FOREST REFINE PARTNER – KOKKOLA UNIVERSITY CONSORTIUM CHYDENIUS

Forest Refine is a cross-border research project between Sweden and Finland about the raw material supply to biorefineries. Forest Refine has seven participating organizations, three from Sweden and four from Finland. This presentation of the participating organizations is about Kokkola University Consortium Chydenius.

UNIVERSITY OF JYVÄSKYLÄ
KOKKOLA UNIVERSITY CONSORTIUM
CHYDENIUS

TEACHING AND RESEARCH UNDER THREE UNIVERSITIES

The Kokkola University Consortium Chydenius acts as a joint institution carrying out teaching and research under the auspices of the universities of Jyväskylä, Oulu and Vaasa. University consortiums are umbrella organizations that coordinate the regional activities of various universities, with the objective of improving the visibility of universities in their own regions.

The mission of the University Consortium is to support material and intellectual growth in Central Ostrobothnia through education and research. It offers academic research and training services that promote the development of individuals and communities, and thereby also the region as a whole.

Areas of specialization of the Kokkola University Consortium Chydenius are: education, data processing, social sciences and regional studies, business and administration, the natural sciences and materials technology. The consortium also works in close cooperation with the Central Ostrobothnia University of Applied Sciences and with industry in the Kokkola region.

The University Consortium offers both master's and doctoral level education. In addition, it engages in scientific research, arranges a wide range of adult education courses and accepts commissions from individuals and organizations within the region. Thus, its activities may be looked on as a modern attempt to combine the goals of educational, scientific, and regional policy under one roof.

THE UNIT OF APPLIED CHEMISTRY

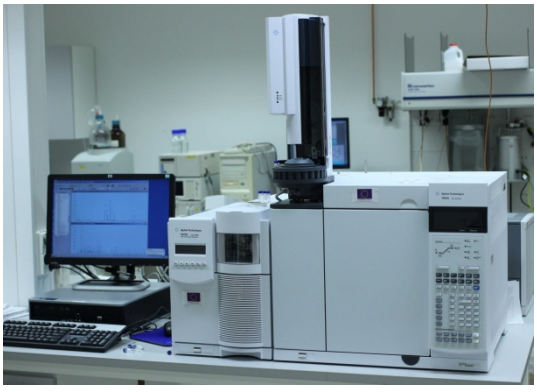
The Unit of Applied Chemistry has been established in 2007, and is headed by Professor Ulla Lassi. Research and education is carried out under the University of Oulu. The Unit has research activity both in Kokkola and Oulu, and it employs 25 people. Main research areas include catalytic materials in process and environmental engineering applications (e.g. conversion of biomass into valuable chemicals), battery chemicals, and chemical precipitation (e.g. in the recovery of valuable metals).

CHYDENIUS IN FOREST REFINE

Professor Ulla Lassi and researcher Tero Tuuttila are both involved in the Forest Refine project and are working in the sub-project 3 “Chemical and physical requirements of the forest biomass to biorefineries, fractionation of biomass and preparation of bio-chemicals”.

Lignocellulosic biomass provides an abundant source of raw material for fermentable sugars, and subsequent production of fuel ethanol or other chemicals. In sub-project 3, the Chydenius is responsible for the chemical characterization and pretreatment of the wood samples delivered by project partners. The research is implemented in close collaboration with other project partners Centria, Processum and Metla.

Chydenius’ contribution to the Forest Refine project includes the chemical characterization of the wood samples obtained from the sub-project 2. It includes the analysis of extractives, lignin, and carbohydrates. The wood samples (pine, spruce, birch) are first extracted with suitable solvent. Subsequently, extractive-free samples are exposed to acid hydrolysis in order to determine the acid-soluble and acid-insoluble lignin. The aqueous residue is then analyzed to determine the amount of carbohydrates in the wood.



The pretreatment is an important step in biorefining of lignocellulosic raw material e.g. wood samples and other relevant raw materials, such as fiber sludge (a by-product from the paper mill industry). Processing of lignocellulosic biomass into monomeric sugar units consists of two steps: pretreatment of the raw material, and conversion of the cellulose into fermentable sugars by acid or enzymatic hydrolysis. In the pretreatment step the structure of lignocellulosic material is disrupt, so that the hydrolysis can be achieved faster and with higher yields. Several pretreatment methods are available.

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