Change Fashion Workshop

Session A: Materials

Location: Board room

Co-Leads:

Pirjo Kääriäinen, Aalto University
Claudia Richardson, Patagonia
Amanda Johnston, London College of Fashion

Spider silk, orange silk, lab and yeast grown leather, textiles and materials made of leather, cork, pineapple, apples, etc… what's next! We will discuss and debate what is working and where the gaps lie in the world of material science in order to better understand and create new materials which are safe for the environment, affordable, and can be delivered at scale. Where can we apply more science-based solutions for maximum impact?

Materials: Questions for the Working Group

Definition and Scope:

How should we define materials for the purposes of the Change Fashion Challenge?

What is the scope of this working group? What processes, products, areas, etc. will we focus on?

Current State:

What is the current state of sustainable materials for fashion? What are the “hot spots”?

Ideal State:

What are the main needs and expectations from business and industry?

What would the ideal state for sustainability in fashion materials look like, assuming required solutions could be developed?

Bridging the Gaps:

Opportunities/Actions

What are the opportunities for science and technology to improve sustainability of materials for fashion?

Of these, what are the top 2-3 priority areas? (highlight in bold on the slide)

Barriers/Requirements

What are the barriers to enabling science and technology to improve sustainability of materials for fashion?

Priority Areas (up to 3):

For each area:

What are the key scientific issues? What are the key research questions that need to be answered?

What are the critical areas for innovation?

What data is needed and what are the gaps in data currently (reliability, integration, frequency)?

What would a research roadmap look like (key actions)?

What would success look like?

What are the next steps?

Materials: Definition and Scope

A material encompasses both the physical raw materials and the processes needed to form a new entity.

A material is physical matter that makes up and is used in the process of making products and goods.

Materials can be created from a natural, chemically regenerated or synthetic sources, and may be further enhanced through processing.

Scope:

The choice of materials is crucial for the company's environmental impact, materials can account for up to ¾ of a products impact.

Materials: What is happening now? When will the emerging ideas be commercially available? (all participants answers)

0-5 years:

- Airink: pollution collected and filtered to form black dye/ink
- Biofabricated leather
- Fabrics made from recovered ocean plastics
- Plastics made of natural (bio) replacements
- Waste materials into to plastics
- More natural fabrics replacing synthetics
- Regenerative agriculture in plant and animal fibres
- Synthetic analogy from natural resource e.g ‘spider silk’
- Clarifying terms, demystifying sustainability

Materials: What is happening now? When will the emerging ideas be commercially available? (all participants answers)

5-10 years:

- Biofabrication vs industrial fabrication
- Closing the loop on polymers
- Regenerative fabrics
- Depolymerization of polyester and spinning into new fibres
- Decompose plastics etc to atomic/molecular level to make them biodegradable
- Bio-based materials to create most apparel
- Scalable sources of performance polymers to replace synthetics
- Biodegradeables in cases where the material lifespan does not exceed the lifespan of the product
- Demolab- Chitosan (waste from shrimp shells) turned into 3D printing substrate
- Plastic bag alternative that dissolves in salt water
- Biodesign materials, algae and mycelium, produced using bacteria (Bolt, Zoa, Qmilk, Algikuit)
- New non-toxic chemical components
- Scaling up of existing sustainable approaches e.g. natural and 'waterless' dyes, ocean plastics, recycled materials

Materials: What is happening now? When will the emerging ideas be commercially available? (all participants answers)

Over 10 years

- Traditional dyeing becomes trendy and broadly used
- Plastic fibre biodegradability in marine environments
- Biodegradable circuits
- Dissolvable circuits
- Protein –based silk

Materials: Current State - Conclusions

Current industry practice predicated upon:

TAKE – MAKE - DISPOSE MODEL

Global textile demand lacks diversity

63% Synthetics- Polyester, 28% Conventionally farmed Cotton,

the only available stretch is non-degradeable and recyclable elastin/spandex

Many emerging innovations…

Growing number of start-ups and research in three main areas:

1) Green chemistry for functionalization and finishings
2) Novel ways of deriving polymers and natural raw materials
3) Recycling technologies enabling value to be captured throughout the product lifecycle- Waste is gold!

..and need for capital investment and cross-disciplinary collaboration

to evaluate and push these startup technologies into commercialization

Materials: Ideal State

We have a global closed loop textile material system

Materials are only made of renewable or recyclable components, they are carbon positive and truly circular

Biomimetic production systems have been successfully adapted in materials production

We have user-friendly functional textile materials, for example sensing materials for medical applications and programmable functionality

New materials like protein-based, easily recyclable polymers have replaced plastics, and the production of plastics has reduced dramatically

We use only non-toxic chemistry

Reuse is the norm and celebrated

Materials: Bridging the Gaps

Opportunities/Actions:

Inclusive sustainable development (ethical, environmental, global, safe)

To clarify understanding of terms inside fashion/textile community and to create a shared ‘sustainability language’

Biomimicry ‘Design by Nature’

Embedding multi expertise in interdisciplinary teams

Start the creation of an interdisciplinay culture in education

Scaling up prototype materials to industrial production and wide use

Use abundant, rapidly growing source materials and overcome their inherent Challenges through technology to make them usable as textile material (water resistant, strength, inherent recyclability etc.)

Materials: Bridging the Gaps

Barriers/Resource Requirements:

Technical challenges of sustainable materials: chemical properties, physical properties, colouring, cost, transparency of technology

Silo'd working practices prevalent in the complex fashion and textile supply chains that wrap around the globe.

Big fashion/textile companies like H&M, Inditex, Kering, PVH etc don’t have their own research centers
(like Google and other ICT companies have)

Need for capital investment and cross-disciplinary collaboration to push new innovations in practice

Need for think-tanks to result in affordable real life solutions

Materials: Priority Area #1

Utilising all waste becomes a necessity

Creation of closed loop material system based on regenerative principles, cognisant of the technological and biological nutrient systems theory proposed by William McDonough- these materials and systems must stay affordable in order to contribute to significant change.

Key Actions:

Diverting waste from the fashion system

Waste from all sources including agriculture and food

Success Metrics:

No waste any more, waste becomes a feedstock for new materials

Next Steps: Close collaboration with waste industry and other new value chain stakeholders, continue scientific research required for material recycling

Materials: Priority Area #2

‘All heads together’ - Building of totally new cross-disciplinary working culture for collaborative doing and learning,

Key Actions:

All levels (education, industry, research institutes)

The NYAS Fashion Challenge should require diversity of experts in participating teams

Communication needed for all stakeholders to change the mindset and the ways of working

Success Metrics: More and more material-related success stories based on science, communicated through fashion

Next Steps: Collect the best practices of collaborative science + fashion success stories of HOW the collaboration has been done in practice (not only communicating the fascinating outcomes)

Think-tanks created -NYAS CFF is already one

Materials: Priority Area #3

Towards true sustainability of textile materials: process transparency, material traceability and knowledge sharing

Key Actions:

Start building scenarios to understand the needs and impact of new materials as a whole, and to analyze the impact, and to establish a clear and shared understanding of terms

Next Steps:

Easy access and user-friendly databases, to be able to estimate and analyze the material impact throughout the supply chain

Materials: Priority Area #4

Suggesting some urgent focus areas for materials research:

Replace (recycle) polyester & viscose

Intercept and provide solutions to existing ocean and land plastic waste, and preventing the continuum of single use plastics

Recycle cotton

Create circular or biodegradable stretch for fabrics to replace elastane /spandex

Develop technologies to allow the recycling of blends efficiently

Sustainable solutions for water repellency and fire retardancy