Man-Made Fibers in the Future

FINIX Seminar

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cellulose
textiles per capita
demand increase:
1.7 kg/a

Cotton
growth
stagnates

14 Mt
CELLULOSE
GAP IN 2030
73% of textiles landfilled or incinerated
Cotton accounts for 16% global insecticide releases.
7000 l water for one pair of jeans
Opportunity:
Closed-Loop Man-Made Cellulose Fiber Process
How to make Cellulose Fibers?

DIRECT DISSOLUTION
LYOCELL
Lyein = dissolve
Green solvent

Ionic Liquids are liquid salts at T <100°C

Dissolution
Filtration
Dearation
Dry-jet wet spinning
Streching
Cutting
After treatment
Drying
Baling

Ioncell®
Lyocell Process

Pulp Textile waste
Solvent Recovery

Ioncell®
Lyocell Process
Challenges

Stable air-gap spinning

High Filament stretching

Soft, good handle
High toughness
Textile fiber from Sustainably Grown Wood

Ioncell® Fiber Process
Textile fiber from Textile Waste

Pretreatment

Ioncell® Fiber Process
Solvent Recycling

DISSOLUTION → SPINNING, WASHING → FIBRES

PULP

IL / WATER

EVAP-I

EVAP-II

Recycled IL
Fiber properties from recycle solvent

Recycling Rate Ionic Liquid (Lab) >99%

Elsayed S. et al. (2019) unpublished results
Products from Wood Pulp

Fibers: Ioncell™-Team
Akino Kurosawa, MA FaCT Fashion
Photo: Sara Riikonen

Fibers: Ioncell™-Team
Design: Anna-Mari Leppisaari
Photo: Eeva Suorlahti

Fibers: Ioncell™-Team
Dress design: Emma Saarni
Textile Vesa Moilanen/Lehtikuva

Fibers: Ioncell™-Team; Anna Semi MA FaCT Fashion
Sofia Ilmonen MA FaCT Fashion

Tuula Pöyhönen

marimekko®
Products from Recycled Textile Waste or Paper Waste
Products from Recycled Jeans

On the occasion of President Macron’s visit August 2018


New Scarf
Products from Recycled Jeans

New Fibers from old Jeans

T2C (Söktas)

T2C (Reima)

Properties of Ioncell® fibers from Pulp and Textile Waste

PoConCoW: Postconsumer Cotton Waste
PreConCoW: Preconsumer Cotton Waste
Summary of Ioncell® Fibers

Ioncell® superior to commercial Cellulose fibers in mechanical and other textile-related properties

Ioncell® upcycles Cotton Waste

Properties of Ioncell® fibers from cellulosic textile waste much better than those of virgin Cotton fibers
Ioncell® Pilot plant

Start-up fiber line: 1/2021
Pilot phase 1: 2021 – 2022
Pilot phase 2: 2023 – 2025

Strategy: joint process development with industrial partners
Ioncell® Pilot at Aalto Bioproduct Centre

Continuous fiber line, closed-loop solvent recycling and process control

Fiber production capacity

1.5 kg / h
Thank you!