poster presented the possibility to produce carbon fibre precursors by solvent spinning. The study "*Carbon fibres from lignin-cellulose precursor*" had been conducted in cooperation between Swerea IVF and Innventia. Two types of LignoBoost kraft lignin of fuel grade were used: one obtained from processing of hardwood (HKL) and the other from processing of softwood (SKL). Also two types of celluloses were tested: one dissolving grade and one fully bleached softwood kraft pulp. The air-gap spun precursor fibres, containing 70 % lignin and 30 % cellulose, demonstrate mechanical properties equivalent to commercial textile fibres. Precursor fibres based on SKL were more easily stabilised as compared to those made from HKL, and was further concerted into CF. The obtained CFs had mechanical properties equal to or greater than those reported for neat lignin-based carbon fibres produced by melt spinning. An advantage of the wet-spun precursor fibres is that they are more flexible and easier to handle with a decreased risk of brittle fracture. The potential for further improvement for the new type of carbon fibre is considered very high.

*according to the speaker Procter and Gamble has patented a process for producing a biobased PAA – but it was not used in this study.

ISWFPC 2015

18th International Symposium on Wood, Fibre and Pulping Chemistry

Wednesday, September 9th

Track 1: Lecture Hall XX 12	Track 2: Lecture Hall XXI	Track 3: SR
	Registration opens	
	Opening Ceremony	
Plenary		
Biorefinery products for chemical intermediates - An Industry Perspective A. Kindler, BASF Ludwigshafen, Germany		
Biorefinery (chair: M. Ek)	**Materials** (chair: O. Rojas)	**Paper** (chair: A. Sundberg)

9:50-10:15	**Our Industry's Need to Refine Lignin prior to Use in a Way Similar to Crude** Dimitris S. Argyropoulos	**Phase Behaviour and Stability of Nanocellulose Stabilized Oil-in-Water Emulsions** M. Gestranius, P. Stenius, J. Sjöblom, T. Tammelin	**Mechanical properties of hardwood fibres and fibre to fibre bonds** M. Jajcinovic, W.J. Fischer, U. Hirn, W. Bauer
10:20-10:45	**Value-added Biomaterials and Biofuels from Lignocelluloses based on a Biorefinery Scenario** Run-Cang Sun	**New biosourced amphiphilic conjugates from xylan oligomers and fatty acid derivatives by click chemistry** D. da Silva Perez, M. Chemin, F. Ham-Pichavant, G. Chollet, H. Cramail, S. Grelier	**Morphological characterization of pulp fibers and fines** M. Mayr, W.J. Fischer, R. Eckhart, W. Bauer
		Coffee	
	Track 1: Lecture Hall XX	**Track 2: Lecture Hall XXI**	**Track 3: SR 12**
	Cellulose (chair: D. da Silva Perez)	**Analytical** (chair: E. Sjöholm)	**Biotechnology** (chair: A. Gutierrez)
11:15-11:40	**Stability of cellulose nanocrystal submonolayers and morphological differences between cellulose I and III on cationized surfaces** R. Salminen, E. Kontturi	**New Developments in the Characterization of Cellulose Derivatives: Gradient Separations by Degree of Substitution and Two-Dimensional Separations** W. Radke, H.O. Ghareeb, M. Shakun, T. Heinze	**New insights on ligninolytic peroxidases** E. Fernández-Fueyo, F.J. Ruiz-Dueñas, A. Romero, F.J. Medrano, K.E. Hammel, A.T. Martínez
11:45-12:10	**A general approach to functionalization of never-dried cellulose materials: a mild click chemistry protocol in water** H. Hettegger, M. Beaumont, A. Potthast, T. Rosenau	**Isolation and Chemical Composition of Lignin-Carbohydrate Complexes from Non-Woody Plants** J.C. del Río, J. Rencoret, P. Prinsen, E.M. Cadena, A.T. Martínez, A. Gutiérrez	**Lipoxygenase: a new versatile oxidative enzyme in lignin upgrade** C. Crestini, H. Lange
12:15-12:40	**Molecular- Sieving Gas Separation with Nanoporous Metal/Organic Frameworks Synthesized on Highly-Dense Nanocellulose Matrix** M. Matsumoto, T. Kitaoka	**Behavioral analyses of a detergent in kraft- pulp washing process by cryo-TOF- SIMS/SEM** D. Aoki, K. Tokugawa, Y. Matsushita, M. Ishiguro, Y. Noda, K. Fukushima	**Comparison of lignocellulose pretreatment and enzymatic hydrolysisin deep eutectic solvents and ionic liquids** R. Wahlström, J. Hiltunen, L. Kuutti, K. Kruus, A. Suurnäkki, S. Vuoti

Wednesday, September 9th

Lunch

	Track 1: Lecture Hall XX	Track 2: Lecture Hall XXI	Track 3: SR 12
	Biorefinery (chair: E. Capanema)	**Cellulose** (chair: D. Evtuguin)	**Materials** (chair: R. Venditti)
14:00-14:25	**Fundamental biomass characteristics that affect enzymatic digestibility of autohydrolysis pretreated biomass** H. Qiang, R. Narron, H. Jameel, H.-M. Chang, S. Park, R. Phillips	**Alternative preparation pathways to cellulose nanocrystals by hydrogen chloride vapour** E. Kontturi, M. Lorenz, A. Bismarck	**Interaction of CNF and modified hemicelluloses in films** T. Nypelö, C. Laine, U. Henniges, T. Tammelin
14:30-14.55	**Fast, facile and reproducible approach for lignosulfonate isolation** I. Sumerskii, G. Zinovyev, P. Korntner, T. Rosenau, A. Potthast	**Structural study of methyl glucosides mimicking methyl cellulose** Y. Yoneda, S. Kawai, T. Kawada, T. Rosenau	**Cellulose nanofibril films as templates for functional membranes** M. Hakalahti, T. Hänninen, A. Salminen, A. Mautner, A. Bismarck, T. Tammelin

Coffee and Poster

	Track 1: Lecture Hall XX	Track 2: Lecture Hall XXI	Track 3: SR 12
	Biorefinery (chair: H. Jameel)	**Paper** (chair: G. Mortha)	**Materials** (chair: H. Kamitakahara)
16:00-16:25	**Novel biorefinery concept based on gamma-valerolactone/water fractionation** H.Q. Le, Y. Ma, M. Borrega, H. Sixta	**Development of innovative binders for a biodegradable and environmentally friendly coated paper** B. Busnardo, R. Ganzerla, M. Moretti	**Polymer reinforcement with microfibrillated lignocellulose** W. Gindl-Altmutter, S. Veigel, S. Herzele, F. Liebner
16:30-16:55	**Catalysis for conversion of biorefinery lignin to high value chemicals – structural and computational analysis for improved catalyst design** J.J. Bozell, T. Elder, B. Biannic, D. Cedeno	**An innovative "green" lignin coating to improve properties of paper from recycled fibers** F. Bardot, E.S. Esakkimuthu, G. Mortha	**Preparation of hemicellulose-g-P4-VP copolymer and its characterization** X. Zhou, M. Ge
17:00-17:25	**Modification of xylan from E. globulus kraft pulp for packaging applications** A. Quaresma, V. Dias, S. Magina, D. Evtuguin	**Fiber Charge Density Measurement by the Polyelectrolyte Titration Method** C. Zhao, H. Zhang, Z. Li, X. Zeng, H. Li	**Thermo-responsive Cellulose Paper via ARGET ATRP** W. Wu, Z. Zhuang, L. Zhu, H. Dai

Thursday, September 10th

	Track 1: Lecture Hall XX	Track 2: Lecture Hall XXI	Track 3: SR 12
	Plenary		
8:30 - 9:15	**Textiles from Regenerated Cellulose** H. Sixta, Aalto University, Finland		
	Material (chair: D. Argyropoulos)	**Analytical** (chair: U. Agarwal)	**Cellulose** (chair: B. Saake)
9:20-9:45	**Plastics Composed Entirely of Methylated Ball-milled Lignins and Ligninsulfonates** S. Sarkanen, Y.-Y. Wang, Y. Chen	**Molecular Weight and Structure Characterisation of Lignin by Multi-Detector GPC** B. Sabagh, B. Schaefer	**Advances in IONCELL-P, an ionic liquid based hemicellulose extraction method** A. Roselli, S. Hellsten, M. Hummel, H. Sixta
9:50-10:15	**Function of lignin derivatives in polyethylene blends and composites** L. Dehne, C. Vila Babarro, B. Saake, K.U. Schwarz	**Method for Assessing Accessibility of Cellulose by Dynamic Vapor Sorption Combined with Deuterium Exchange** S. Väisänen, R. Pönni, A. Hämäläinen, T. Vuorinen	**Pulp properties after cationization in different solvents** N. Odabas, H. Amer, U. Henniges, A. Potthast, T. Rosenau
10:20-10:45	**Preparation and characterization of stimuli-responsive lignins** A. Duval, H. Lange, M. Lawoko, C. Crestini	**Chemical mapping of lignin precursors in the xylem of freeze-fixed Ginkgo biloba by the cryo-TOF-SIMS/SEM system** K. Fukushima, Y. Hanaya, D. Aoki, Y. Matsushita, K. Kuroda	**Interaction of hemicelluloses and cellulose and their influence on the cellulose microfibrillation process** L. Falcoz-Vigne, L. Heux, K. Mazeau, Y. Nishiyama, V. Meyer
		Coffee	
	Track 1: Lecture Hall XX	**Track 2: Lecture Hall XXI**	**Track 3: SR 12**
	Lignin (chair: H.-M. Chang)	**Pulping** (chair: J. Colodette)	**Wood** (chair: K. Fukushima)
11:15-11:40	**Plantrose(TM) lignins: a new type of technical lignins** E. Capanema, M. Balakshin	**Effect of cooking, oxygen delignification and bleaching on final sugar content of prehydrolysed softwood kraft pulps** C. Chirat, S. Das, D. Lachenal	**New Model of Wood Cell Wall Microfibril and Its Implications** U.P. Agarwal, S.A. Ralph, R.S. Reiner, C. Baez
11:45-12:10	**Up-grading lignin side streams by chemical modification** M. Orlandi, A. Salanti, L. Zoia	**Computational Study of Copper-Phenanthrolines as Pulping Catalysts** T. Elder, A. Rudie	**Raman fingerprint of different wooden cells: a comparison of species and positions** B. Prats-Mateu, N. Gierlinger
12:15-12:40	**Structural Changes of Corn Stover Lignin Induced by the Different Pretreatments** D. Min, H.-M. Chang, L. Lucia, H. Jameel	**Effect of prehydrolysis on lignin-carbohydrate complexes in wood and pulps** C. Monot, C. Chirat, B. Evangelista, L. Arroyo	**Application of the Adsorptive Bubble Separation (ABS) to Wood and Wood Byproducts** R. Wanschura, M. Baumgartner, E. Windeisen, K. Richter

Thursday, September 10th

Lunch

Track 1: Lecture Hall XX

Biorefinery (chair: T. Elder)

14:00-14:25

Improving the economics of bio-based process by upgrading the value ot the non-sugar residue
R. Phillips, C.G. Culbertson

14:30-14.55

Assessing Biorefineries Using Wood for the BioEconomy – Current Status and Future Perspective of IEA Bioenergy Task 42 "Biorefining"
G. Jungmeier, R. van Ree, H. Stichnothe, I. di Bari

Track 2: Lecture Hall XXI

Lignin (chair: Y. Matsumoto)

Radical chain and heterolysis reactions in lignin pyrolysis as studied with model dimers
H. Kawamoto, K. Matsuda, S. Saka

Effect of alpha-acetyl group on the oxidative coupling of sinapyl alcohol by Ag_2O
T. Kishimoto, N. Takahashi, M. Hamada, N. Nakajima

Track 3: SR 12

Materials (chair: T. Nypelö)

Stimuli-Responsive Films from Cellulose-Based Organogel Nanoparticles
K. Zhang

Development of new polyester film from cedar-organosolv lignin and its application for a separator in electric double layer capacitor
A. Kubota, T. Isozaki, T. Yamada, K. Koda, Y. Uraki

Coffee and Poster

Track 1: Lecture Hall XX

Biorefinery (chair: A. Martinez)

16:00-16:25

Generate platform chemicals out of lignin with reductive approach
H. Schwarz

16:30-16:55

Process Simulation and Environmental Life Cycle Assessment of a Lignin Extraction Process in a Kraft Pulp Mill
C. Culbertson, R. Venditti, H. Jameel, R. Phillips

17:00-17:25

Production of bioethanol and market pulp from Eucalyptus grandis under the approach of an integrated forest biorefinery
N. Cabrera, F. Arrosbide, M. Guigou, F. Cebreiros, N. Cassella, C. Lareo

Track 2: Lecture Hall XXI

Lignin (chair: Y. Uraki)

A novel phenolation process of softwood kraft lignin for adhesive application
J. Liu, J. Du, H. Jameel, H.-M. Chang

Why is the rate of the beta-O-4 bond cleavage dependent on the type of aromatic nucleus in the delignification during alkaline pulping process?
S. Shimizu, T. Yokoyama, Y. Matsumoto

Preparation and Characterization of an Aminated Lignin
W. Zhou, F. Chen

Track 3: SR 12

Materials (chair: S. Fu)

Thermo-responsive supramolecular hydrogels of end-functionalized methyl celluloses
H. Kamitakahara, M. Yamagami, R. Suhara, A. Nakagawa, A. Yoshinaga, T. Takano

Characterization of Tencel® gel: a cellulose II gel featuring particle-like morphology
M. Beaumont, M. Opietnik, A. Potthast, T. Rosenau

Chemically cross-linked cellulose nanofibril (CNF) hydrogels: Rheology and analysis of the mesh size
L. Jowkarderis, T.G.M. van de Ven

Friday, September 11th

	Track 1: Lecture Hall XX	Track 2: Lecture Hall XXI	Track 3: SR 12
	Plenary		
8:30 - 9:15	**Designer lignins** J. Ralph, University of Wisconsin, Madison, USA		
	Lignin (chair: C. Crestini)	**Pulping** (chair: C. Chirat)	**Wood** (chair: F. Chen)
9:20-9:45	**New insights into residual lignin structure of eucalypt sulphite pulp** D. Evtuguin, S. Magina, A.P. Marques	**Utilization of CCE filtrate to improve kraft pulp refinability and strength properties** J.L. Colodette, J. Resende, F. Gomes, R.C. Oliveira	**The surface charge of wood** T. Luxbacher, B. Michen
9:50-10:15	**Synthesis and NMR Characterization of Lignin Tetramers** F. Lu, F. Yue, J. Ralph	**Characterization of dissolving pulp fiber swelling in dilute cupriethylenediamine solution by MorFi analysis: correlation with Fock reactivity** A.J. Benoit, R. Passas, C. Chirat, D. Lachenal	**Structure of wood cell wall based on high-resolution transmission electron microscopy** M. Reza, J. Ruokolainen, T. Vuorinen
10:20-10:45	**Chemical structure assignment for minor lignin components present in spruce MWL by NMR** L. Zhang	**Chemical transformations in eucalyptus, sugarcane bagasse and straw during hydrothermal, acid and alkaline pretreatments** D.M. de Carvalho, O. Sevastyanova, L.S. Penna, B.P. da Silva, M.E. Lindstrom, J.L. Colodette	**Microstructural changes of cellulose in wood by moist-thermal treatment** T. Kuribayashi, Y. Ogawa, Y. Nishiyama, L. Heux, Y. Saito, Y. Matsumoto
	Materials (chair: W. Gindl-Altmutter)	**Coffee** **Cellulose** (chair: E. Kontturi)	**Analytical** (chair: S. Sarkanen)
11:15-11:40	**Lignin and lignocellulose nanofibers: Fundamentals and application prospects** E. Rojo, S. Li, C. Carrillo, I. Hoeger, T. Nypelö, M. Ago, A. Ferrer, O.J. Rojas	**A new synthetic approach to sterically hindered ethers of hydroxypropyl cellulose by reductive etherification** K.M. Klinger, D. Gray	**Comprehensive lignin analysis by quantitative 13C NMR spectroscopy: Possibilities and limitations** M. Balakshin, E. Capanema
11:45-12:10	**Magnetic ferrite nanoparticles immobilized in situ on the surfaces of cellulose nanocrystals** S. Fu, C. Tian	**Investigating the effect of residual lignin on cellulose nanofibrils and nanopapers properties** E. Rojo, M.S. Peresin, J. Laine, O.J. Rojas	**Mountain pine beetle infestation: GCxGC-TOFMS and GC-MS of Lodgepole pine (pinus contorta) acetone extractives** R.K. Moore
12:15-12:40	**Luminescent biohybrid nanomaterials from nanocellulose and carbon dots (CDs)** J. Guo, K. Junka, I. Filpponen, J. Laine, O.J. Rojas	**Regeneration of aqueous periodate solution from dialdehyde cellulose production by ozone treatment determined by RPHPLC with UV detection** S. Koprivica, R. Scholz, D. Bauer, W. Roggenstein, T. Rosenau, A. Potthast	**Effect of iron on the long-term stability of cellulose: comparison between spectroscopic and molecular kinetics** S. Zaccaron, P. Calvini, R. Ganzerla

Friday, September 11th

Lunch

	Track 1: Lecture Hall XX	Track 2: Lecture Hall XXI	Track 3: SR 12
	Fibers (chair: M. Kostic)	**Bleaching** (chair: D. Lachenal)	**Materials** (chair: H.Kawamoto)
14:00-14:25	**Man-made cellulose fibers – review and outlook** T. Röder, J. Moosbauer, S. Schlader, G. Kraft	**Isolation and characterisation of chromophores in pulps: A review** V. Zungu, B. Sithole, D. Ramjugernath	**Transparent aerogels from liquid-crystalline TEMPO-oxidised nanocellulose reinforced with PMMA and equipped with evenly distributed, covalently immobilized, highly photoluminiscent carbon dots** S. Quraishi, S. Plappert, P. Taupe, B. Ungerer, T. Rosenau, F. Liebner
14:30-14.55	**Process for Spinning Wood-based Pulp Filaments from Deep Eutectic Solvent Dope** T.-M. Tenhunen, M. Hakalahti, J. Kouko, A. Salminen, T. Härkäsalmi, T. Hänninen	**Reactions between lipophilic extractives and peracetic acid during post-bleaching: a study of model compounds** J.-E. Raitanen, A. Sundberg, J. Konn, S. Willför	**Preparation of chemically modified CNF aerogels and evaluation of their ion adsorption capability** H.L. Lee, C.H. Kim, H. Jun

Coffee and Poster

	Track 1: Lecture Hall XX	Track 2: Lecture Hall XXI	Track 3: SR 12
	Bleaching (chair: T. Hosoya)	**Fiber** (chair: T. Röder)	**Materials** (chair: M. Balakshin)
16:00-16:25	**Investigations on the decomposition mechanism of chlorine dioxide at alkaline pH** J. Marcon, G. Mortha, N. Marlin, F. Molton, C. Duboc, A. Burnet	**Superhydrophobic effect on viscose fabric obtained by plasma surface modification and incorporation of metal ions** M. Kostić, A. Kramar, B. Obradovic, M. Kuraica:	**Electroconductive and antimicrobial composite films of nanocellulose, polypyrrole and silver nanoparticles** C. Xu, J. Liu, P. Bober, T. Lindfors, R.-M. Latonen
16:30-16:55	**Discoloration phenomenon of cellulose nanofibril sheet depending on raw material and drying condition** H.J. Youn, J. Lee, K. Sim, H. Lee, H. Lee	**Textile fibers from recycled waste materials** Y. Ma, M. Maattanen, A. Sarkilahti, M. Hummel, A. Harlin, H. Sixta	**Biolignin, biosilica a new era in pulp and paper industry and biosourcing for the chemical industry** M. Delmas

Closing Ceremony

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ISWFPC 2015

18th International Symposium on Wood, Fibre and Pulping Chemistry

ISWFPC 2015 - Poster presentations

Note:

- All posters are **on display throughout the whole conference** (Wednesday through Friday).
- Authors of posters with **odd numbers** should be present at their posters during poster sessions on the **first day** of the conference (Wednesday, September 09).
- Authors of posters with **even numbers** should be present at their posters during poster sessions on the **second day** of the conference (Thursday, September 10).
- This **list contains only posters with a corresponding extended abstract** having been submitted for inclusion in the proceedings. The number in this list corresponds with the number in the conference proceedings (vol. 2).
- Authors of **posters without corresponding extended abstract** will receive their **poster number upon registration**.

P1: A novel method of micro-fibrillated cellulose preparation and its characterization
Aijiao Wang, Qun Li, Fei Li

P2: Cellulose degradation during closed vessel aging
Myung-Joon Jeong, Sinah Lee, Antje Potthast, Kyu-Young Kang

P3: Comparison of Cellulose Supramolecular Structures Between Nanocrystals of Different Origins
Umesh P. Agarwal, Richard S. Reiner, Christopher G. Hunt, Jeffery Catchmark, E. Johan Foster, Akira Isogai

P4: Cooperative Asymmetric Organocatalysis with Proline and Nanocellulose
Xin Jin, Takuya Kitaoka

P5: Enhancing Antibacterial Activity of Cationic Microfibrillated Cellulose by Adsorbing Triclosan
Xu Zeng, Hongjie Zhang, Zhiqiang Li, Huiren Hu

P6: Evaluation of cellulose hydrolysis during peracetic acid delignification
Sinah Lee, Bong Suk Yang, Myung-Joon Jeong, Antje Potthast, Kyu-Young Kang

P7: Formation of Irreversible H-bonds in Cellulose Materials
Umesh P. Agarwal, Sally A. Ralph, Rick S. Reiner, Nicole M. Stark

P8: Homogeneous Esterification of Pre-Hydrolysis Kraft Pulp in [DBNH][OAc]
Tia Kakko, Shirin Asaadi, Alistair W.T. King, Michel Hummel, Herbert Sixta, Ilkka Kilpeläinen

P9: How cellulose can be degraded – different approaches to get to DP 100 and below
Thomas Zweckmair, Sonja Schiehser, Martin Siller, Stefan Koch, Thomas Rosenau, Antje Potthast

P10: Influence of the intrinsic characteristics of cellulose on the production of manmade cellulosic fibers from ionic liquid solution
Anne Michud, Michael Hummel, Herbert Sixta

P11: Microwave-assisted synthesis of eucalyptus cellulose carbamate
Diana B. Lanieri, María S. Peresin, Mirtha G. Maximino

P12: Production of nanocellulose from commercial *E. globulus* kraft wood pulp: influence of xylan removal
Ana Reis, Rui Duarte, Maria T. Gomes, António Mendes de Sousa, José Ataíde, Dmitry Evtuguin

P13: Structural and Morphological Characterization of Ultrasound Pretreated Wood Cellulose Pulp
Atsile Ocwelwang, Bruce Sithole, Deresh Ramjugernath

P14: Synthesis and characterization of biodegradable cellulosic polycations with antimicrobial properties
Hassan Amer, Nora Odabas, Markus Gorfer, Ute Henninges, Antje Potthast, Thomas Rosenau

P15: Ternary Phase Equilibria of Cellulose-EMIM Acetate-Water System
Lalaso V. Mohite, Santosh S. Shingote, Neelesh Bharti Shukla, K. Gurudatt

P16: The macroscopic effects of ultrasound coupling TEMPO oxidizing cellulose
Xinliang Liu, Chunrong Wei, Cong He, Chongxin Huang, Shuangfei Wang

P17: A Lignin-containing Hemicelluloses-based Stimuli-sensitive Hydrogel and Its Adsorption Behavior
Xiyi Song, Fangeng Chen, Shangjun Liu

P18: A rapid, efficient, and facile solution for dental hypersensitivity: The tannin–iron complex
Dongyeop X. Oh, Dong Soo Hwang

P19: Acetic Acid Lignin as A Precursor for Development of Dye Adsorbent
Qinghua Feng, Heli Cheng, Hao Fu, Yimin Xie, Fangeng Chen

P20: Adsorbents based on hydrolysis lignin and polyacrylonitrile
S.M. Krutov, E.V. Ipatova, Yu.N. Sazanov, N.I. Sverdlova, E.M. Korotkova, A.V. Pranovich, S. Willför

P21: Application of Technical Lignosulfonates for the Synthesis of Magnetic Active Compound
Yu.G. Khabarov, N.Yu. Kuzyakov, G.V. Komarova, V.A. Veshnyakov

P22: Cellulose-based Superabsorbent Hydrogels Prepared from Bleached Hardwood Kraft Pulp
Cui Chen, Huxiang Guo, Hongbin Liu

P23: Chitin nanofibrillar metalation with greatly improved toughness by ALD
Seunghwan Choy, Seung-Mo Lee, Dongyeop X. Oh, Dong Soo Hwang

P24: Electrospinning of lignin/chitin composite nanofibers
Heiko Lange, Elisavet D. Bartzoka, Pierfrancesco Morganti, Claudia Crestini

P25: Hemicellulose-based hydrogels promising for metal ion removal
Dax Daniel, Chunlin Xu, Sánchez Julio, Stefan Willför

P26: Nano and Micro Crystalline Cellulose as Modifier of Polylactic Acid Foams
Rabi Behrooz, Reza Miraki

P27: Obtaining And Investigation Of Activated Carbon From Waste Hydrolysis Lignin
S. Nenkova, R. Nikolov, L. Raycheva, I. Valchev

P28: Polyelectrolyte Complexes Of Xylan And Chitosan – Effects Of The Order Of Addition And Ionic Strength
Carla N. Schnell, María V. Galván, María S. Peresin, Miguel A. Zanuttini, Paulina Mocchiutti

P29: Preparation and Properties of Fatty Acid Esters of Softwood Kraft Lignin
Richard Venditti, Siddhesh Pawar, Hasan Jameel, Hou-min Chang, Ali Ayoub

P30: Preparation of cellulose nanofibrils films from wood fibers and non-wood fibers
Shiyu Fu, Qijun Meng, Yilong Liang, Lucian A Lucia

P31: Preparation of iron oxide particles decorated lignin-based carbon nanofibers as electrode material for pseudocapacitor
Linping Wang, Aori Gele, Yuxiang Sun

P32: Synthesis and Characteristics of Lignin-Phenol-Formaldehyde Resole Adhesives
M. Ghorbani, F. Liebner, E. Van Herwijnen, L. Pfungen, M. Krahofer, J. Konnerth

P33: The chitosan particles from TEMPO oxidized chitosan with self-assemble process
Ngoc-Minh Vu, Fang Zhang, Shufang Wu, Guolin Tong

P34: The preparation of cellulosic aerogel from wood biomass with different degree of polymerization
Kyu-Young Kang, Myung-Joon Jeong, Sinah Lee, Falk Liebner, Antje Potthast

P35: Thermochemical formation of copolymer polyacrylonitrile / hydrolysis lignin complexes
Yu.N. Sazanov, S.M. Krutov, D.S. Kosyakov, E.V. Ipatova, G.N. Fedorova, E.M. Kulikova, N.N. Saprykina

P36: Thermodynamic properties of epoxy resins synthesized from the lignin selectively depolymerized in acidic non-polar solvent
Atsushi Kaiho, Makiko Kogo, Ryo Sakai, Kaori Saito, Takashi Watanabe

P37: Thermoresponsive supramolecular hydrogels of end-functionalized methylcelluloses
Hiroshi Kamitakahara, Mao Yamagami, Ryo Suhara, Atsushi Nakagawa, Arata Yoshinaga, Toshiyuki Takano

P38: Carbon fibres from lignin-cellulose precursor
Carina Olsson, Bengt Hagström, Elisabeth Sjöholm, Anders Reimann

P39: Deformation Characterization of HYP Fibers and its Effects on the Inter-fiber Bonding Ability
Zhiqiang Li, Hongjie Zhang, Chengke Zhao, Xu Zeng, Hailong Li

P40: Effect of Degree of Acetylation on Properties of Regenerated Fibres Spun from Cellulose-Ionic Liquid ([DBNH]OAc) Solution
Shirin Asaadi, Tia Kakko, Michael Hummel, Alistair W.T. King, Ilkka Kilpeläinen, Herbert Sixta

P41: Effects of hornification of softwood fibers on the characteristics of acid hydrolysis products
Yishan Kuang, Bo Li, Shubin Wu, Jun Li, Ying Zhang

P42: Enhanced optical, chemical and mechanical properties for different cellulosic fibers treated by different concentrations of polymers
Samar H. Mohamed, Zenat A. Nagieb, Magda G. El-Meligy

P43: Evaluation of antibacterial properties of fibre modified by different cationic polymers
Chen Chao, Illergård Josefin, Ek Monica

P44: Fiber Surface Analysis of Different Bamboo Sulfonated Chemimechanical Pulp (SCMP) Fiber Fractions
Zhang Yifan, Zhan Yixia, Liang Chen, Zhou Jinghong, Qin Chengrong

P45: Multiple Melting Behavior of High-Speed Melt Spun Polylactide Fibers
Midori Takasaki, Natsumi Fukushi, Miku Yoshizawa, Shota Onosato, Motohiro Hanada,Wataru Takarada, Yutaka Kawahara, Takeshi Kikutani, Katsufumi Tanaka, Haruki Kobayashi

P46: Water purification using eco-friendly antibacterial fibres
Anna Ottenhall, Josefin Illergård, Jonatan Henschen, Monica Ek

P47: Cationization of soda-AQ pulps and its influence on retention effectiveness
Ana Moral, Roberto Aguado, Menta Ballesteros, Alejandro Rodríguez, Eduardo Espinosa, Antonio Tijero

P48: Effect of cationic microfibrillated cellulose on the flocculation behaviour of high yield pulp suspension and paper properties
Gao Yanhong, Li Qun, Shi Yu

P49: Fabrication of water-repelling paper by surface coating using modified calcium carbonate particles and reactive biopolymer binder
Zhiwei Wang, Peng Lu, Yang Liu, Shuangfei Wang

P50: Further Understanding on the Effect of Surface Lignin Distribution and Content of HYP Fiber Fractions on Inter-fiber Bonding Capacity
Hongjie Zhang, Hailong Li, Jiehui Li, Huiren Hu

P51: *Hesperaloe funifera's* cellulose nanofibers applied to recycled flutting
Eduardo Espinosa, Quim Tarrés, Marc Delgado-Aguilar, Ana Moral, Pere Mutjé, Alejandro Rodríguez

P52: Impact of xylans addition to kraft pulping on process performance and pulp bleachability and quality
Wendel Pianca Demuner, Jorge Luiz Colodette, Fernando José Borges Gomes

P53: Interaction of Pulp Fibers and Inorganic Filler Modified Through Layer-by-layer Multilayering of Polyelectrolytes
Jegon Lee, Hye Jung Youn, Jungeon Ahn, Kyujeong Sim, Hak Lae Lee

P54: Optimization of mulberry stalk SCMP process using response surface methodology and impact of sulphonic group on SCMP pulp strength properties
Luo Lianxin, Zhao Guiling, Li Mingfu, Yan Zhaoqing, Zhou Jinghong

P55: Polysaccharide stabilized alkaline nanoparticles for deacidification, strengthening, and stabilization upon accelerated aging of paper
L. Amornkitbamrung, T. Mohan, R. Kargl, S. Hribernik, V. Reichel, D. Faivre, A. Gregorova, P. Engel, V. Ribitsch

P56: Soda-AQ Pulping with Oil Palm Trunk as Raw Material
Soo-Jeong Shin, Woo-Yong Song

P57: Starch ethers and esters as surface sizing agents for papermaking and their influence on drying energy reduction
Young Bin Jeong, Rajabi Abhari Arab, Young Seok Kim, Dong Kyun Jang, Hye Jung Youm, Hak Lae lee

P58: Study on Synthesis of Quaternary Ammonium Salt of Chitosan and its Strengthening Effect on Paper
Xin Yang, Meiyan Wu, Zhu Long, Lei Dai, Wenzhi Lv

P59: Sugarcane bagasse soda pulping assisted by steam explosion
Marín, A., Gómez, S., Ramírez, C., Velásquez, J., Quintana, G.,

P60: Synthesis of Graft Copolymer of Dimethyldiallylammonium Chloride with Chitosan and its Strengthening Effect on Paper
Meiyan Wu, Zhu Long, Lei Dai, Wenzhi Lv

P61: Thermal stability of coated papers: a spectroscopic kinetic study
Barbara Busnardo, Sara Zaccaron, Renzo Ganzerla, Paolo Francesco Calvini

P62: Ultra high pressure combined with enzymatic treatment boosts recycled pulp properties
Ana M. Salgueiro, Dmitry V. Evtyugin, Jorge A. Saraiva, Filipe Almeida

P63: Upgrading paper machines with virtual technology
Peter Fisera, Erik Bargfrieder

P64: Effect of high-temperature peroxide bleaching and chelating on properties of chemi-mechanical pulp from cotton stalk
Kun Nie, Qun Li

P65: Effects of additives on the reduction of AOX in elemental chlorine-free bleaching of bagasse kraft pulp
Shuangquan Yao, Yixia Zhang, Yi Dai, Xinyu Li and Chengrong Qin

P66: Influence of Hexenuronic Acid on AOX Formation during ECF Bleaching of Kraft Pulp
Xueping Song, Shuangxi Nie

P67: Kinetic Investigation of Pulp Post Bleaching with Tetraacetylthylenediamine
Ivo Valchev, Petya Tsekova, Stoyko Petrin

P68: Kinetics of AOX Formation in Elemental Chlorine-Free Bleaching of Eucalyptus Kraft Pulp
Chengrong Qin, Shuangquan Yao, Cong Gao, Lei Jiang, and Shuangfei Wang

P69: Molecular mechanisms in pulp bleaching with chlorine dioxide: degradation of 5,8-dihydroxy-[1,4]-naphthoquinone as a key chromophore in pulps
Takashi Hosoya, Thomas Dietz, Ute Henniges, Antje Potthast, Thomas Rosenau

P70: New chlorine-free bleaching for dissolving pulp production
Jordan Perrin, Christine Chirat, Dominique Lachenal

P71: Study of magnesium-based alkali on the physical strength of the alkaline peroxide bleached poplar CTMP
Wei Liu, Song Han, Qingxi Hou, Xiaoya Jiang, Ziming Zeng, Hongbin Liu

P72: The role of bleaching history on the final brightening of eucalyptus kraft pulp: a comparison of D and P final stages
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P73: Use of copper(II)-phenanthroline as a hydrogen peroxide activator for dyed pulp color-stripping - Investigation of the chemical mechanism
Elsa Walger, Muhammad Khairumuzdanial, Nathalie Marlin, Gérard Mortha, Florian Molton, Carole Duboc

P74: Bioautography of extracts from selected indigenous tree species of Uganda and antioxidant activity of *Canarium schweinfurthii* oil
Christine Betty Nagawa, Stefan Böhmdorfer, Markus Gorfer, Thomas Rosenau

P75: Cellulose from *Zostera noltii* using clean technologies
Ana Moral, Menta Ballesteros, Roberto Aguado, Alejandro Rodríguez, Antonio Tijero

P76: Energetic and chemical valorization of two legumes by biorefinery scheme and thermochemical process
M: García-Domínguez, A. Palma, I. Giraldez, M. Ruiz-Montoya, F.D. Lopez

P77: Hydrothermal treatment of organosolv lignin for production of bio-oil rich in monoaromatic phenolic compounds
Syed Farhan Hashmi, Johanna Hakonen, Heidi Meriö-Talvio, Kyösti Ruuttunen, Juha Lehtonen, Herbert Sixta

P78: Non-isothermal autohydrolysis of vine shoots: a biorefinery approach
Izaskun Davila-Rodriguez, Patricia Gullón, Itziar Egües, Jalel Labidi

P79: Production and characterization of hemicellulose oligomers from softwoods
Vivien Deloule, Christine Chirat, Claire Boisset, Bertrand Toussaint, Jadwiga Chroboczek

P80: The enzyme refinery- functional materials derived from lignin
Andreas Ortner, Daniela Huber, Oskar Haske-Cornelius, Gregor Tengl, Gibson S. Nyanhongo, Georg M. Guebitz

P81: Valorization of the Orange Tree Pruning by Ethanol Process
Juan Domínguez, Zoilo González, Alberto de Vega, Pablo Ligero, Eduardo Espinosa, Alejandro Rodríguez

P82: Black locust wood – kinetics aspects and potential for cellulase hydrolysis to glucose for bioethanol production
Nikolay Yavorov, Ivo Valchev, Stoyko Petrin

P83: Comparison of lignocellulose pretreatment and enzymatic hydrolysis in deep eutectic solvents and ionic liquids
Ronny Wahlström, Jaakko Hiltunen, Mariáh Pitaluga de Souza Nascente Sirkka, Kristiina Kruus, Sauli Vuoti

P84: Developing antioxidant capacity to cellulose-based materials by using enzymatically-modified products
Oriol Cusola, Cristina Valls, Teresa Vidal, M. Blanca Roncero

P85: Effects of a cellulase treatment on the preparation process and final properties of nanocrystalline cellulose
Facundo Beltramino, M. Blanca Roncero, Terese Vidal, Antonio L. Torres, Cristina Valls

P86: Endoglucanase Treatments for Improving Pulp Reactivity in Biobleached and Commercial Dissolving Pulps
Elisabet Quintana, Cristina Valls, Teresa Vidal, M. Blanca Roncero

P87: Eucalyptus Globulus Biopulping: Optimization Enzymatic-Mediator Stage after autohydrolysis treatment
J.M. Loaiza, F. López, M.T. García, J.C. García, M.J. Díaz-Blanco

P88: Influence of water on enzymatic saccharification of Japanese softwood treated with an ionic liquid, 1-ethyl-3-methylimidazolium acetate
Nakagawa-izumi Akiko, H'ng Yin Ying, Arakawa Takuya, Kishino Masanori

P89: Innovative Utilization of Naturally-Grown Cladophora for Antimicrobial Application
Bo Shi, Soo Yeon Oh

P90: Novel glucuronoyl esterases for wood processing
Sylvia Klaubauf, Silvia Hüttner, Hampus Sunner, Lisbeth Olsson

P91: Oxygen: A limiting factor for enzymatic oxidation of industrial lignin
Daniela Huber, Andreas Ortner, Oskar Haske-Cornelius, Hedda K. Weber, Karin Hofer, Wolfgang Bauer, Gibson S. Nyanhongo, Georg M. Guebitz

P92: The Action of a Fungal Glucuronoyl Esterase on Native Lignin-Carbohydrate Ester Bonds
Jenny Arnling Bååth, Nicola Giummarella, Sylvia Klaubauf, Martin Lawoko, Lisbeth Olsson

P93: Turning the Austrian Pulp and Paper Industry green
Oskar Haske-Cornelius, Wolfgang Bauer, Hedda K. Weber, Gibson S. Nyanhongo, Georg M. Guebitz

P94: Unraveling the relative importance of enzyme accessibility and enzyme inhibition on the digestibility of mild steam pretreated softwoods
Jessica J. MacAskill, Merilyn Manley-Harris, Ian D. Suckling, John A. Lloyd

P95: A Novel Phenolation Process of Softwood Kraft Lignin for Adhesive Applications
Jie Liu, Jing Du, Zhoujian Hu, Xueyu Du, Hasan Jameel, Hou-min Chang

P96: Dependence of the formation rate of the benzyl cation intermediate on the type of aromatic nucleus in acidic reactions of lignin
Toshinao Shioya, Tomoya Yokoyama, Yuji Matsumoto

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Liu Qiang, Nakagawa-izumi Akiko, Ohi Hiroshi, Keiichi Nakamata

P98: Estimation of S/G ratio in woods using 1064 nm FT-Raman spectroscopy
Umesh P. Agarwal, Sally A. Ralph, Dharshana Padmakshan, Sarah Liu, Steven D. Karlen, Cliff Foster, John Ralph

P99: Fractionation and Characterization of Kraft Lignin by Sequential Precipitation with Various Organic Solvents
Xiao Jiang, Dhanalekshmi Savithri, Xueyu Du, Hasan Jameel, Hou-min Chang, Xiaofan Zhou

P100: Isolation and Chemical Characterization of Lignin from Brewer's Spent Grain
Jorge Rencoret, Pepijn Prinsen, Ana Gutiérrez, Ángel T. Martínez, José C. del Río

P101: Lignin distribution of poplar chips under varying dilute sulfuric acid pretreatment intensities
Wei Liu, Wei Chen, Jinping Zhang, Qingxi Hou, Jianqiu Gao

P102: Lignin phenolation for improvement of performance and substitution level in technical polymers
Jacob Podschun, Alexander Stücker, Bodo Saake, Ralph Lehnen

P103: Miniaturized determination of ash content in kraft lignin samples using thermogravimetric analysis
Fredrik Aldaeus, Anne-Mari Olsson, Jasna S. Stevanic

P104: Oxidation of Lignosulfonates by peroxyacetic acid – Effect of pH and acid concentration
Alexander Stücker, Bodo Saake, Ralph Lehnen

P105: Purification of Technical Lignins with Ionic Liquids
Maris Lauberts, Jevgenija Ponomarenko, Olena Sevastjanova, Tatjana Dižbite, Galina Dobele, Vilhelmina Jurkjane, Galina Teliševa

P106: Radical chain and heterolysis reactions in lignin pyrolysis as studied with model dimers
Haruo Kawamoto, Keiko Matsuda, Shiro Saka

P107: Stereo-preferential degradation of the *erythro* and *threo* isomers of *β*-*O*-4 type lignin model compounds under oxygen delignification conditions
Pattaraporn Posoknistakul, Tomoya Yokoyama, Yuji Matsumoto

P108: Structural changes in softwood kraft lignin during thermal treatment
Jerk Rönnols, Hannah Schweinebarth, Anna Jacobs, Jasna S. Stevanic, Anne-Mari Olsson, Anders Reimann, Fredrik Aldaeus

P109: Thermal molding of lignin based on its fusibility
Yasumitsu Uraki, Xiangyu You, Keiichi Koda, Satoshi Kubo, Tatsuhiko Yamada

P110: Thermal properties of organosolv lignins from different species
Patrícia S. B. dos Santos, Silvia H. F. da Silva, Darci A. Gatto, Jalel Labidi

P111: Chemical polarity vs Wood durability: The polarity of extractives on the durability of wood
Roderquita K. Moore, Jonathon Smaglick, Erick Arellano-ruiz, Michael Leitch, Doreen Mann

P112: Effects of ionic liquid treatment on cell wall structure and chemical component of reaction wood
Toru Kanbayashi, Hisashi Miyafuji

P113: Evaluation of degradation tendency of wood polymeric compounds in wood extract at high temperature
Harri Niemi, Mari Kallioinen, Liisa Puro, Sverker Danielsson, Maria Sedin, Mika Mänttäri

P114: Liquefaction behavior of wood and its components in ionic liquids
Hisashi Miyafuji

P115: The Equation of Diffusion Kinetics for Interphase Processes with Participation of Components of Wood and Plant
Nikolai A.Makarevich

P116: A novel content detection method of microstickies based on gravimetry analysis
Jicheng Pei, Zhenghui Shen, Dongxu Zhang, Xueli Zheng, Fangdong Zhang

P117: A Novel Laboratory Device for Measurement of Retention, Dewatering and Flocculation Behavior
Matthias Trimmel, Rene Eckhart, Wolfgang Bauer

P118: Activation, dissolution and SEC analysis of poorly soluble cellulose samples in one day
Stephan Silbermann, Christian Weilach, Gerhard Kliba, Gabriele Schild, Antje Potthast

P119: Application of Ionic Liquids for the Chemical Characterization of Archaeological Woods from Oseberg
Luca Zoia, Anika Salanti, Marco Orlandi

P120: Challenges to detect key-chromophores by DESI-MS on cellulosic material
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