



JANUARY 2018 | # 14

## BioHub in Kokkola Material Week 2017

*Mikko Karjalainen and Eelis Halmemies from BioHub held presentations in Kokkola Material Week. Mikko's presentation focused on terminals as processing sites for feedstocks for biorefining industries. Eelis talked about high value chemicals from spruce extracts and their losses in supply chain.*

### YEARLY EVENT IN CENTRAL OSTROBOTHNIA

Kokkola Material Week is a yearly event that presents the latest research results and developments in chemical industry, bioeconomy and mineraleconomy. The event was arranged for the fifth time by the region's research, education and development organisations.

Material Week started with open day for families at Kokkola Industrial Park on 28.10. The rest of the programme was divided under three one-day seminars: BioRegion, BioKokkola and ReKokkola during 30.10.-1.11. Presentations were focused on important regional projects, bioeconomy and circular economy research and development. BioHub presentations were part of BioKokkola seminar that was held at the town hall in Kokkola. In connection to Material Week, Nordic Battery Conference was also arranged in Kokkola 1.-3.11.

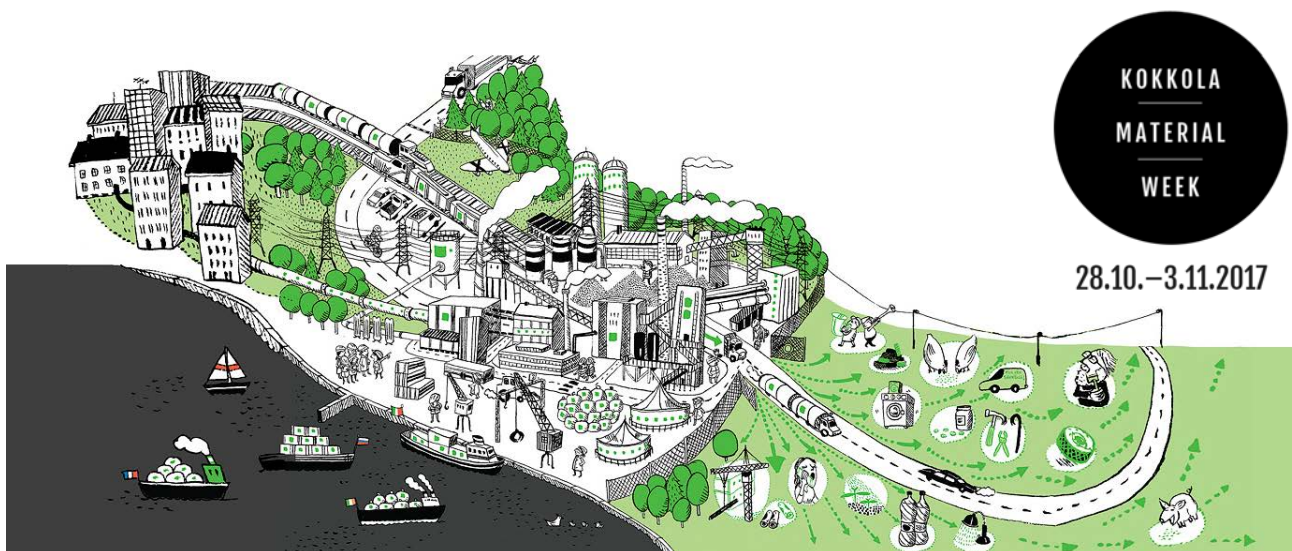
The Material Week and Battery Conference had about 800 participants. BioKokkola seminar, in which BioHub participated, had 110 participants.

### BIOKOKKOLA SEMINAR 31.10.2017

BioKokkola seminar covered various bioeconomy issues. Forestry related presentations were:

- Conversion of cellulose to levulinic acid
- Chemical modification of wood industry waste biomass to new materials/chemicals
- Tannin foams as new biobased products from saw mills
- Biorefinery development close to commercialization – Swedish examples
- Nanocellulose – properties and possibilities
- High value chemicals from spruce extractives – losses in the supply chain
- Increasing the value of a tree biomass through mechanical fractionation
- Finland Business concept and cluster for biorefinery in Kokkola

Read more about the events: <http://materialweek.fi/> and <https://www.chydenius.fi/nordbatt2017>



## SUPPLY CHAIN HAS MAJOR EFFECT ON EXTRACTIVES



Eelis Halmemies presented BioHub results in BioKokkola seminar. The title of his presentation was “High value chemicals from spruce extracts - losses in supply chain”.

Bioactive extractives can be found in different tree parts and there are also several routes how to extract them. Potential endproducts are e.g. health

foods, dietary supplements, pharmaceuticals, cosmetics and antioxidants.

Supply chain can influence the tree extractives and their losses in significant ways.

### Chemical changes in the extractives after felling

After felling a tree, the content of its extractives starts to immediately decrease. The decrease is most substantial in the hydrophilic extractives such as sugars, organic acids and stilbenes. During wood storage, the major chemical changes in resin are:

- Evaporation of volatile terpenoids.
- Rapid hydrolysis of triglycerides accompanied by slower hydrolysis of waxes, especially steryl esters.
- Oxidation / degradation / polymerization of resin acids, unsaturated fatty acids and to some extent other unsaturated compounds.

### The amount of total dissolved solids decreases rapidly

To promote the BioHub project’s aim “right material for right industry”, experimental set-ups were constructed to find out what happens to forestry side-streams incl. spruce bark, logging residues, and stumps during storage.

According to the BioHub study, the amount of total dissolved solids (TDS) in the un-covered spruce bark pile, decreased after 6 months of storage from 35 % of dry matter to even 10 % of dry matter.

It seems that hydrophilic extractives are best preserved in the middle of the storage pile. The loss of extractives is most substantial where the exposure to external influences e.g. weather and UV-light is the greatest.

### More research on storage is needed

The effect of the way of storage and the physical form of the wood is substantial to the chemical composition of extractives.

This kind of information could be utilized to improve the logistics of wood supply chains to get “the right material to the right customer at the right time”.

In order to maximize the potential value of the forestry side streams, and to make correct decisions about handling of the material, more comprehensive research is still needed.

## FUTURE POSSIBILITIES FOR FOREST TERMINALS

Mikko Karjalainen’s presentation “Terminals as processing site for feedstocks for biorefining industries” was also held at BioKokkola seminar.

### There are unutilised forest biomasses

In 2016, the consumption of domestic roundwood in Finland was 59 million cubic meters. Wood is mainly used by pulp and wood product industries.

In addition, 9 million m<sup>3</sup> of wood is used in energy production. Despite of this wood use, the volume of growing stock increases by about 23 million m<sup>3</sup> per year.

A high amount of logging residues are formed as by product from forest felling and only a small part of this is utilised. Residues include stumps, branches and tops, and foliage.

All these parts contain marked proportion of different types of extractives. At the moment, wood for industrial use is stored for a quite long time and valuable chemicals are lost.

### Terminals feeding future biorefineries

In future, biomass, including logging residues, should be collected and delivered to a terminal immediately after felling to avoid losses of valuable chemicals.

The biomass could be processed - debarked, comminuted and fractionated, for example - in the terminal. Fractions the terminal could produce could be industrial wood chips, energy wood chips, bark and foliage, for example. All these fractions can be produced using either mobile or stationary equipment.

Finally the fractions would be delivered to further processing. Especially new biorefineries and small companies who do not have possibility to process wood might benefit from this kind of supply chain.



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