

Lignin conference LignoCOST

May 31 - June 3, 2022 Wageningen

Dr. Richard Gosselink (chair)

Welcome

- Local organizing committee:

Dr. Mirjam Kabel (WU Food Chemistry), Dr. Gijs van Erven (WR Food & Biobased Research / WU Food Chemistry),
Carla Bruil, Suzan Draaisma, Dr. Ted Slaghek and Dr. Richard Gosselink (all WR Food & Biobased Research)

- Workshop Lignin Analytics

45 participants

5 speakers

15 countries represented

- Lignin Conference

78 participants

26 speakers

23 countries represented *including South Africa and US*

Need for pan-Europe network

- Lignin has large potential, is underexploited, but has also large challenges
- Industry is now more convinced of valorisation of side streams (e.g. lignin)
- Last 5 years industrial lignin production increased
- Knowledge is scattered in Europe
- To overcome challenges, hurdles
- Multi-actor network needed to connect whole development-deployment chain
- Development knowledge to built new value chains including industrial valorisation of lignin
- Not only focusing on connecting Academic persons but also on SMEs and industry

Recent developments on lignin



- **Lignin production:** Suzano/Fibria Kraft lignin, Klabin Kraft lignin, Avantium acid lignin, Graanul Biotech hydrolysis lignin, Clariant hydrolysis lignin,
- Several companies launched new production lines on board materials in which **50% lignin based PF resins** are commercially used (Trespa/Arpa, UPM, Stora Enso + Latvijas Finieris, West Fräser).
- Start of EU funded VIOBOND project for the realization of the world's first novel biorefining **lignins-based resin production plant** is to be built at the Latvijas Finieris industrial hub in Riga. VIOBOND partners St1, Graanul Biotech and Chempolis provide biorefinery lignins.
- In the Netherlands >25 demonstration asphalt roads have been paved with up to **50% lignin based bituminous binders**; In Sweden, Finland, Canada the first demo roads have been realised.
- In Sweden Lignin Industries AB (former Rencom) produces **thermoplastic lignin** for packaging application.
- Stora Enso's (SE) pilot facility for producing **bio-based carbon materials** of Lignode[®], wood-based carbon for batteries, is currently operational.
- Sekab (SE) and Vertoro (NL) have begun the construction of a **demofacility** in Örnsköldsvik to convert biomass, lignin or residues into Goldilocks[®], soluble lignin oligomers, for chemicals and fuels.

Objectives

- To establish a whole chain network focusing on sustainable lignin production, conversion and valorisation
- To deliver answers for the main scientific, technical, engineering and market deployment questions on lignin valorisation
- To create a platform for the actors to cooperate and exchange know-how of experienced and young researchers and other (industrial) stakeholders

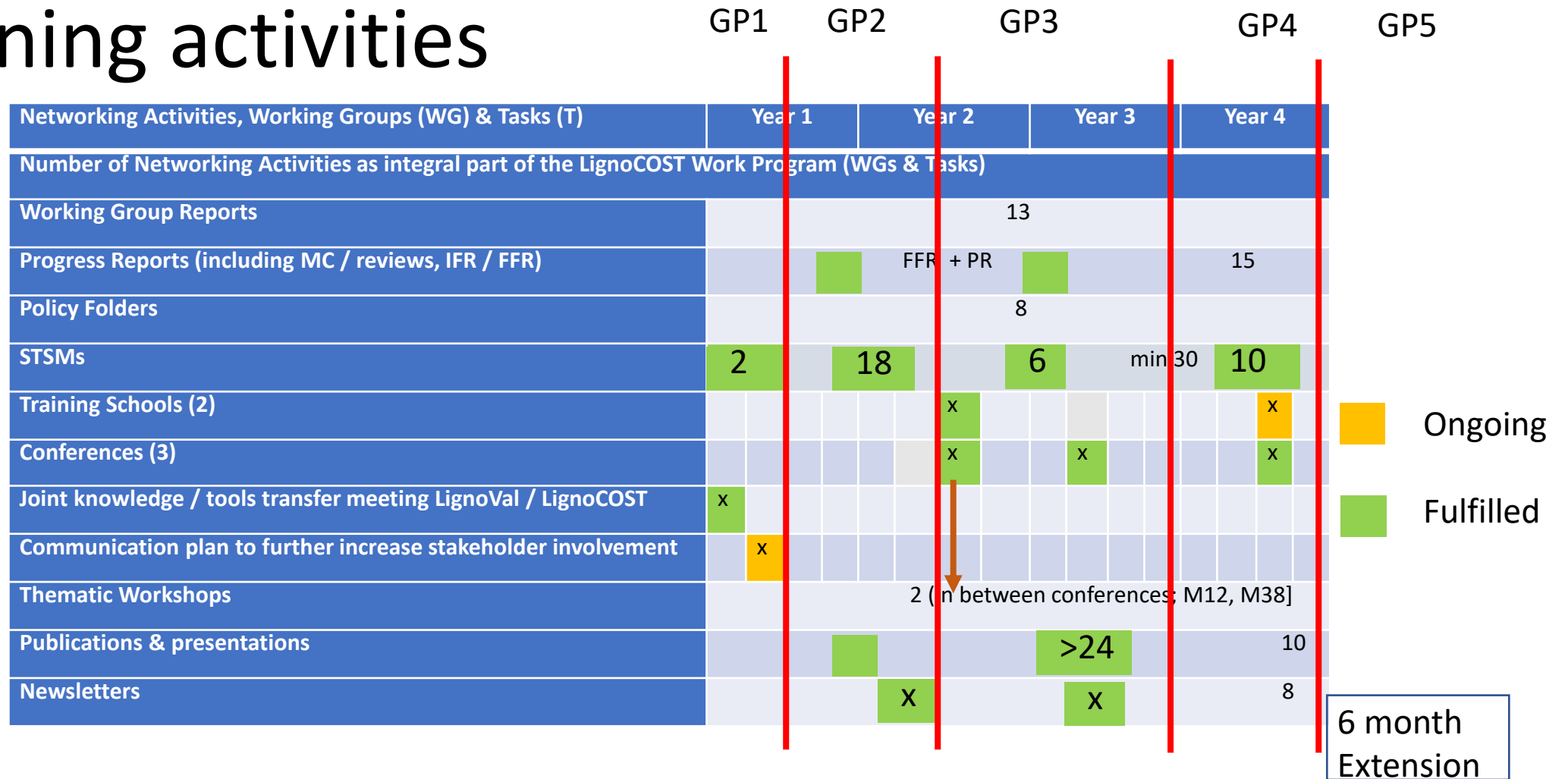
Secondary objectives

- Develop a web tool-based lignin information portal (**WikiLignin**)
- Develop knowledge on standardisation, regulation (REACH), improvement of lignin's intrinsic properties by innovative processing
- Assess the international state-of-the-art (lignin providers, technologies, stakeholders) as reference to support European lignin-based business development
- Set-up an inventory of industrial market application requirements versus lignin properties
- Assess the performance of lignin conversion processes at relevant technology readiness levels (TRLs)
- Evaluate **technical and sustainability** aspects, market potential and implementation potential, of most promising lignin valorisation routes

Major achievements GP1-GP4

- Participants (>315)
 - Increase from 80 till **315** in 3 years (10/2018 – 9/2021)
 - Gender balance: **48%** female; many Early Career Investigators incl. PhD students
 - **21** companies and associations (incl. SMEs)
- **32** STSMs organized; **4** STSMs planned/ongoing; **2** ITC conference grants granted
- Meetings: 10/2018 **Kick off** and 1st MC meeting Brussels (47 participants)
 - 01/2019 Core group meeting Cordoba: Exchange LigniVAL and LignoCOST (27 participants)
 - 03/2019 Co-located joint WG + 2nd MC meeting Wageningen (122 participants)
 - 11/2019 Co-located joint WG + 3rd MC meeting Régua (106 participants)
 - 10/2020 ONLINE **workshop** organized by RISE/WFBR (155 participants)
 - 10/2020 ONLINE **Training school** organized by University of Belgrade (91 participants)
 - 4/2021 ONLINE working group day organized by WFBR (118 participants)
 - 6/2021 ONLINE 4th MC meeting organized by WFBR (69 participants)
 - 9/2021 ONLINE **Conference** + WG meeting organized by University of Pisa (80 participants)
 - 2/2022 ONLINE 5th MC meeting organized by WFBR (32 participants)
 - 6/2022 Lignin **PhD workshop analytics** + **conference** organized by WUR (78 participants)

Planning activities



Sessions

Poster exhibition

Poster award ceremony on Friday 12:30

Enjoy the CONFERENCE!

31 May 2022 Workshop Lignin Analytics

09:30 - 10:30 Coffee/tea & registration

10:30 - 10:45 Welcome and opening (dr. Gijs van Erven – Wageningen Food & Biobased Research/dr. Mirjam Kabel – Wageningen University)

10:45 - 11:40 Lignin synthesis in plants (prof. Wout Boerjan – University of Ghent, Belgium)

11:40 - 12:30 Overview lignin analytics (dr. Mirjam Kabel – Wageningen University)

12:30 - 13:30 Lunch

13:30 - 14:25 Molecular weight determination of lignins (prof. Antje Potthast – BOKU, Austria)

14:25 - 15:20 Lignin quantification & structural fingerprinting by pyrolysis-GC-MS (dr. Gijs van Erven – WUR-FBR)

15:20 - 15:45 Coffee/tea break

15:45 - 16:45 Lignin molecular structure characterization by NMR
(prof. Pieter Bruijninx – Utrecht University, The Netherlands)

16:45 – 18:00 Drinks & registration conference (in WICC)

01 June 2022 Lignin Conference day 1 morning

08:45 - 09:00 Registration / poster mounting

09:00 - 09:15 Welcome and opening (dr. Richard Gosselink – chair CA17128 LignoCOST)

Chair dr. Richard Gosselink

09:15 - 10:15 **Keynote** - Tailoring lignin biosynthesis to improve biomass deconstruction
(prof. Wout Boerjan – University of Ghent, Belgium)

10:15 – 10.45 Ethanol organosolv lignin fractions: temperature effect on structure, functionality and molecular weight
(dr. Edita Jasiukaitytė-Grojzdek - National Institute of Chemistry, Slovenia)

10:45 - 11:10 Coffee/tea break (poster mounting)

11:10 - 11:35 Improved acetone organosolv process design for the production of higher quality lignins
(MSc. Arjan Smit - TNO, The Netherlands)

11:35 - 12.00 Biopolyol production from black liquor via ultrafast depolymerization in supercritical water
(MSc. Emre Demirkaya - Universidad de Valladolid, Spain)

12:00 - 12:25 Expanding Lignin Thermal Property Space through Fractionation and Covalent Modification
(MSc. Luke Riddell - Utrecht University, The Netherlands)

12:25 - 13:25 Lunch followed by Poster Session

01 June 2022 Lignin Conference day 1 afternoon

Chair prof. Pieter Bruijninx

13:25 - 14:25 **Keynote** - Chemical Lignin Conversion (dr. Peter Deuss – University of Groningen, The Netherlands)

14:25 - 15:00 Mild and tunable pyrolytic lignin ozonolysis in acetic acid
(dr. Martin Palazzolo - University of Groningen, The Netherlands)

15:00 - 15:30 **Coffee/tea break**

15:30 - 15:55 Hydrodeoxygenation of lignin derived phenolic monomers and model bio-oils towards (alkyl)cyclohexane hydrocarbon fuels (prof. Konstantinos Triantafyllidis - Aristotle University of Thessaloniki, Greece)

15:55 - 16:20 Design of a pilot scale lignin depolymerisation plant and downstream separation process
(MSc. Theresa Rücker - SINTEF Industry, Norway)

16:20 - 17:30 **Keynote** – Cleave and couple strategies for sustainable value chains in lignin chemistry: Matching depolymerization with product demand (prof. Katalin Barta – University of Graz, Austria, ONLINE)

17:30 - 19:00 **Poster Session**

19:00 - 22:30 **Dinner WICC (with Willie B & the Blue Sparrow band)**

02 June 2022 Lignin Conference day 2 morning

Chair: dr. Olena Sevastyanova

08:45 - 09:35 **Keynote** – Bacterial enzymes for lignin degradation: enzymatic and microbial conversion of lignin to high-value products (prof. Timothy Bugg - University of Warwick, United Kingdom)

09:35 - 10:00 Assessing the potential of termite gut microbiota for lignin bioconversion
(dr. Guillermina Hernandez-Raquet - INSA, France)

10:00 - 10:25 Lignin derivatization via biocatalysis (prof. Vasile Parvulescu - University of Bucharest, Romania)

10:25 - 11:00 **Coffee/tea break**

11:00 - 12:00 **Keynote** – Challenges and opportunities in biological/ chemical routes from lignin to end-products (dr. Gregg Beckham – NREL, USA)

12:00 - 12:25 Overexpression of the scopoletin biosynthetic pathway enhances lignocellulosic biomass processing
(dr. Lennart Hoengenaert - Ghent University, Belgium)

12:25 - 13:30 **Lunch & Poster Session**



02 June 2022 Lignin Conference day 2 afternoon

Chair: dr. Karolien Vanbroekhoven

13:30 - 14:20 **Keynote** – Towards application of specific lignin production
(prof. Bert Sels – KU Leuven, Belgium)

14:20 - 15:05 A New Biorefinery Concept with the Focus on Lignin-Carbohydrate Functional Hybrids
(prof. Mikhail Balakshin - Aalto University, Finland)

15:05 - 15:30 Solvent-fractionated alkaline lignins: from analysis and structure-property correlations to functional materials (MSc. Luyao Wang - Åbo Akademi University, Finland)

15:30 - 16:00 Group picture with the participants followed by Coffee/tea break

16:00 - 17:00 **Keynote** - Lignin structure – function relationships with industrial perspectives
(dr. Karolien Vanbroekhoven – Vito, Belgium)

17:00 - 17:25 Correlation between the molecular structure of lignin and the properties of its nanoparticles, using lignin from different processes – MSc. Maria Karlson (KTH, Sweden)

17:30 - 19:00 Poster Session

19:00 - 22:30 Buffet dinner WICC



03 June 2022 Lignin Conference day 3 morning

Chair: prof. Konstantinos Triantafyllidis

08:45 - 09:35 Keynote - LCA of lignin based products (prof. Martin Junginger – Utrecht University, The Netherlands)

09:35 - 10:00 Sustainability of lignin-based products in a defossilised economy

(dr. Heiko Keller - IFEU - Institut für Energie- und Umweltforschung, Germany)

10:00 - 10:25 Utilization of Kraft and Organosolv lignin towards bio-based epoxy polymer composites

(MSc. Christina Pappa - Aristotle University of Thessaloniki, Greece)

10:25 - 10:50 Coffee/tea break

10:50 - 11:15 Comparative study of lignin and its fractions as phenol substitutes in phenol-formaldehyde resin formulations for plywood panels (dr. Electra Papadopoulou - Chimar, Greece)

11:15 - 11:40 Lignin chemical modification with cyclic carbonates: from original building blocks to polyurethane foams

(dr. Antoine Duval - Université de Strasbourg, France)

11:40 - 12:30 Keynote - Application of Lignin & Future Perspectives

(dr. Richard Gosselink – Wageningen Food & Biobased Research, The Netherlands)

12:30 - 12:45 **Closing Session + Poster award ceremony** (Scientific Organization)

12:45 - 13:45 Lunch WICC



Lignin conference

May 31 – June 3, 2022 in Wageningen (NL)

Organised by CA17128 LignoCOST



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The Graduate School

