

# Tomorrow's biorefineries in Europe

**Conversion of wood to microfibrillated  
cellulose and its uses**

Ali Moosavifar  
*Research scientist*  
*Borregaard AS*



**February 11-12, 2014**  
**Brussels, Belgium**



**Borregaard**

The Sustainable Biorefinery



# OUTLINE

- General presentation of Borregaard
- Borregaards Microfibrillated cellulose project
  - What is MFC?
  - Properties of MFC and potential application areas
- Borregaard within Suprabio
  - Demonstration plant
  - MFC project evaluation

# BORREGAARD – A BRIEF INTRODUCTION

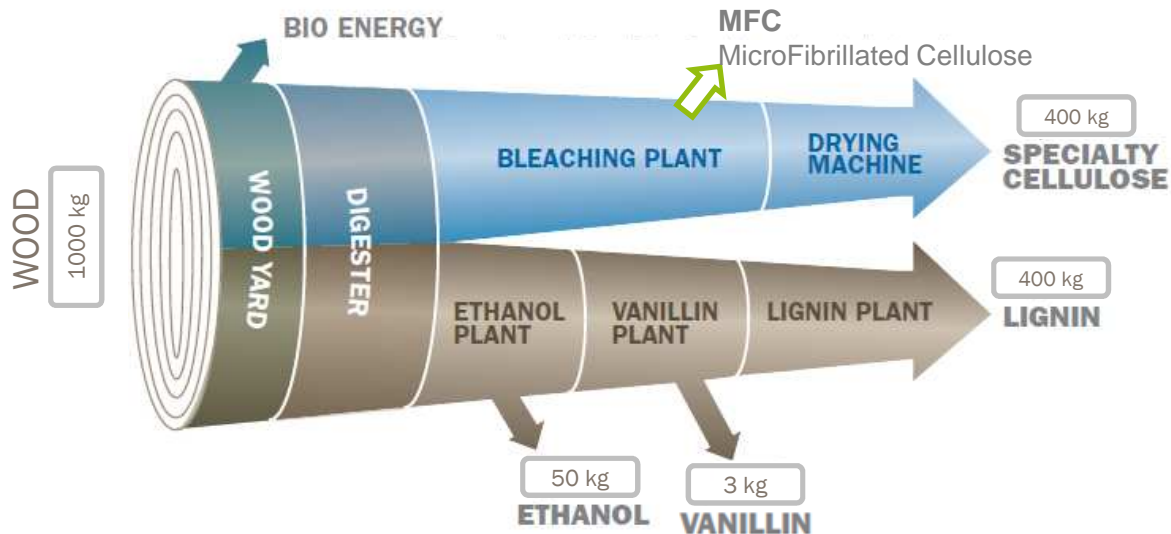
A GLOBAL NICHE PLAYER WITH A MARKET DRIVEN ORGANISATION



Performance Chemicals

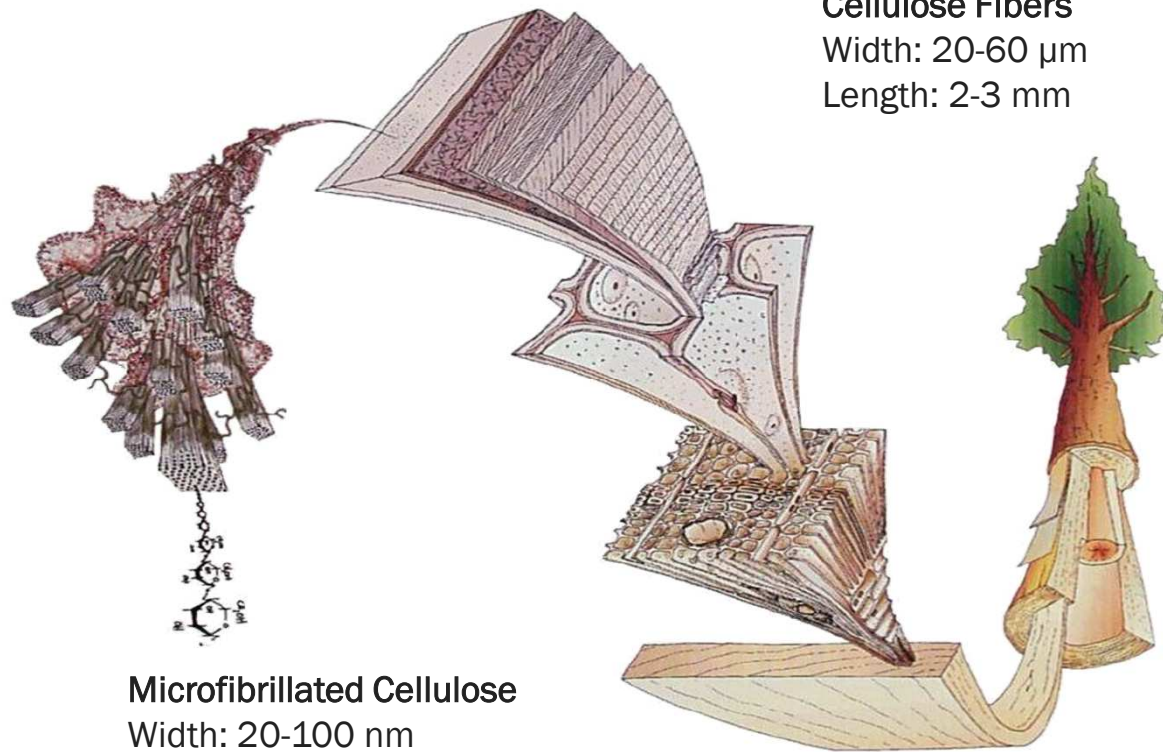
Specialty Cellulose

Other Businesses



# BORREGAARDS MICROFIBRILLATED CELLULOSE

Fibres are delaminated to smaller bundles of microfibrils



**Cellulose Fibers**  
Width: 20-60  $\mu\text{m}$   
Length: 2-3 mm

**Microfibrillated Cellulose**  
Width: 20-100 nm  
Length: up to 100  $\mu\text{m}$

The logo features a white circle with a green outline, partially overlapping a green circular shape. The background of the top left corner shows a close-up of green plant fibers.

# MICROFIBRILLATED CELLULOSE

## *PRODUCT CHARACTERISTICS*

### MFC properties:

- Very high surface area, many accessible OH groups
- High aspect ratio
- High viscosity at low concentrations
- Shear thinning
- Thixotropic
- Extremely robust to pH and temperature
- High water retention value
- Can make strong microfiber films with excellent barrier properties

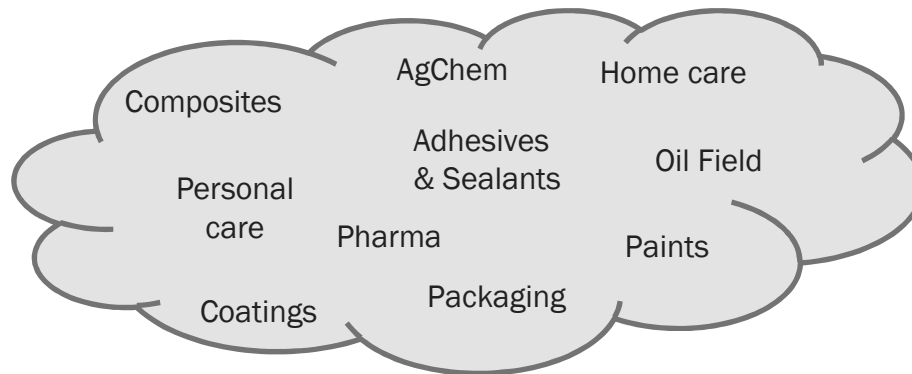
# MICROFIBRILLATED CELLULOSE

## APPLICATIONS

Unique properties



Can be used in a large range of applications to obtain superior material properties for different end-products





# BORREGAARD WITHIN SUPRABIO

- Development of each process step and a method for production of microfibrillated cellulose
- Three different patent applications were generated
- Construction of a demonstration plant with pre-commercial capacity
- Microfibrillated cellulose has been successfully tested in selected applications
- Gives high added value to different applications



# PROJECT EVALUATION

- Technical evaluation
- Economical evaluation
- Life cycle analysis





QUESTIONS?

Thanks for your attention!  
Ali Moosavifar  
Tel. +4769118304  
[ali.moosavifar@borregaard.com](mailto:ali.moosavifar@borregaard.com)