Arcintex Hybrid Seminar
2nd-3rd May 2023

The seminar is free and includes lunch, coffee/tea and snacks/cake

The dinner is optional and paid by the participants at the restaurant

Registration
No later than 25th april

Link: https://da.surveymonkey.com/r/B2KTQKQ

Practical information will be supplied to registered participants

What are Smart Textiles and Bio-Materials in the Anthropocene?

Speculating through materials and future scenarios.

Program: 2nd May

Location

On-Site: **The Garage, Building B, VIA Herning Campus, Birk Centerpark 5, 7400 Herning, Denmark**

On-Line: **https://viadk.zoom.us/j/65859551569?pwd=REVhMTdJTkJZWGFzU2tXZjRGS1VqZz09**

PhD Forum

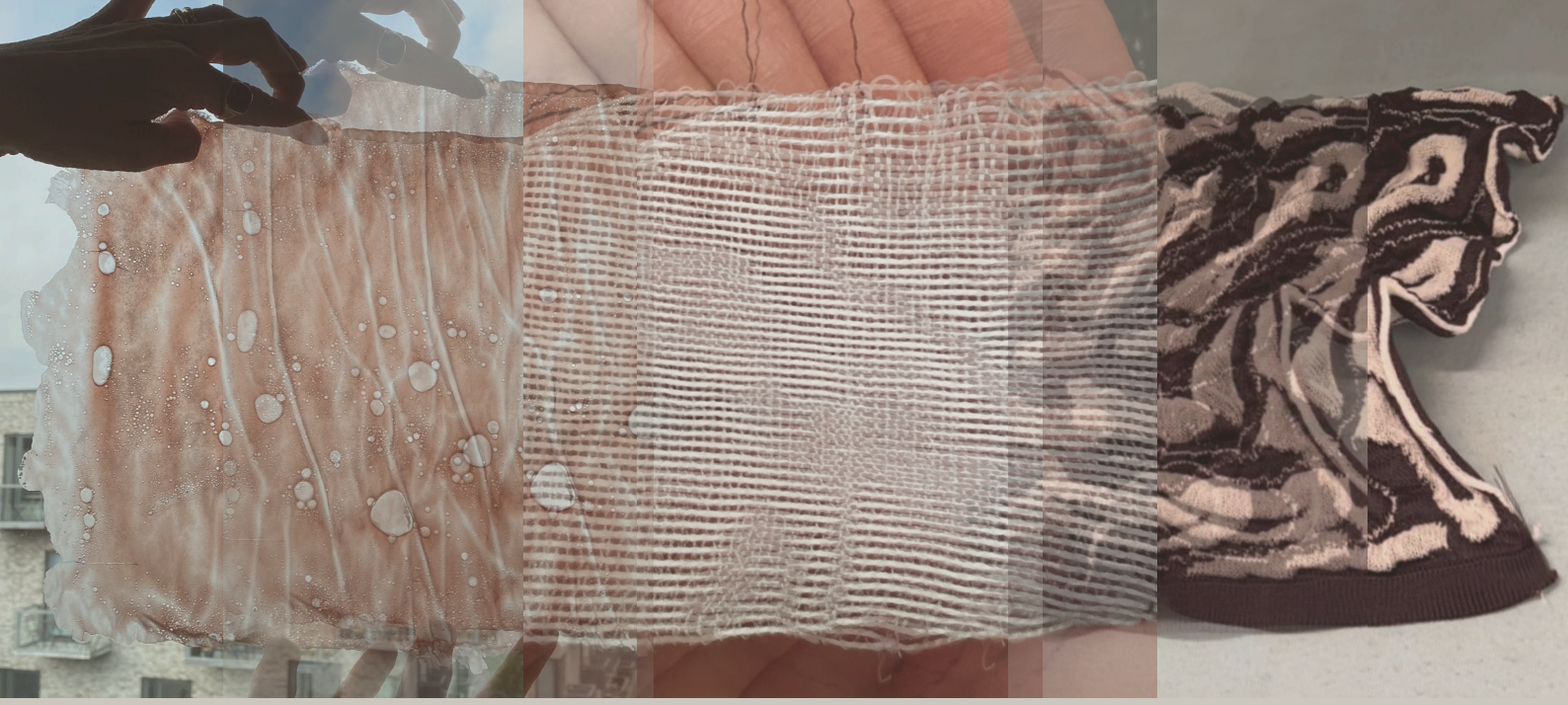
11.00-12.00	Arrival and Lunch
12.00-12.30	**Carolina de Lara Cunha**, Borås University The Alchemy of Scoby
12.30-13.00	**Paula Nerlich**, Newcastle University The Materiality of Well-Being: Designing living Textile-bacterial hybrids
13.00-13.30	**Charlotte Hansen**, Designskolen Kolding Graduate Study of pleating – how digital craftsmanship addresses sustainable issues in clothing design
13.30-14.00	Coffee Break
14.00-14.30	**Magdalena Kohler**, TU Chemnitz & Universität der Künste Berlin Re:Value - Holistic consideration of the wool fibre cycle for clothing textiles, in particular the recovery of mixed fibre waste from knitted post consumer waste
14.30-15.00	**Virginia Binsch**, Hochschule Anhalt The Tactility of Emotions - Multisensory Design of Active Materials
15.00-16.00	Discussion

Arcintex Steering Group Meeting

16.30-17.30	Arcintex Steering Group Meeting

Dinner for onsite participants

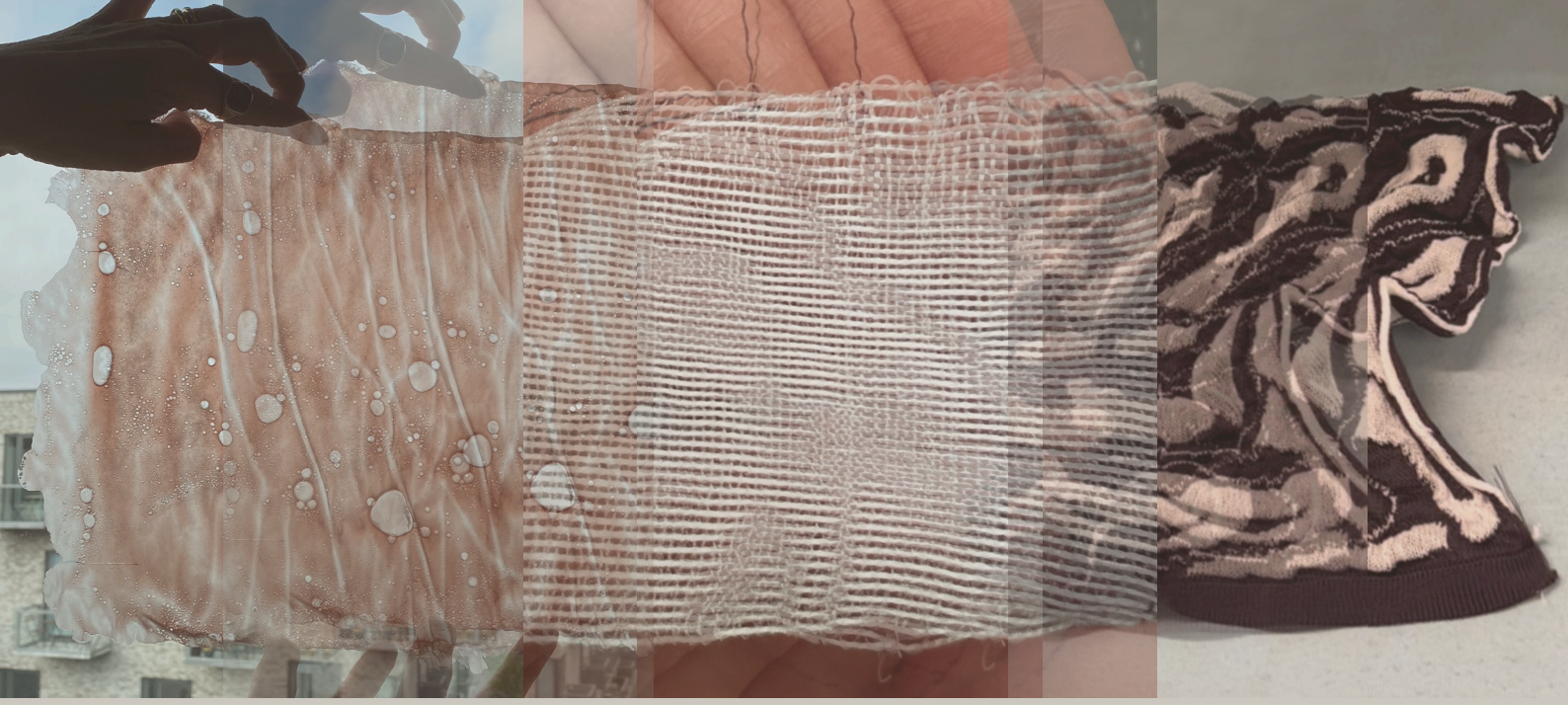
18.00	Restaurant in Herning



The Alchemy of Scoby

– **Carolina de Lara Cunha,** Borås University

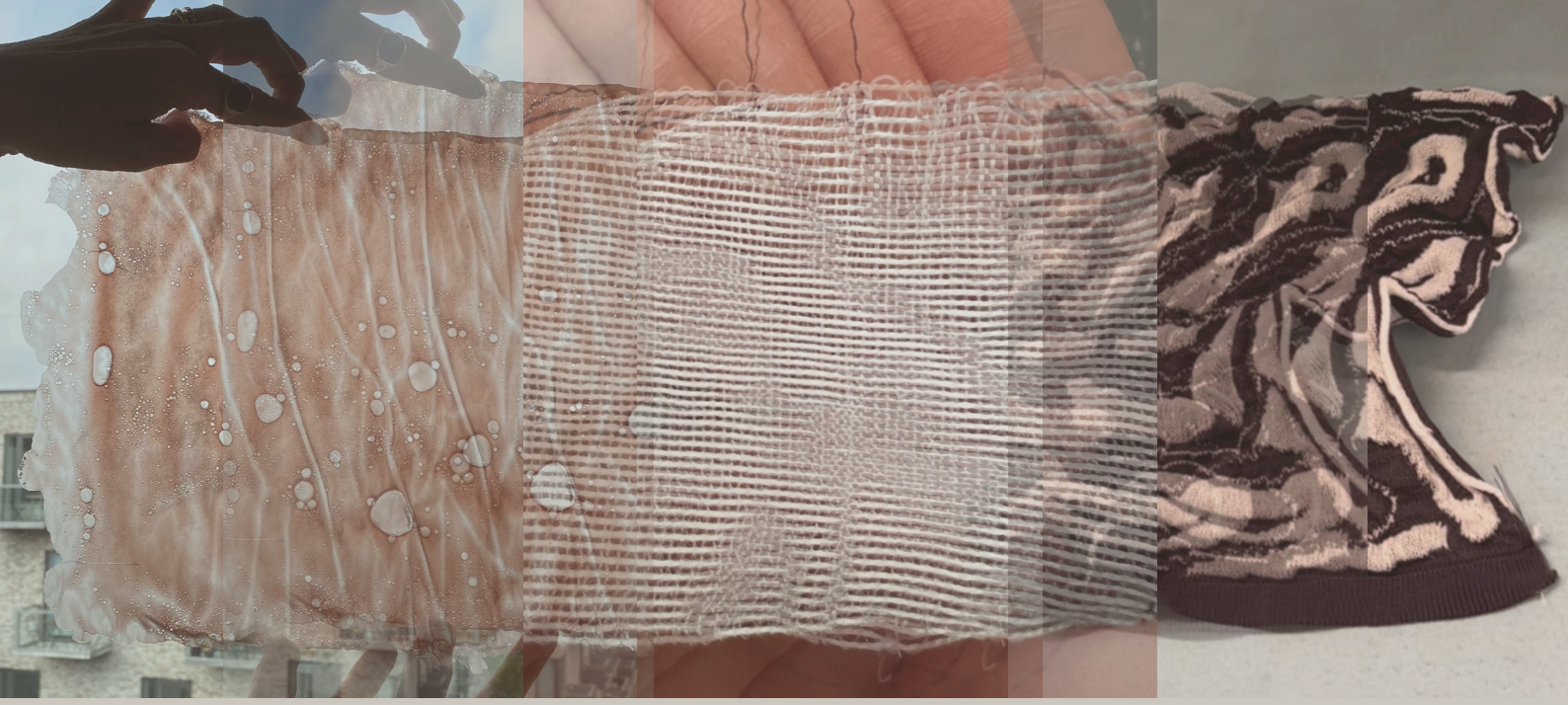
Living materials and biocomposites, due to being relatively inexpensive and quickly produced, offer a biodegradable alternative to traditional materials, potentially alleviating the stress placed on production turn-over and, eventually, aid in rethinking 'what' and 'how' is consumed in terms of material. However, despite the first projects exploring bio- and living materials dating to the early 2000s, fashion and textile spheres have been slow to adopt these innovative material developments, which suggests some sort of unspoken bias or distrust towards biomaterials.
This research aims to bypass this reluctance by creating a viable pathway to introduce biomaterials, specifically bacterial cellulose, into fashion and textile contexts. Due to the component variation in shoe construction, and capacity to both affect and relate the world as it exists, the research area positions itself between biomaterials and footwear. The goal surpasses designing, reaching towards both adoption and normalisation of biomaterials outside of laboratories and academia. By investigating how diegetic narratives wrought from speculative design can suspend disbelief, The Alchemy of SCOBY envisions a fictional future where bacterial cellulose is the most commonly used textile. The resulting artefacts can be observed within and without context, acting as design fiction, cautionary tale, and examples of practice-led design research that can be extrapolated to other materials, contexts and concepts.
With an efficient approach, biomaterials can become prominent in design thinking by discussing the potential for artistic expression, as well as speculating about the role of components relative to footwear construction from aesthetic and practical perspectives. By delving into this intersection, what is 'shoe' and its purpose in relation to wearer, material and circumstance is challenged, generating insights into what they could be and how they could become.



The Materiality of Well-Being: Designing living Textile-bacterial hybrids

– **Paula Nerlich,** Newcastle University

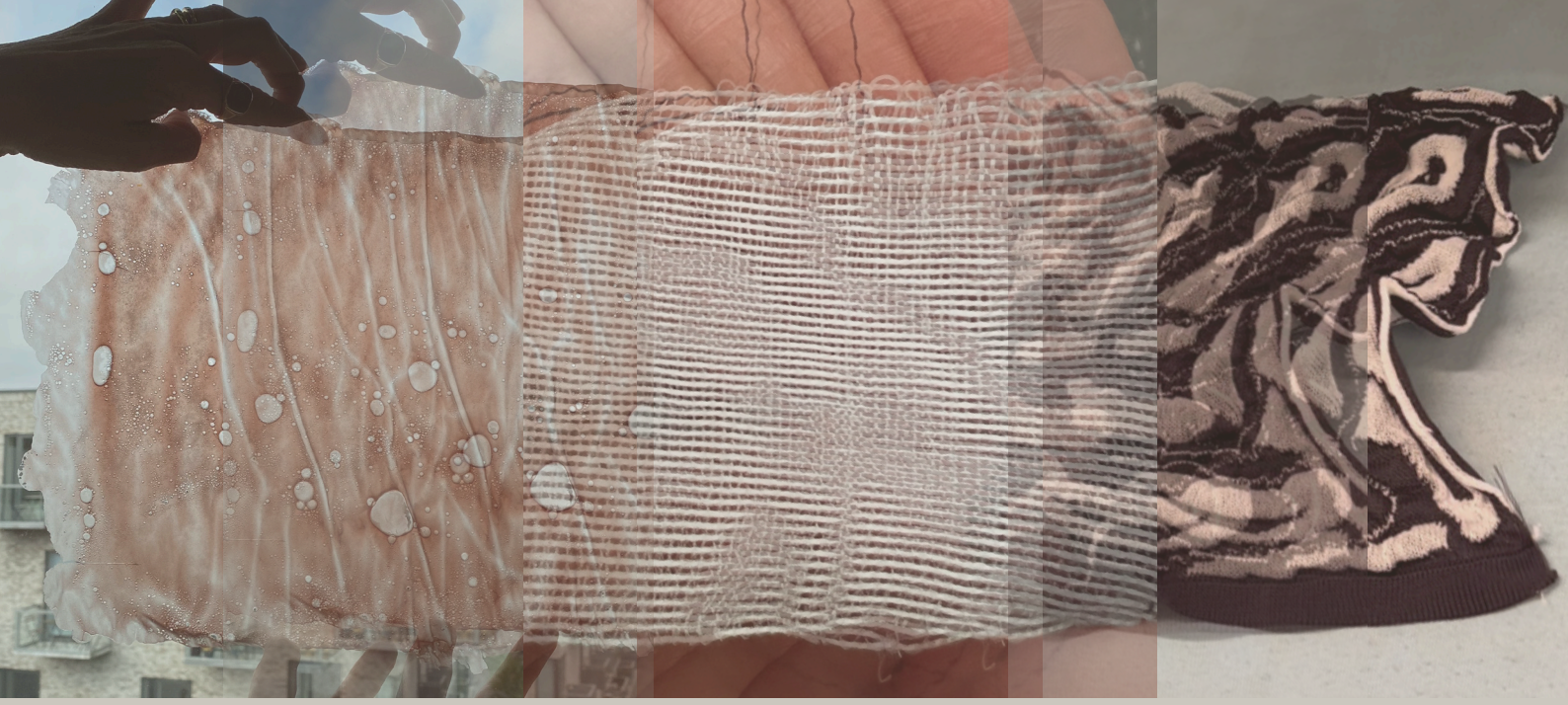
Growing interest in the intersection of textile design and biotechnologies within the context of the built environment has driven research with bacteria and fungi as grown components to create textile composites, resulting in applications such as bacterial dye or structural elements in form of bricks and scaffolds.
Whereas previous research into textile-bacterial composites required the microbial communities to be neutralized prior to application, the Materiality of Well-Being asks how textile design and microbiology can be merged to create living textiles that keep the selected bacteria alive on the textile and through the fire properties create living, sensory textile-bacterial hybrids.
This research considers how the textile fires impact bacterial volatile compounds production on the hybrid materials and applies interdisciplinary methods to compare change in volatile compounds present and identify fires and fabrication processes most suitable to create the living textile.
The study is explored through the development of textile samples that are infused with selected bacterial strains and observed for their subjective scent as well as the volatile compounds, which are analysed via gas chromatography.
Further, the resulting living bacterial scent is examined for the potential of living textiles as sensory interfaces. Within workshops and through an immersive collaborative multi-media installation, the living textile hybrids are explored to gain insight of their impact on olfactory and physical space and their potential as activator for new forms of textile-architecture of co-habitating and interacting with the non-human within the realm of future grown and living Architectures.



Study of pleating - how digital craftsmanship addresses sustainable issues in clothing design

- **Charlotte Hansen,** Designskolen Kolding Graduate

At a time were finding new ways of working with and finding new approaches to sustainability never has been more necessary, I have in my master's project worked to investigate the possibility of creating sustainable fits in clothing.
Mette Terkildsen's research shows that only 12% of women fit Danish standard sizes and fit in clothing. Fit is one of the primary reasons why we in Denmark have 35% more consumption than the rest of the world, and the clothes are only worn 20% before they are passed on or thrown away.
Therefore, we need to take a closer look at how we through craftsmanship, technology and rethinking systems can create better fits that meet the consumer's needs and account for sustainability.
Over time, pleating has played an important role in relation to freedom of movement. Pleating is a finishing technique used on finished woven textiles that adds flexibility through folds in 2D and 3D.
What if we could incorporate freedom of movement and flexible solutions into our clothing today?
My hypothesis is to create flexible solutions that can meet a need for products that can reach a wider target group. In the project, I work with partial digitization of pleating processes and experiments with various IT programs with the potential to test the properties of pleats in the textile and application to several body types by converting 3D body scans of women into avatars.
My problem statement is:
How can the craft of pleating evolve through 3D technology and thereby contribute to creating sustainable textiles?



Re:Value - Holistic consideration of the wool fibre cycle for clothing textiles, in particular the recovery of mixed fibre waste from knitted post consumer waste

- **Magdalena Kohler,** TU Chemnitz & Universität der Künste Berlin

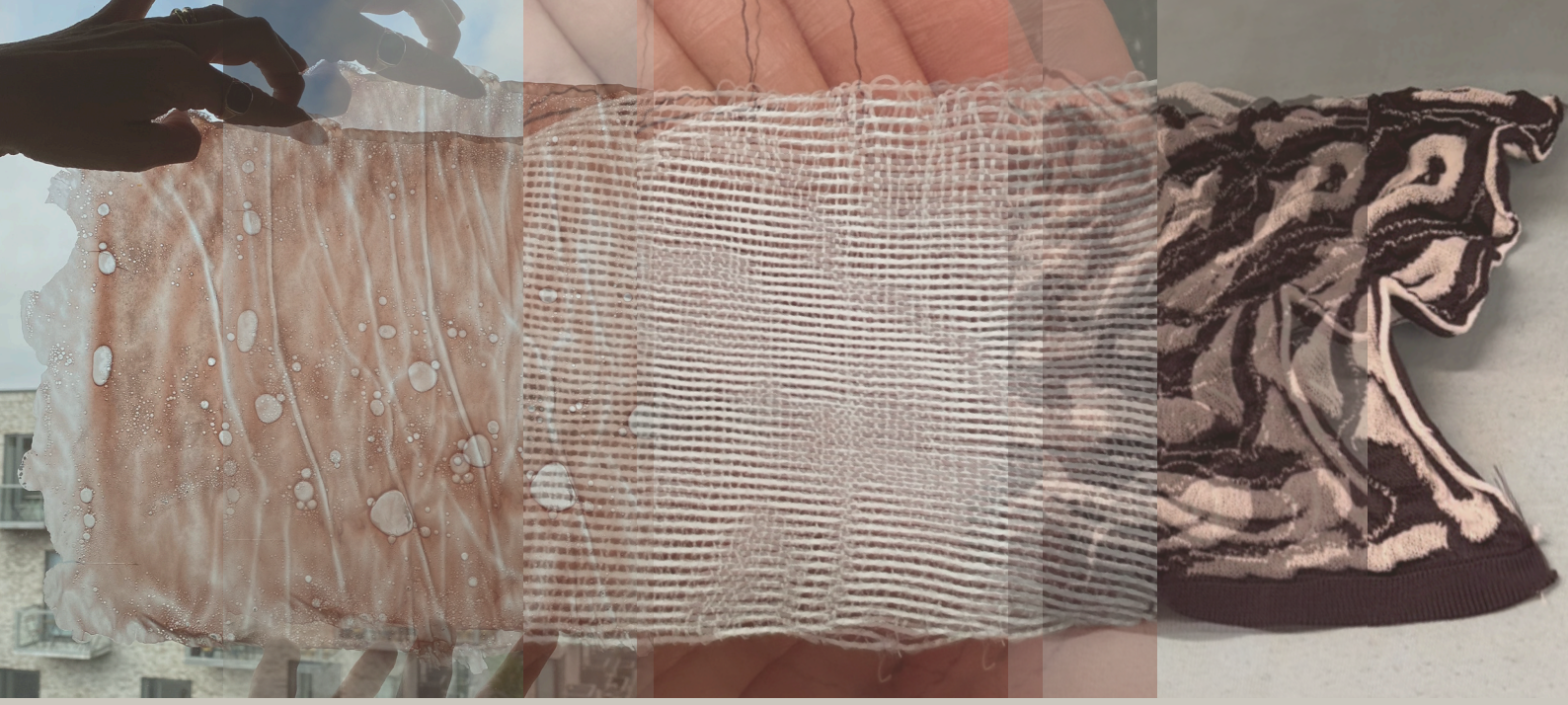
Pure new wool is rarely found as a quality in used clothing sorting plants.
On the other hand, large quantities of synthetic fibre-wool mixtures accumulate as a waste product of the fast fashion industry. Especially their mixture of material composition create a high loss of value. My previous research has shown that within one garment, fibre mixtures with up to seven different fibres are in circulation.
These qualities are mainly used as filling & insulation materials and for fleeces.

In order to achieve the recyclability of these fibres for the clothing sector, two essential areas of the current textile recycling process chain are to be analysed in detail and modified in my PhD project.

1. sorting and analysis of the knitted synthetic fibre-wool mixtures:
- Analysis and categorisation of relevant synthetic fibre-wool mixture groups
- Analysis and categorisation according to stitch geometry, yarn twist, as well as yarn count
- Analysis of different blending ratios with virgin merino wool to derive a stable production process

2. modification and adaptation or redesign of the existing cutting/tearing process:
- Exploring the cutting lengths in relation to the existing stitch geometry
- Gentle cutting process to preserve the existing fibre qualities and lengths as far as possible
- Evaluate the tearing process and rule it out if necessary

These not yet adapted, research relevant process steps, have a direct impact on the rest of the textile chain in the recycling sector and are essential for the more strongly promoted circularity in textile recycling in the future.



The Tactility of Emotions – Multisensory Design of Active Materials

– **Virginia Binsch,** Hochschule Anhalt

The human haptic perception is one of humans' most important yet underrated orientation functions. The human sensory system, especially visual perception, is constantly confronted with an overflow of data and information due to the developments of modern technologies, the power of intelligent machines, and the accompanying streams of information, knowledge, and data. This progressively leads to complexity, disorientation, and imminent human overload. However, important channels of communication, information transfer, and interaction remain unused.
As materials are interfaces between the user, environment, and object, they are our sensory connection to the world and therefore carry powerful information-bearing prospects. This research project will identify and explore unutilized, material-based potentials as information carriers. It investigates the active role of materiality in conditioning and influencing user experiences and emotions. Derivative, it understands and inspects emotion as a formable medium.
With a primary focus on tactile perception, materials that can adapt their haptic properties, e. g. in shape or surface structure, are of particular interest. As both dynamic and sensory properties are considered promising features in creating an emotional attachment between user and product, the Ph.D. will explore a materiality of dynamic change through shape-changing materials and their qualities in creating emotional user experiences through multi-sensory material interaction.
The practice-led and prototype-intensive Ph.D. will develop a catalog of design and manufacturing variables of selected smart materials and their effect on human emotions. Cross-linking the fields of emotion science, senses, new materialism, and programming of behavioral patterns of active matter, the design language of an emotion will be a central research question.

What are Smart Textiles and Bio-Materials in the Anthropocene?

Speculating through materials and future scenarios.

Program: 3rd May

Location

On-Site: **The Garage, Building B, VIA Herning Campus, Birk Centerpark 5, 7400 Herning, Denmark**

On-Line: **https://viadk.zoom.us/j/65076852818?pwd=YWFiOHN2OHVoMlYraXIxR2lVWjhXdz09**

Seminar

9.00-9.15	Arrival and Coffee
9.15-10.00	**Sofía Guridi Sotomayor**, Aalto University eTextiles and Biomaterials: A literature review on the use of novel-biobased materials for smart textiles
10.00-10.45	**Bruna Goveia da Rocha**, Eindhoven University of Technology Becoming Travelers
10.45-11.00	Break
11.00-11.45	**Inger Marie Ladekarl**, VIA University College Dyeing with Food Waste: Craft as a driver for sustainability
11.45-12.30	Lunch
12.30-13.15	**Charlotte Werth**, Central Saint Martins Graduate Moving Pigment: Bacteria Dye Machine_01
13.15-14.00	**Erin Lewis**, Borås University Multi-sensorial textile Design
14.00-14.15	Coffee Break
14.15-15.00	**Lena Kramer Pedersen**, VIA University College Speculative Crafting: Knit experiments mimicking future yarns
15.00-16.00	Summing up

eTextiles and Biomaterials: A literature review on the use of novel-biobased materials for smart textiles

- **Sofa Guridi Sotomayor,** Aalto University

Developing smart textile materials capable of sensing, reacting, and adapting to environmental stimuli has contributed to the growing field of Wearables [1]. When combined with digital components and technologies, these now Textiles, also gain the computational capabilities that have proven to have potential in various fields such as performance or healthcare [2,3). Nevertheless, the ubiquitous integration of electronic components, such as metallic conductive fires, into textile structures creates complex multi-material substrates. Considering the challenges regarding textile waste [4] and electronic waste management [5), this reveals an urgent need to address the issue of sustainability in creating new eTextiles.

To approach it, waste preventive eco-design guidelines have been proposed, including reducing the diversity of materials in a product, reducing the weight, and prioritizing using renewable and recycled materials [6, 7]. Focusing on the last one, bio-based Textiles could create new alternatives to the industry, where adaptive, biocompatible, and biodegradable materials could replace metals and plastics. Examples of this approach can be found in using carbon-based conductive inks to replace metal nanoparticles [8] or cellulose-based waveguides for light-emitting fabrics [9).

Therefore, the following work will present a literature review focused on the use of biomaterials in the creation of Textiles, From the perspective of design practice, existing examples are compiled, described and analysed to showcase who is working on these issues, their potential, and their main challenges, aiming to contribute to the field's discussion on more sustainable future textiles.

The methodological approach aims for an integrative work, starting with a general domain mapping, selecting main academic outlets (in this case, interdisciplinary ones), defining the exclusion criteria, compilation, categorisation and analysis. Knowledge gaps and research opportunities are unravelled and presented using a concept-centric framework.

In general terms, a body of 60 papers published between 2008-2022 was found, showcasing a big research gap on the subject of Sustainability for Smart Textiles and Textiles. These results mostly come from Electrical Engineering and Chemical Engineering; therefore, focused research on Design and Textiles could contribute to a more holistic understanding and development of these soft interfaces. Specifically, due to their electrical conductivity properties, carbon-based composites and polypyrrole are the most studied materials as alternatives for metals in soft textile electronics.

Nevertheless, these biocompatible materials are not biodegradable and come in combinations with various polymers. On the other hand, examples of biobased, biodegradable and biocompatible materials such as mycelium, gelatin, chitosan or cellulose, among others, were minimal but showcased exciting research paths to develop a variety of Textile systems components such as sensors, light outputs, actuators and cases.
Regarding the actual environmental impact of these material developments, just two papers incorporated a Life Cycle Assessment and End of Life approach, so further work needs to be done to determine their potential as better solutions. Finally, the work suggests incorporating insights from local non-academic initiatives on biomaterials to nurture sustainability by integrating social, economic and environmental factors.

Becoming Travelers: Reflecting on the Emerging Practices of Sample Making in Digital Craftsmanship

- **Bruna Goveia da Rocha,** Eindhoven University of Technology

In this doctoral research through design project, I explored making through the lens of itineration and traveling to identify aspects of digital craftsmanship that were obscured in the ways we describe its practice. In this, serendipitous opportunities and the complexities of material-driven processes were embraced both as a way of working and as objects of investigation. This journey has taken me to a different understanding of collaborative practices, exploration and sample making. By making samples the unit of observation in this research, it was possible to question the notions of failure and exploration in digital craftsmanship, which led to the proposal of an approach for explorative making. This approach, called Becoming Travelers, sees the making process as akin to traveling. The core of the approach is understanding that samples embody the intra-relations between entities of a production system. Through this relational view, samples can be seen as loose ends, which can serve as starting points for new journeys through revisiting. As such, making as travelers means embracing detours from our main lines of inquiry by considering our samples both within and outside our design journeys. This depends on the ability to document our processes and live with our samples in ways that preserve the design work actionable, open to appreciation and appropriation. As a call for action, I hope that Becoming Travelers can support design communities to devise systems and to inspire other approaches that open our making processes and material samples to new interpretations and to each other.

Dyeing with Food Waste: Craft as a driver for sustainability

- **Inger Marie Ladekarl,** VIA University College

We aim to work with more sustainable processes when producing textiles for the fashion and lifestyle industry. Dyeing with natural dyes is a way to dye more responsible than using synthetic dyes. Our students and collaborative partners ask for data to show the color fastness of natural dyeing, and this fostered the idea of looking into the possibilities of using food waste for dyeing. For centuries we used natural colorants but in the past century the recipes and craft methods tend to be 'forgotten' in the zeal of industrialization aiming to standardize products to ensure quality requirements.

The investigation was to test color fastness when using a traditional recipe for dye extract of avocado skin, avocado seed and onion skin on wool, silk and cotton. The following tests were carried out: Color fastness to rubbing: wet and dry and to washing: Color change and color staining.

From a craft perspective color can variate but in an industrial production it is important to be able to reach the same color several times. Can we succeed? We do not expect to be able to obtain the same fastness as when dyeing with synthetic dyes, but we believe that dyeing with food waste can have a raison d'etre in future textile use. Using craft methods in the industry might change the way we look at design. How can a designer create textile whose look change in the use phase in a way that is valuable to product aesthetics? Can the consumer accept that textiles change over time if only these changes do not affect product aesthetics?

Moving Pigment: Bacteria Dye Machine 01

- Charlotte Werth, Central Saint Martins Graduate

‚Moving Pigments' aims to scale up and automate the process of codesigning textile patterns with pigment- producing bacteria. It intends to enlarge and make visible a reality that is usually hidden from sight, showing us the incredible beauty of this parallel microscopic world. The high degree of uniformity demanded in the context of mass production and consumer capitalism has led to extensive usage of petrochemical dyes. These often have disastrous impacts on ecosystems through the pollution of watercourses and landscapes.
In contrast, bacteria dye has many environmentally friendly advantages, including far lower water usage and no use of harmful chemicals. Bacteria dyeing is a rather beautiful and unique method of dyeing, creating colour-gradients and lines which cannot be easily imitated. The microbes grow in slightly unexpected ways that informs the design process.
Challenging the established separation of human and non-human species can create meaningful innovation. Designing with and not against nature necessitates alternative practices and new instruments. The machine developed within this work is designed to experiment with and explore the process of bacteria dyeing through automation. It represents a case study for the prospective large-scale implementation of sustainable co-designing dye practices.
‚Bacteria Dye Machine 01 is a self-sterilizing machine, which feeds panels of textiles through different stages of sterilization and pattern creation. After the first stage of sterilizing the textile through UVC LED lights, it gets moved through multiple dye baths where line and fade patterns are cultivated directly onto the surface of the textile. Upon completion of the dyeing process, the textile undergoes a conclusive sterilization procedure before being rolled up for further processed.
The second phase of the machine development (currently work in progress) aims to explore the feasibility of generating diverse patterns via a single machine. This innovation is envisioned to enable interchangeable bacteriadyed patterns with ease and efficiency.
Besides the work around up-scaling and automation, one of the main topics within this practice is control. When generating patterns, there is always a possibility for the microorganism to grow slightly unexpected and thus, taking part in the design process. In a time of AI image generation, there are a lot of interesting similarities around both processes. The decision to relinquish some control, to direct the outcome but never accurately predict it, other than assuming we're not looking for it, is actually what's gripping us right now.

Radiant textiles: Opening towards multisensorial textile design

- **Erin Lewis,** Borås University

Radiant textiles are a new type of conductive textile that is regarded for its electromagnetic qualities and properties rather than its electrical capabilities. They are energetic materials that contain electrons dancing within the atoms of their yarns, thereby extending a textile's design qualities and expressions far beyond surface and selvedge, courses and wales, by opening into an intangible, invisible, and abstract atmospheric space. To regard the electromagnetic domain of the textile is to open the textile to a world of new expressive possibilities for conductive textiles. The electromagnetic domain is present as an under-explored quality in all conductive textiles, suggesting that a vast number of computational and electronic textiles that have been designed to date contain a hidden world of unexplored possibilities.

This presentation will discuss the expressional possibilities of radiant textiles, and methods and tools for sensing and working with the electromagnetic qualities and properties of the textiles. Case studies of introducing this intangible and invisible material to students have broadened the focus from electromagnetics to that of extrasensory materials in textile design. Reflections on teaching methods, successes and failures of introducing extrasensory and multisensory materials in textile design education will be presented. This forms an argument for the need to expand textile design student's capacities for material understandings, and leads to a call for new teaching strategies in this context.

Speculative Crafting: Knit experiments mimicking future yarns

- **Lena Kramer Pedersen,** VIA University College

In this presentation, I will discuss how it is possible to work with textile sampling based on scenarios starting with a lot of WHAT IF's, and how to work with the expected properties of a yarn that does not yet exists.
My research is an ongoing textile study under a main Nordforsk research project, called Beyond e. Textiles, which is conducted in a cross disciplinary collaboration with a team of researchers within the fields of Design, Textile and Art from Center for Creative Industries & Professions at VIA Design & Business, and scientists from the Universities Alto in Helsinki and Boräs in Sweden.
Based on existing literature in knitting and weaving, I have been experimenting with existing techniques with an exploratory approach, mimicking future yarns and their expected properties. In the knitting and weaving workshop at VIA, I have been able to work with textile prototyping and performance testing.
There are two main purposes in my textile study. One is to gain insight and knowledge through sampling and prototyping that potentially can contribute to the development of the yarns developed by the scientists under the main Project Beyond -textiles. The second purpose is to gain insight that potentially can lead to the development of new recommendations and/or manufacturing methods where the yarns developed and their properties can be included. In my presentation, I will share with you research approach and my preliminary textile findings.