Melodea Company Overview

Yoram Shkedi, CEO

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About Melodea

- A Cleantech & nanotechnology Israeli Startup
  Founded by Prof. Oded Shoseyov, Dr. Shaul Lapidot and Mr. Tord Gustafsson (Sweden) in 2010
- Today we are 9 employees, CEO - Yoram Shkedi. Lab and offices in the Faculty of Agriculture, Rehovot
- The company is backed by Holmen AB, Sweden

Melodea’s Technologies and Products

NCC production
Development of economically viable industrial process for the extraction of Nano Crystalline Cellulose (known as NCC or CNC) from the sludge of the paper industry

NCC Foam
Nano structured foams made from NCC for sandwich composites applications

NCC as additive
Development of NCC based applications:
- Paper industry
- Packaging
- Construction sector

Nano Crystalline Cellulose (NCC or CNC)
Basic building block of all living plants

Cellulose fibers contain amorphous and crystalline areas

Production of NCC from the fibers (discovered by Ranby 1949)
- Hydrolysis
- NCC recovery
- Washing cycles with water
- Sonication
Pulp & Paper Industry Waste: A Perfect Source for NCC

11M ton waste annually in Europe
(Monte et al., Waste Management, 2009)

NCC produced from P&P waste
NCC viewed under electron microscopy (TEM)

Main advantages as raw material:
- Investment in fiber growing, collection and handling was already done
- Most of the required energy and chemicals were already invested
- High availability, zero value
- Utilization of paper mills knowhow, infrastructure and utilities
- Paper mill sludge is converted into a valuable product
- Reduced carbon footprint of the industry

Production of NCC from Pulp & Paper Waste

Method for Production of Cellulose Nano Crystals from Cellulose-Containing Waste
Materials (PCT/IL2011/000613)

NCC Based Foam Formed by Ice Templating

NCC suspension is cast into a mold, followed by Freezing/Solvent Drying

NCC Assembles into Foams with Highly Ordered Architecture

Foams at dimensions of A4 sheet X 1 to 2 cm are produced

"Virgin" NCC foam
Density: 35 Kg/m³
Water and fire resistance
Compressive strength: 1.5 MPa
Density: 150 Kg/m³

Crosslinked NCC foam: compressive strength: 1.5 MPa, Density: 150 Kg/m³
Foams Fire Retardation Properties are Superior to Fossil-Oil Based Foams

NCC foam burning test
Commercial PVC foam burning test

Development of NCC Foams into Bio-Based Core Material for Sandwich Composites

Skin
Core

Traditional cores are produced from fossil oil based materials

Melodea Participating in 3 European Programs

BRIMEE “Cost-effective and sustainable bio-renewable Indoor Materials with high potential for customisation and creative design in Energy Efficient buildings”

NCC-Foam “Self assembly of Nano Crystalline Cellulose for lightweight cellular structures”

FLHEA “Flax and Hemp Advanced Fiber Based Composites”


Project objective: Development of novel insulating materials for the construction sectors.

Specific objectives:
• Production of NCC composite foams for acoustic and thermal insulation bearing structural and flame retardation properties
• The project starts at lab-scale production going to pilot scale panels

Information available at www.brimee.eu
Self Assembly of Nano Crystalline Cellulose for Lightweight Cellular Structures

**Project objective:** develop commercially-viable, lightweight, rigid foam core materials from self-assembled NCC

**Specific objectives:**
- Develop low cost, sustainable, structural cellular material from self-assembled NCC
- Develop a pilot-scale manufacturing cell for NCC foams
- Validate the use of NCC foams as lightweight core materials in structural bio-composite sandwich components
- Perform a thorough technical, economic and environmental evaluation of the developed NCC foams to support on-going development and future market appropriation

Project partners from different parts of the composite sector value chain

Information available at [www.ncc-foam.eu](http://www.ncc-foam.eu)

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Flax and Hemp Advanced Fiber Based Composites

**Project objective:** industrial scaled-up processes to obtain modified cellulose nanofibres, for the development of biocomposites with improved properties

**Specific objectives:**
- Melodea develops efficient extraction steps of nano-cellulose from flax and hemp fibers
- Chemical modification of the nano-cellulose for high compatibility with thermoplastic materials
- Develop nano-cellulose reinforced biodegradable composites for food packaging

Partners from fibres and bioplastics sectors

Information available at [www.flhea.eu](http://www.flhea.eu)

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Our Plan

2013
- Upscale NCC production from waste to Kgs scale
- Upscale NCC Foam production to A4 X 1 cm sheet
- Development of NCC based applications for the Pulp & Paper industry and packaging

2014
- Launch of Industrial Pilot plant with capacity of 100Kg/day
- Design and Engineering of first commercial plant
- NCC foam with comparable technical performance to commercial foams

2015
- Launch first NCC production plant with capacity of 1 ton/day
- Upscale NCC foam production to commercial size sheets

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Business Opportunities

- Industrial Partners for production of NCC and products development
- Joint development partners for NCC applications in foams, packaging, additives for paper, glues, construction, composite, . . .
Thank You

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