InTechFibres
experts in plant chemistry

Call for Participation

« ILIQO »
Conditions of integration for the valorisation of lignins of black liquors from pulp plants

InTechFibres R&D Project

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R&D at CTP…

With the mission of supporting the technological development of the pulp, paper and board industry, in its General Research Programme context, the CTP and FCBA develop projects with the objectives of:

- Advancing scientific and technological knowledge
- Innovating and transferring to industry know-how concerning virgin and recycled raw materials, materials, processes, products and associated services.

To achieve this, CTP has defined 9 Scientific Action Priorities, as keys to creation of sustainable economic value for the industry.

FCBA has defined its research and innovation strategy in 8 domains of Research and Strategic Innovation (DRIS) which cover upstream activities as well as building and furniture.

The **ILIQO** project is part of the Scientific Action Priority « **Lignocelluloses chemistry ».**

InTechFibres – Plant Chemistry projects' objectives are to optimise the processes of lignocellulosic fibres production and to develop the potential of lignocellulosic materials from the fibre to the microfibrils and from the material to the molecule.
Wood is very abundant, renewable and sustainable source of fibres and molecules to be upgraded for new applications such as substitutes for fossil chemical molecules or for improving fibre-based processes. Three areas are to be explored:
Lignocelluloses fibres, Cellulose Micro-Nano fibrils and Bio-based molecules from raw materials and industrial co-products.
The main objective is to produce fibres, fibrous elements and molecules with properties adapted to different applications of the wood industries and to extend if possible to other industries, and this in minimising the energetic consumption and environmental impact, in trying to understand the involved mechanisms and to increase the industrialists for these biosourced elements.

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Motivations

Lignins are natural aromatic polymers, which with cellulose and hemicelluloses compose the fibre walls of the plant cells. During the chemical pulping, lignins are partly degraded and dissolved in cooking liquors as phenolates (alkaline processes) or as ligno-sulfonates (acidic processes). Currently, lignins of black liquors are mainly burnt in boiler and contribute to the energy self-sufficiency of pulp mills. In the context of the development of bio-sourced products from renewable raw materials, lignins represent an excellent 'green' alternative for the production of aromatic and carbon-based products. Only 1 million tons of lignins per year are nowadays available. They are mainly lignosulfonates and only 100 000 ons/year are Kraft lignins.The pulp and paper industry with 184million tons of pulp produced worldwide is potentially a source of 50 to 70 million tons of lignins.

Objectives

The main objective of ILIQO project is to establish the technical and economic conditions of the integration of an extraction and marketing value chain of lignins from black liquors in pulp mills.

- The main technical parameters of production of lignins will be identified according to their impact on the quality and the quantity of lignins, such as raw materials, pulping processes and lignin extraction conditions, as well as effluents management. These parameters will be evaluated according to experiments at laboratory scale, and will allow developing a modeling tool. The simulation of the integration of a lignin production line and the operating conditions would be then be validated with the study of an industrial site. A particular attention will be paid on the use of CO_2 emitted from lime kiln, as acidic agent of black liquors.

- The inventory of main actors and existing markets for lignins will allow establishing the most appropriate areas of application of kraft lignins. Detailed technico-economical information will be provided in the case of target applications, such as: 1) Lignins as source of green energy, 2) Lignins as source of green carbon, 3) Lignins as source of aromatic synthons, 4) Lignins in materials/polymers manufacturing. Lignins quality criteria will be established by application type (ie specifications), and lignins samples (commercial or prepared at lab-scale) will be tested specifically, as appropriate: the development of methods for specific measurements and set up tools for lignins functionalization.

Value created for the industry

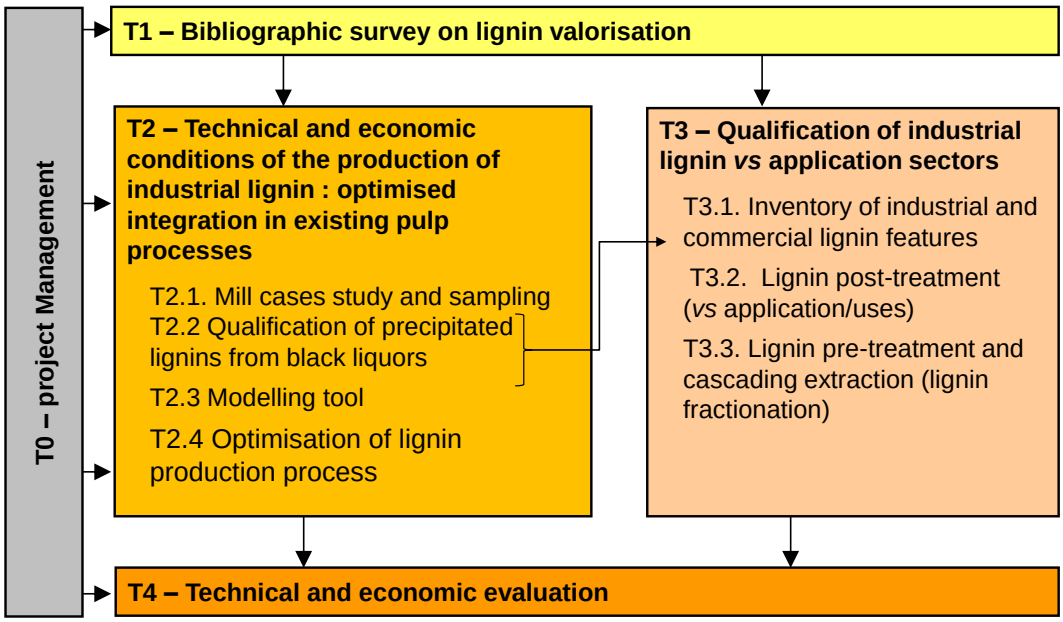
With the production and marketing of lignins coming from black liquors, pulp mills will get a **source of additional income**. The project would give the opportunity to pulp mills to get like an ID card of their lignin with the main characteristics and potential uses. With this diversification, the mills **will limit the influence of the economic uncertainties** relating to the wood and pulp sectors.
The extraction of a part of black liquors would allow **increasing the production capacity** of the mill, while maintaining the supply to the boiler and its performance. The produced lignin can be used in the lime kiln instead of the gas or fuel oil, and will lead to a **reduction in the consumption of fossil energies** of the mill. Technical and economic data of production and valorization of lignin will be delivered during the project, upon two industrial cases study using simulation tools. The main conditions for a successful integration of a lignin production line in an existing pulp mill (2 cases study) will then be defined.

Criteria of success

'Lignin ID card', as well as a validated process simulation tool applied to a lignin production line from black liquor (of pulp mill) are the main criteria of success to establish the technical and economic conditions for a successful integration of a lignin production line in an existing pulp mill.
Nevertheless, the economic criteria of success will rely on the exhaustive market study for lignin, and the implementation of the first assays of modification/fractionation of lignins.

Research programme

Draft Research Programme, to be refined during the Scope Definition Meeting



How to participate?

Within the General Research Programme (GRP) the CTP leads projects open to external participation: the ***OpenProject*** system.
These projects are partially financed by the CTP and FCBA and the partners in the project.

Joining this project gives you the possibility to attend:

- the **Scope Definition Meeting** to refine the technical programme presented by CTP & FCBA experts.
- the **Steering Committee Meeting** in April during which will be discussed the obtained results and the next steps. To ensure a better technology transfer, no *Webex* access will be provided during the Steering Committee Meeting.
- the **Results Transfer Implementation Meeting** in autumn, which is a Peer to Peer private exchange with the Project Leader focusing on the applied result transfer.

Financial participation:

- This project will be conducted on a cost and result shared basis.
  A portion of the budget will be paid by CTP and FCBA and a portion will be required from partners.
  The participation fees will be spread over the duration of the project (2 years).

Pre-project participation:

- Please indicate your interest by return mail.
- Participation in the project is to be confirmed after the Scope Definition Meeting.

Thursday, October 22nd from 14h00 to 16h00 at CTP