

## FLIPPR<sup>2</sup> PROCESS INTEGRATION

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## THE PROJECT

- **Flippr<sup>2</sup>** is a collaborative research project for the development of **process integration** of latest **bio-refinery research findings** into the pulp and paper industry, which already today operates aqueous **bio-refineries – pulp mills** being some of the major contributors to the **bio-economy**.

## THE ADDED-VALUE SPENT LIQUOR PROCESSING TEAM:

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## TASKS

- Continuous process
- Lignin precipitation from black liquor with plant derived CO<sub>2</sub>
- Process integration into the existing pulping process
- Parallel development of on site and off site applications of lignin

### Working Hypotheses:

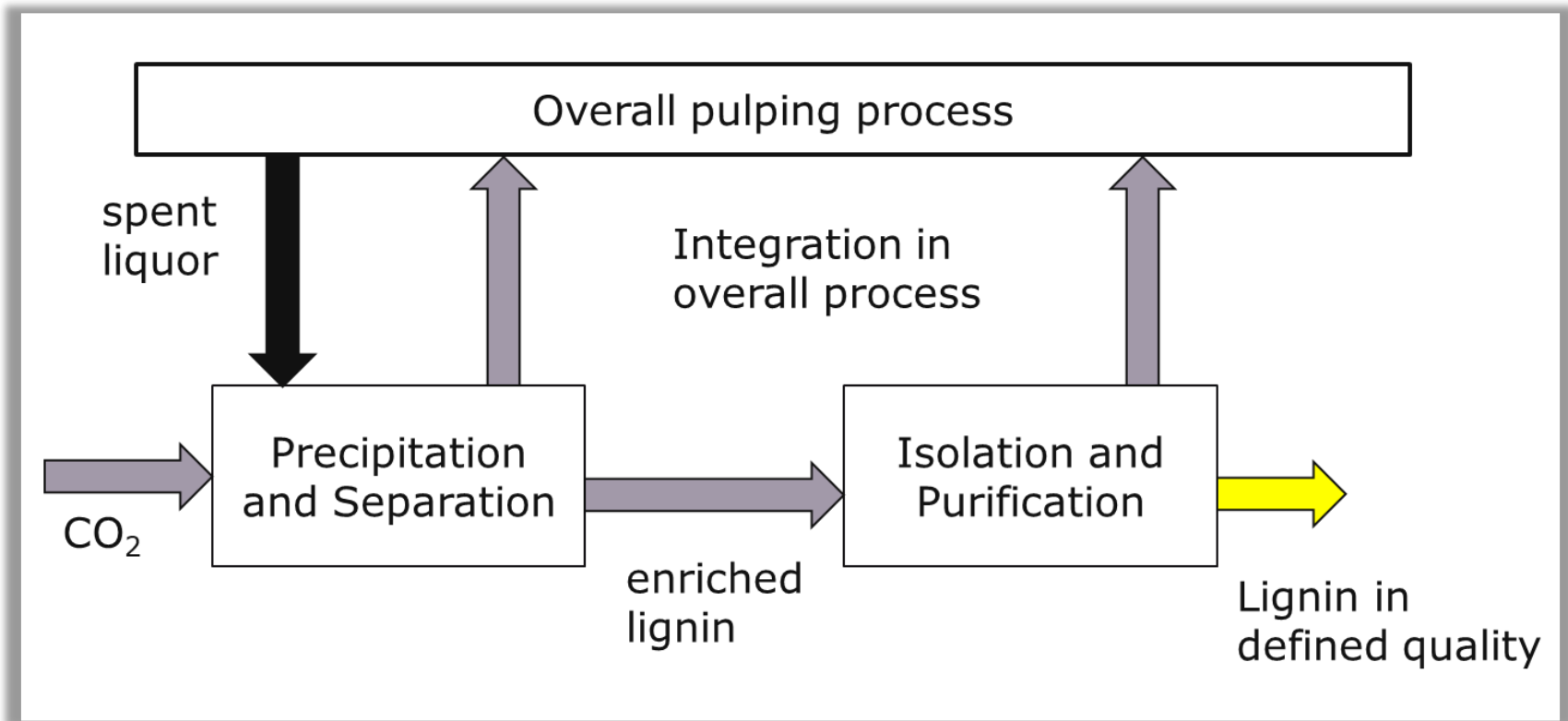
- Simultaneous precipitation and separation using newly developed reactor design will enable closing the loops and to reduce energy and water consumption.

## STATE OF THE ART PROCESSES

	Wash water demand [m <sup>3</sup> /t lignin] \ lignin ash content [%]	Advantages	Disadvantages
<b>LignoBoost</b>	2-2.5 m <sup>3</sup> \ 0.2-1.4 %	+ Improved filtration properties + Low ash content + Increased lignin yield	- Second filter press necessary - Release of odorous compounds
<b>LignoForce</b>	10-15 m <sup>3</sup> \ 0.07-0.18 %	+ Improved filtration properties + Low ash content + Lower acid consumption + Less odor emission	- Lower lignin yield - Oxygen requirements - SO <sub>2</sub> emissions
<b>SLRP</b>	1.36 m <sup>3</sup> \ 1.1 %	+ Improved filtration properties + Low ash content + Continuous process + Effective vent recycle	- Lower energy efficiency - Operation under increased pressure

- High wash water demand
- Present lignin application: on site fuel for lime kiln

## PROCESS IDEA

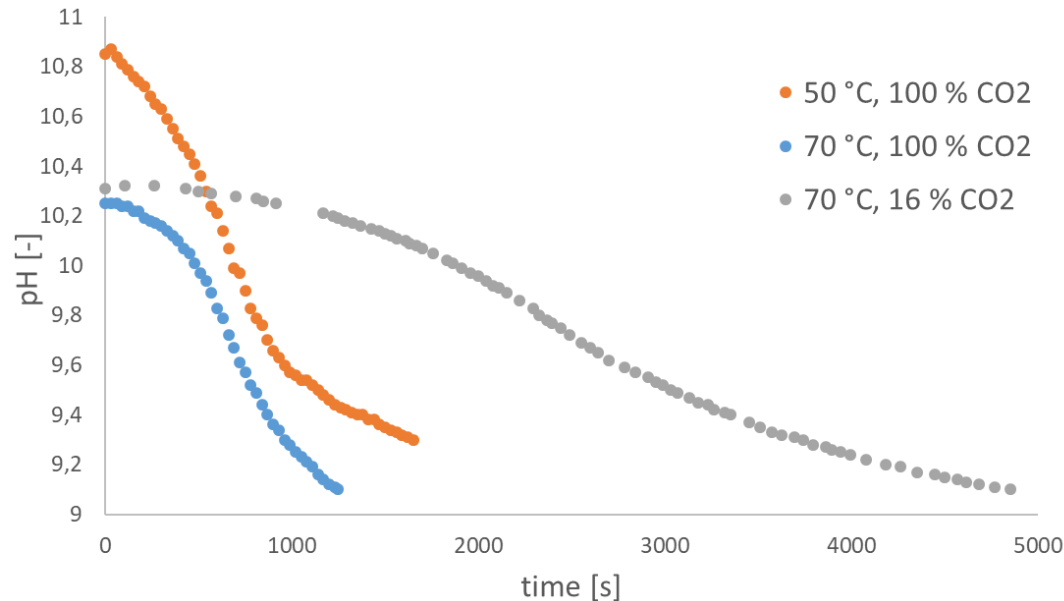


## NEW REACTOR DESIGN



## PRECIPITATION WITH FLIPPR- REACTOR

- Precipitation experiments
  - Gas feed: 100% and 16% CO<sub>2</sub> (= min concentration of plant derived CO<sub>2</sub>)
  - Temperature: 70°C and 50°C





## PROJECT PARTNERS

Industrial partners:



Scientific partners:



Universität für Bodenkultur Wien  
University of Natural Resources  
and Life Sciences, Vienna



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