Technology leaps for future applications of cellulose fibres

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OF CELLULOSE
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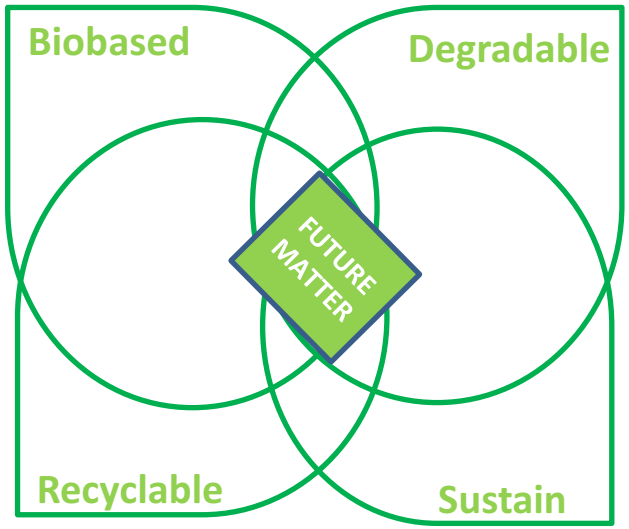
Question:

New meaning of cellulose
- the ultimate properties

of fractioned cellulose as a fibre?



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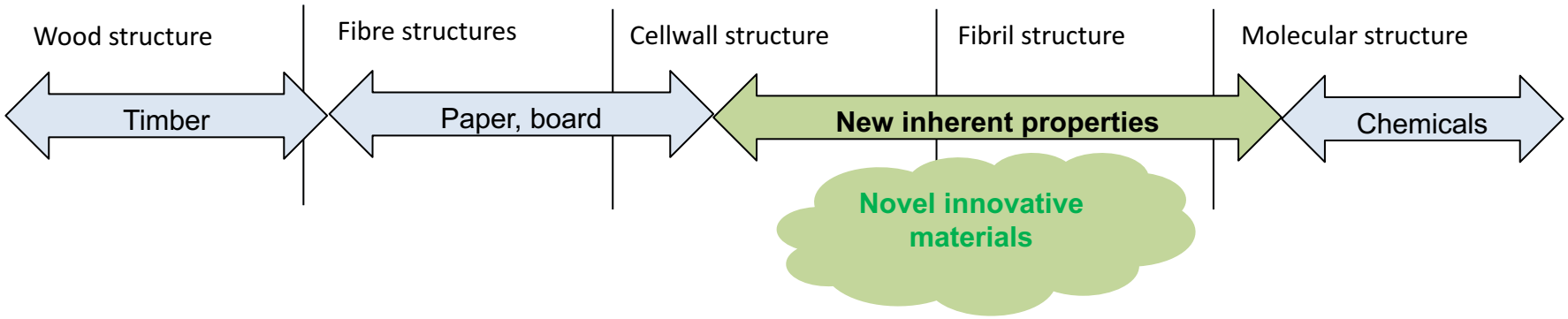
Understanding develops

In the past decades we have learned more of cellulose structure and properties than in previous centuries

- Rapid development of research methods and equiment
- Nanotechnology lead to detailled morphology of cell wall
- Computational methods explained cellulose molular structure
- Advanced methods to modify and dissolve cellulose
- Digitalization enabled active communication of researches
- Reorientation of the forest based industries increased finansing



Tekes

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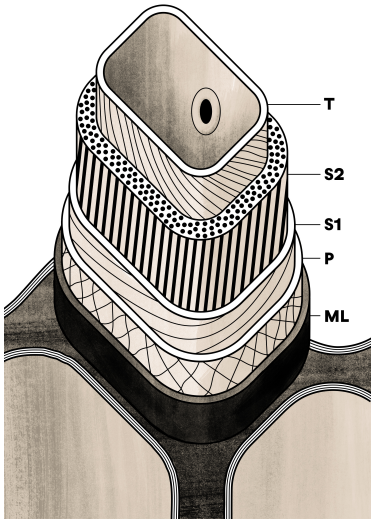
Vision develops

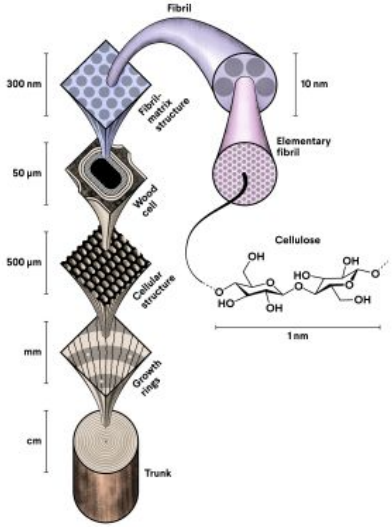


From simple fibers to:

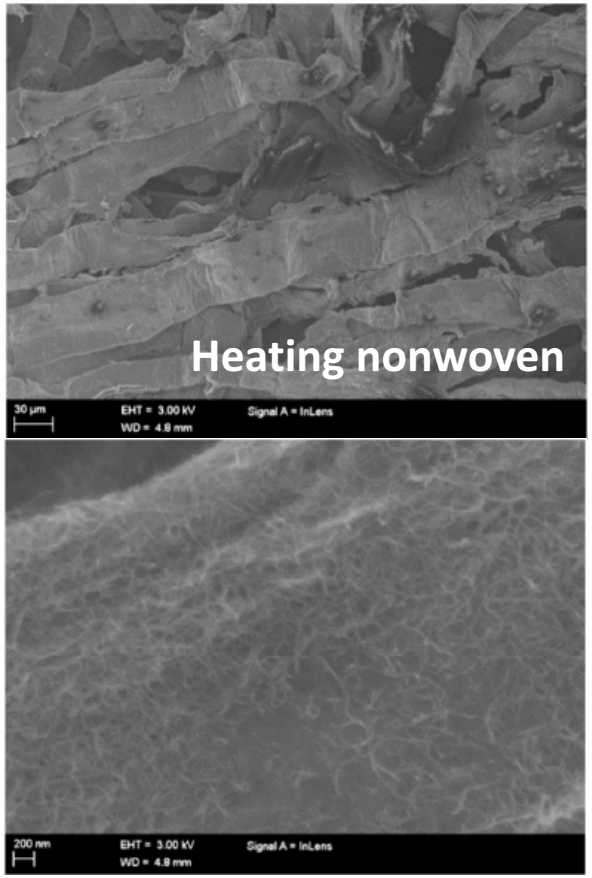
Complex natural polymer

Nano fibils and chrystals

Next supermaterials



Tekes · Aalto University · Tampere University of Technology · University of Vaasa · VTT



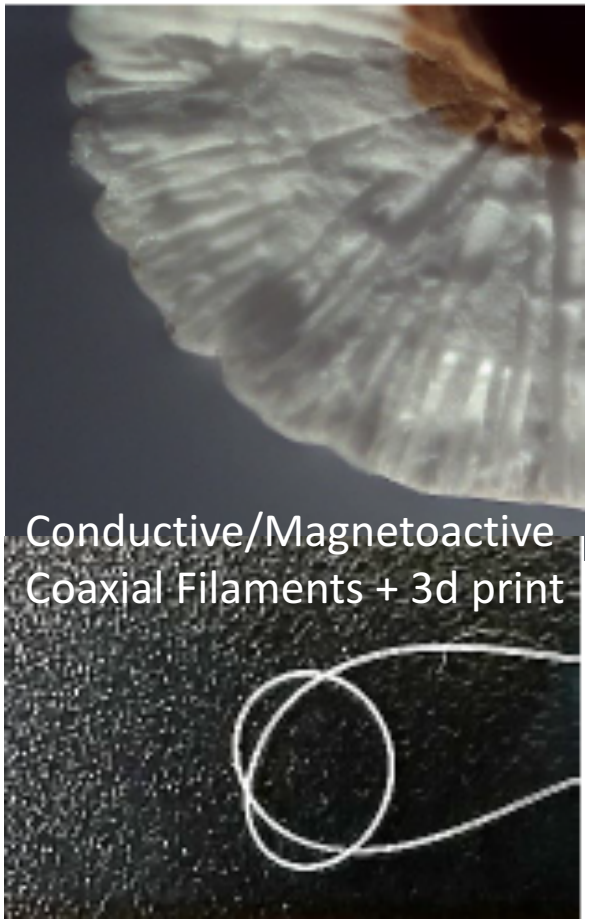
Fiber foams

Innovation in processing:

Specialty and long fibers formation

Tailored orientation and density profils

Siljander et.al. NFC surface on MWCNT network



Lundhal et.al.2016

Digitalized production

On-demand personized

Material adding manufacturing

Direct production

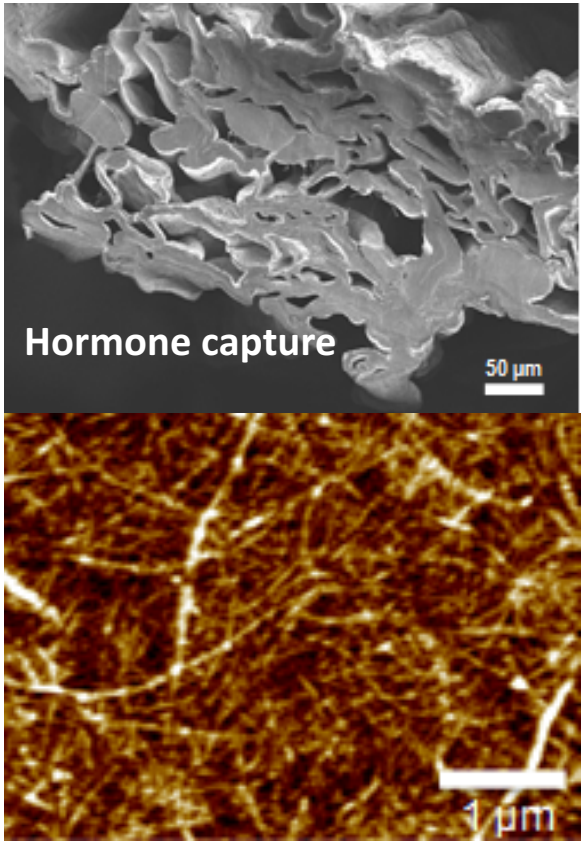
Nanocellulose supermaterial

Applying high strength

Handling hygroscopicity & drying

Controlled composite structures

Kunnari et.al. Pat. Appl. FI20175604



Orelma et.al. 2017

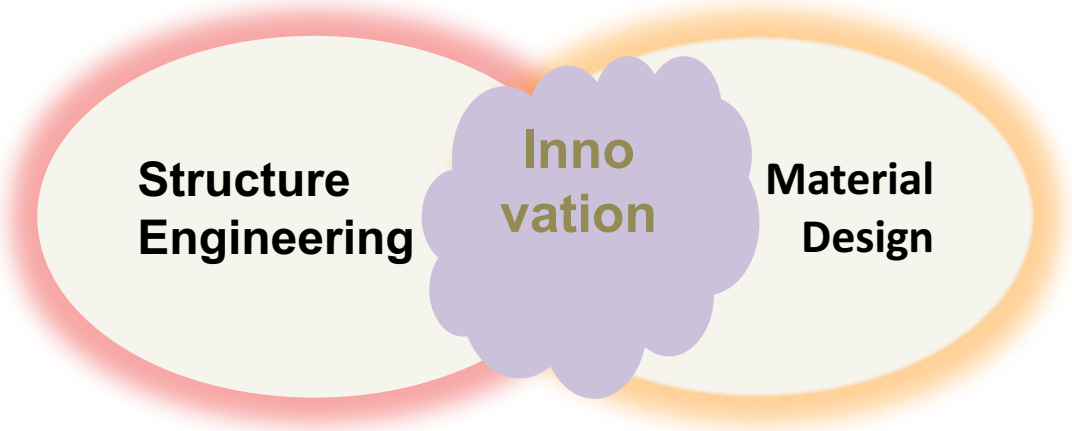
Control over dissolving

Sustainable fibers and technical yarns

IL's: Highly efficient cellulose solvents

DES: Controlled swelling

Towards engineered materials



Cellulose is more than collection of naturally occuring fibers:

- Fibril and chemical properties can be tailored multiple levels
- ability to modify and construct new materials
- Predefined structure engineering leads to material design

Impact of technology leaps:

Enabling competitive renewable materials:
- Sustainable future through low LCA

Recycling of cellulose:
- Increasing supply security of society

Cellulose as next super material:
- Replacement of non renewable materials