



# AER3A

A PEAK INTO THE  
FUTURE

A short guide into the results of the CHEMARTS  
summer project of 2013

“Science does not know its debt to  
imagination.”

- Ralph Waldo Emerson

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## INTRODUCTION

The Finnish forest industry is globally known for its sustainability and abundance in products that vary from paper to pulp or massive wooden structures. In an era where digital technologies have overcome our lives, the need for consumption of Finnish natural resources has decreased within the last decade. There were times when paper was the exclusive media to transfer information, but nowadays it is even to be avoided. Now, with a huge availability of resources from the Finnish forests, the industry is currently facing an exciting challenge to come up with new applications and products for the future generations that are about to come.

One of the many initiatives made in the industry, is the attempt to apply design thinking in the process. The realization that design can serve in more ways than just defining the form and shape of products, has given way for new innovations. The CHEMARTS project is one of them.

CHEMARTS is an annual project in which disciplines from the School of Arts, Design and Architecture and the School of Chemical Technology - of Aalto University - get together in an endeavor to explore where cellulose can be utilized. The CHEMARTS project

is operated by the 'World of Cellulose' scheme in which Aalto University and VTT (Technical Research Centre of Finland) act as the main stakeholders with funding provided by TEKES (Finnish Funding Agency for Innovation and Technology). Bonds with dominating organizations and companies of the forest industry that deal with cellulose as a raw material are vital for its success as well.

This booklet is a sum up of the outcomes from the Summer of 2013, and it is intended to operate only as a complimentary information package in addition to the AEREA exhibition, organized by the end of the CHEMARTS 2013 project. The main focus points were to develop a future corporate identity for a luxurious cellulose-based product brand - that goes by the name AEREA - along with futuristic applications and product concepts. The possibilities of nanotechnology were explored to spring up with fatuous ideas that aim to provide useful and entertaining interactions for the future of a society that is moving fast, without forgetting the importance of sustaining what our nature has to offer.

Explore with us a world of cellulose...

Explore with us the world of AEREA





## FUTURE APPLICATIONS

Within the next pages proposals for future applications are found. Within an intensive process that involved exploring scenarios of the future, developments in nanotechnology and cellulose as a raw material, the result was an inspiring mindshift that gave way to a myriad applications for the future. The most relevant findings are presented in this section of the booklet. It must be noted that within the presented visions, electricity is not the source of energy but it is sourced from the motion and perspiration of the human body as well as the natural light to which the products are exposed to.

## VIBRATING GARMENTS/TEXTILES



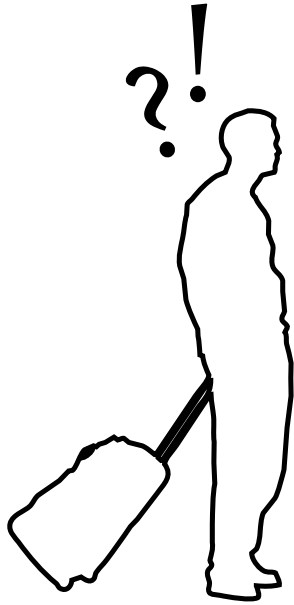
The morning task of waking up early in the morning is still, for many, a challenging activity. Instead of an alarm clock that wakes you up abruptly, using vibration with increasing intensity to awaken a person smoothly could be one of the solutions. This could also be implemented respectively to a contradicting feature of calming a person down, through a massaging vibrating motion.



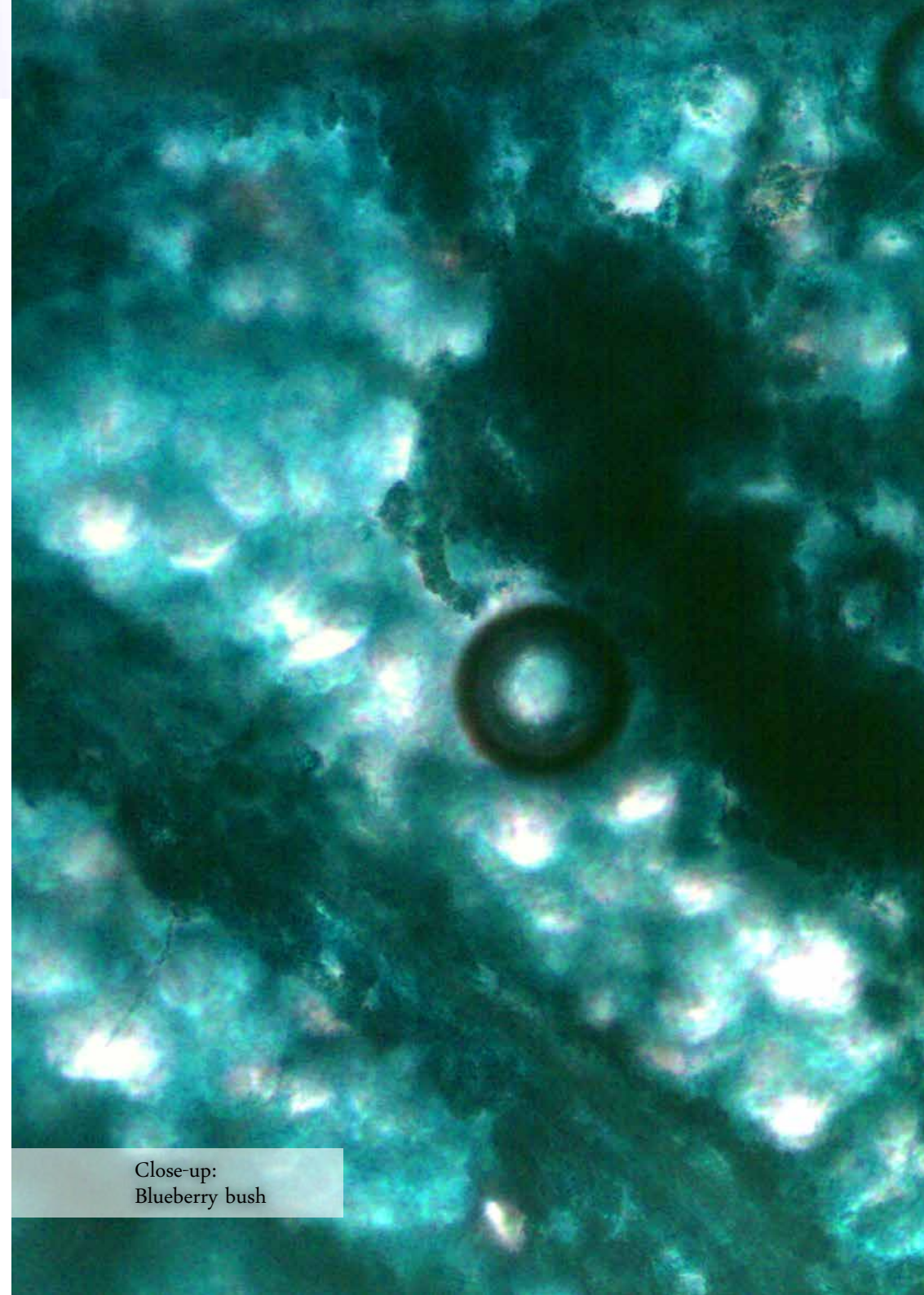
Close-up:  
Birch leaf



## SUGGESTIVE COMMUNICATION PLATFORM

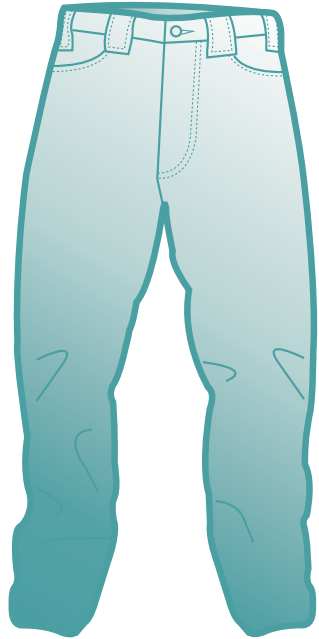


A person, throughout his/her day, is faced with a variety of minor challenges and options. The tasks of deciding what to do or where to go can be assisted through smart communication platforms embedded within the garments. The platforms would have the main task of suggesting appropriate solutions, in the right time. This could be applied for traveling, purchasing food and/or other items, or even provide you with proper guidance on your lifestyle based on your vital signs. Easy accessibility and user-friendliness should be the highlights of a feature of this nature.



Close-up:  
Blueberry bush

**TRANSFORMABLE CLOTHING**  
(CHANGE OF COLOR/PRINT)



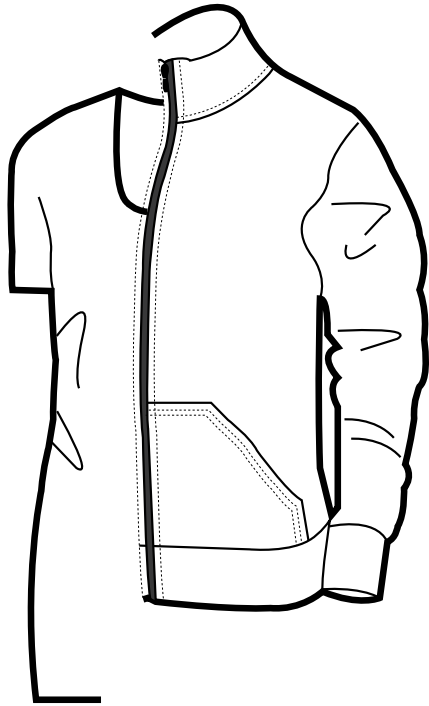
A sense of individual style and fashion is interpreted in so many ways, and is more appreciated, that it makes way for an increased need in the variety of options. Considering the negative environmental implications, transformable clothing with the ability to change color, print and/or pattern would offer the needed variety of styles by using less materials. By creating a business model that allows to retrieve styles within a virtual environment and apply them to the garment, gives space for individual expression in a much more sustainable way.



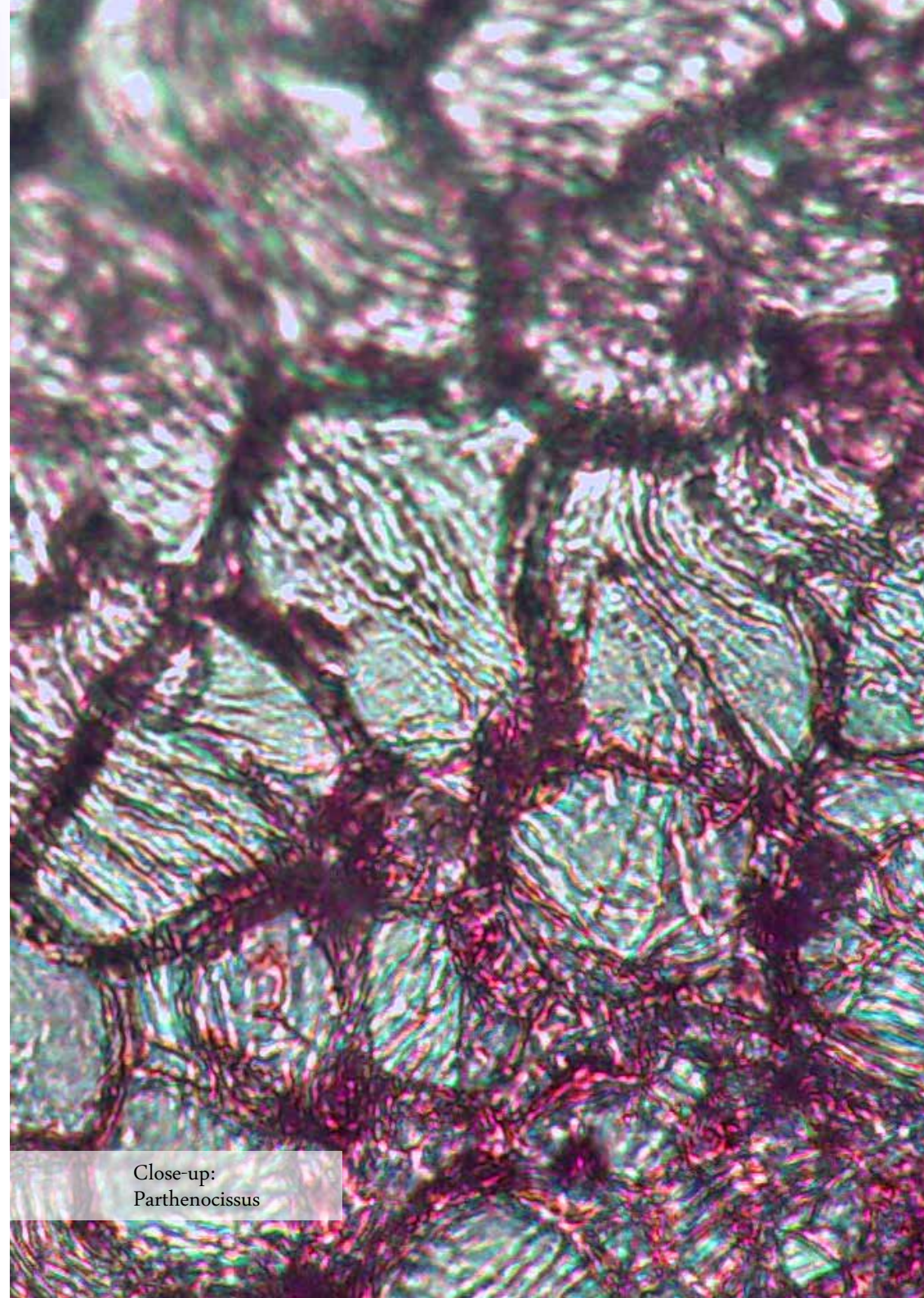
Close-up:  
Red cabbage color



## TRANSFORMABLE CLOTHING (CHANGE OF FUNCTION/SHAPE)



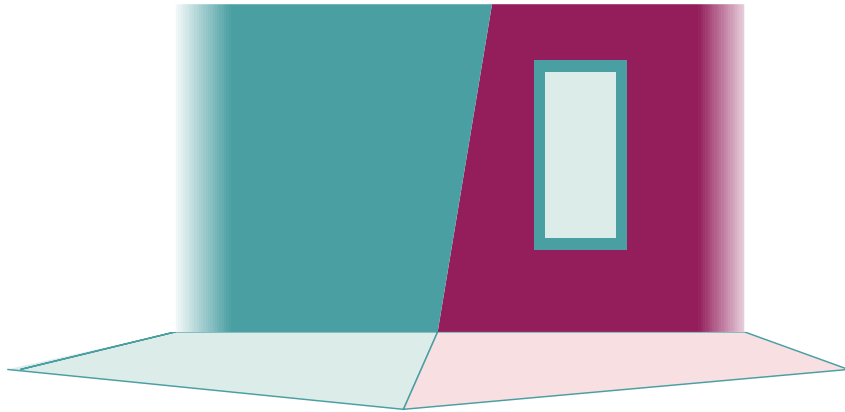
Clothing is worn accordingly to various weather and usage conditions (eg. casual vs. sportswear). Consumers conventionally purchase separate clothing for each needed function, and that behavior is not considered to be as sustainable. One of the possible solutions is seen to be the introduction of a business model in which various functions can be loaded into a single garment after which the necessary behaviors in the garment can be activated or de-activated.



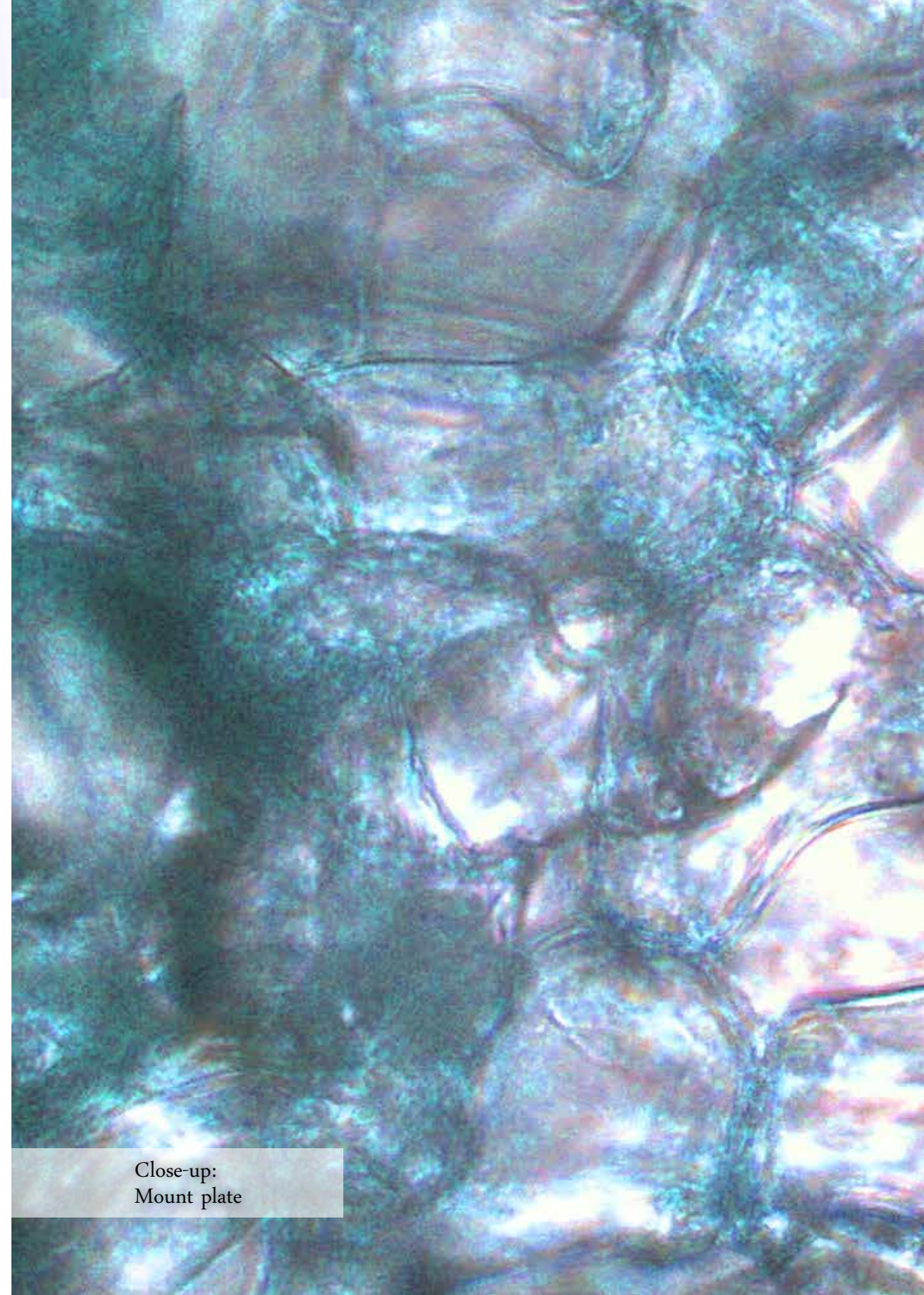
Close-up:  
Parthenocissus



## SPATIAL TRANSFORMATION



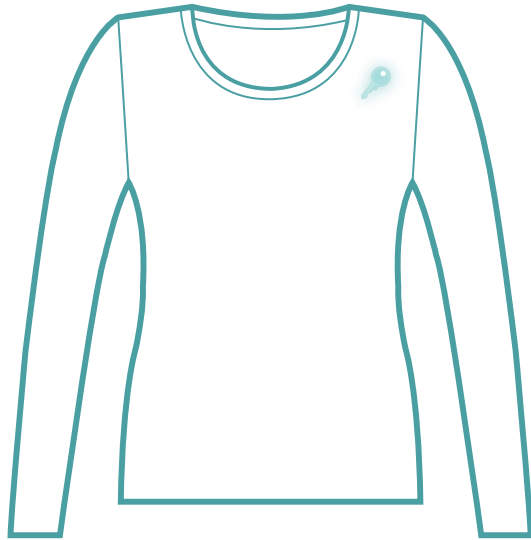
With the increase of urbanization in the future, living spaces especially are becoming very limited. By approaching this issue by providing a solution in which the spaces transform accordingly to the usage, the limited spatial availability can be addressed. A person within a day has various needs in regards to what functions a space is able to offer, but most of the times a surface of some sort is always needed. The surfaces could be the ones that are transformable and abide to these changing needs.



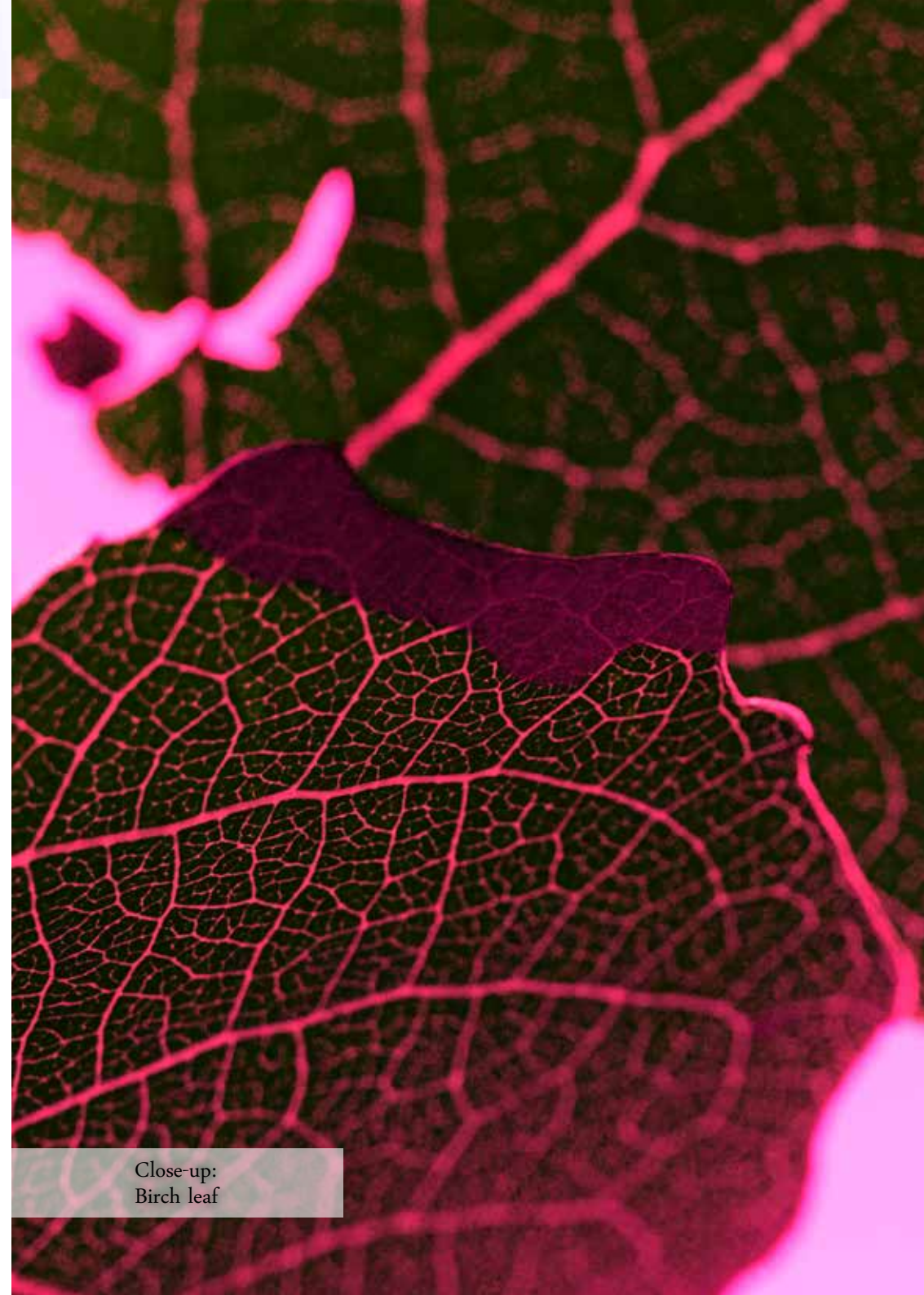
Close-up:  
Mount plate



## ENCODED CLOTHING



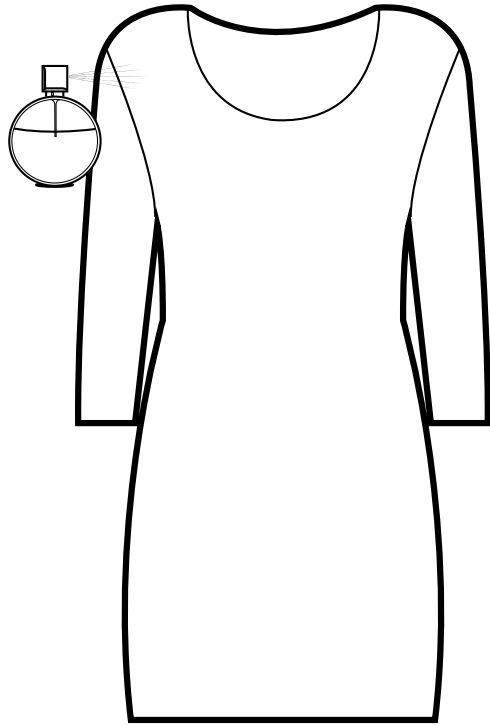
Technologies in encoding are increasing in numbers, yet no clear applications have been found within the textile industry – other than packaging. By introducing a service that replaces physical keys with your own clothing, the discomfort of forgetting or losing your key would not exist anymore. By applying an encoded tag within the molecular structure of a garment's textile, the owner can be recognized thus enhancing security simultaneously.



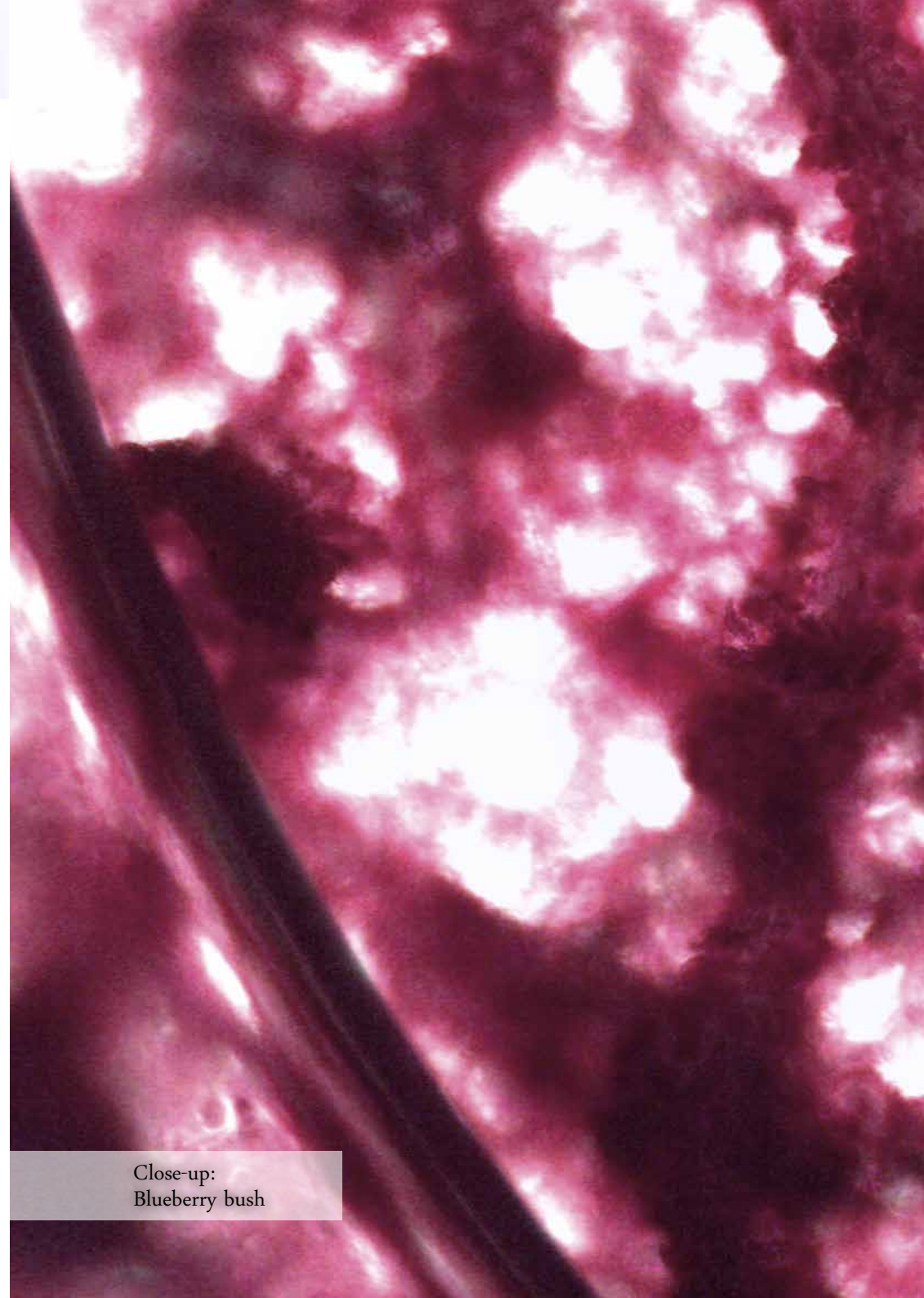
Close-up:  
Birch leaf



## PERFUME-EXTRUDING CLOTHING



The use of perfumes has become an everyday activity, mainly aiming to make a good impression. Additionally, smells also have value for some specific cultures and/or religions. Instead of having to purchase scents separately and consume them, an individual may have them applied directly to a garment which would operate in a way that would extrude a scent repetitively, when needed, to sustain the smell.



Close-up:  
Blueberry bush

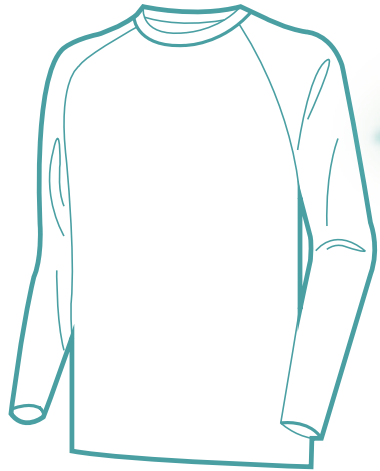
## AIRBAG CLOTHING



The increased usage of public, private and industrial transportation has also increased the risks in which people are induced to while moving between various locations. Fatal accidents occur on an hourly basis, mainly due to human error and lack of proper protection. The introduction of a feature in which clothing stretches open - in a way that resembles an airbag - at time of impact, the fatality rate would decrease substantially when having constant protection.

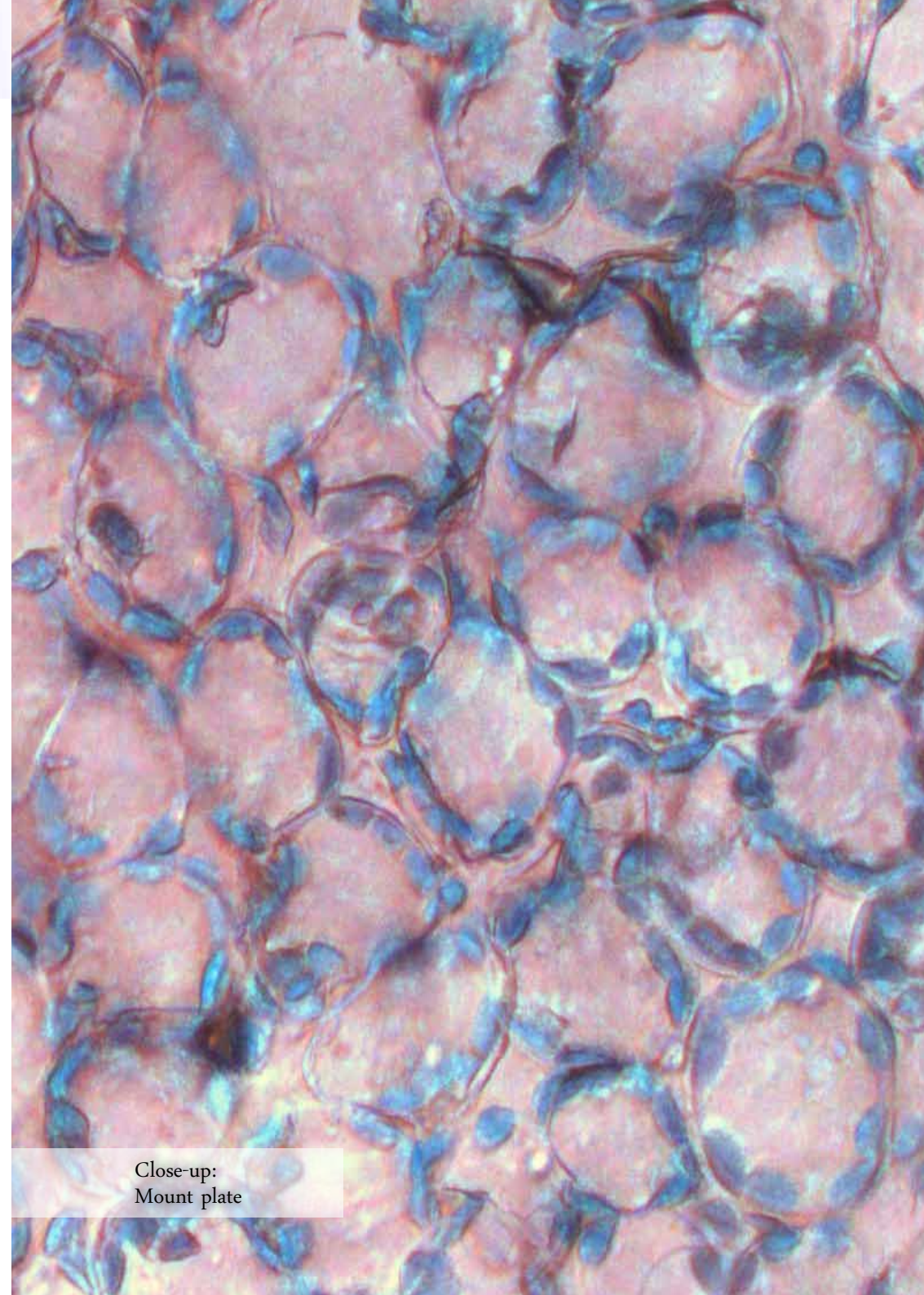


## EXERCISE-ASSISTING CLOTHING



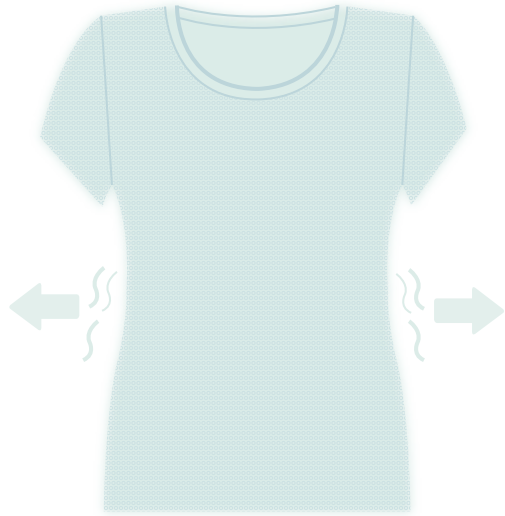
You are running  
too fast! Slow down.

Despite the good intention of active people to stay fit and healthy, many accidents still occur while exercising. Whilst the use of a personal trainer can be of huge help, the risk is still there as the person him/herself is in charge of executing an exercise routine correctly. By applying a feature to the exercise clothing itself which assists a person to exercise correctly, the risks would decrease dramatically. From allowing someone to twist to a certain angle, or blocking him/her from bending into a risky posture can be some of the functionality of these clothes.

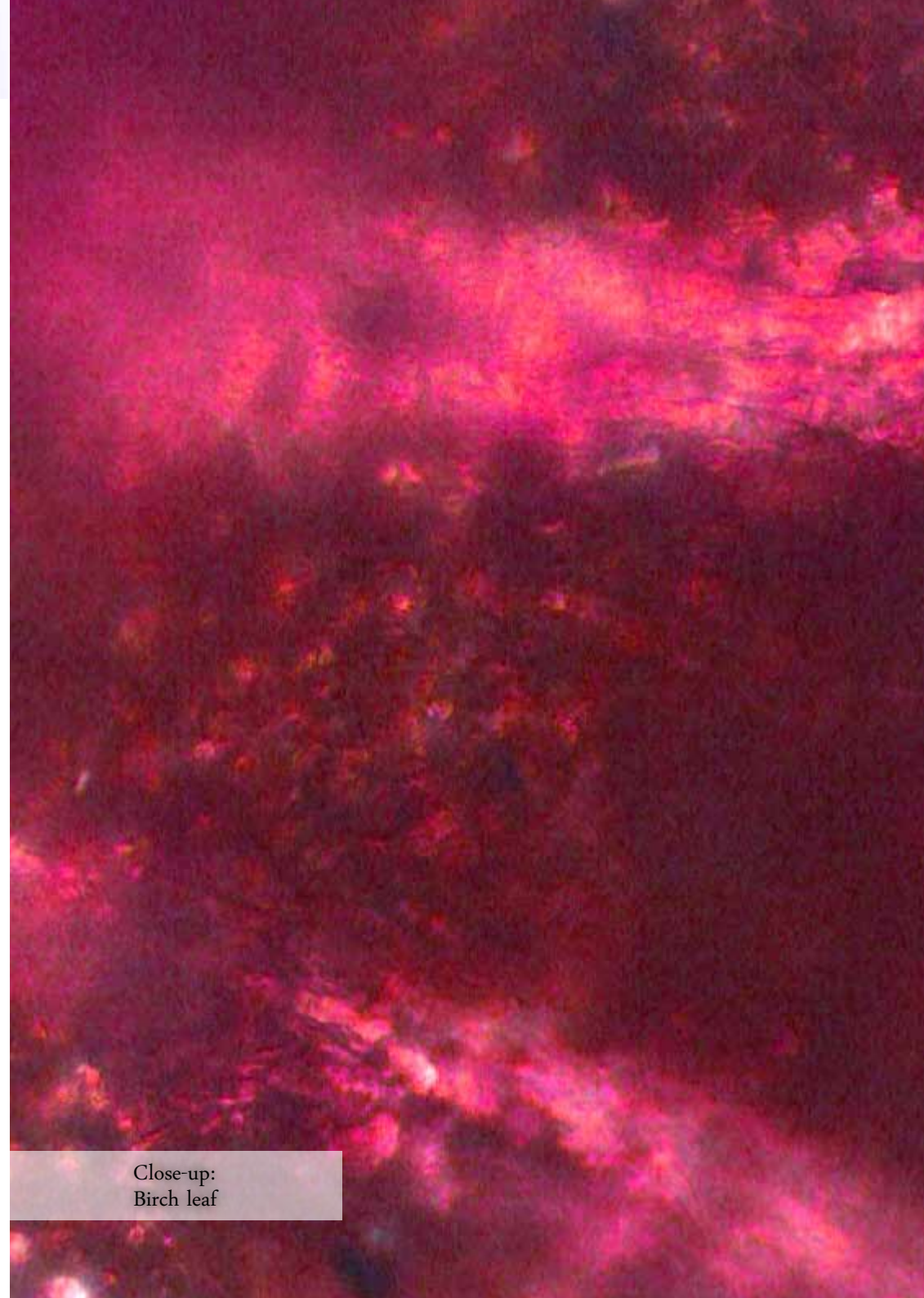


Close-up:  
Mount plate



**SWEAT-RESISTANT CLOTHING**

Whilst there are currently textiles existing that allow for the skin to breathe better, the discomforting scent of sweat still remains. The next revolution in clothing of such functionality is the introduction of clothes that are fully sweat-resistant. No traits of sweat would remain attached onto the skin, nor would the lousy smell of it be an annoyance anymore. Although sportswear already exist with similar functionality, it seems relevant to have this function in other clothing formats, that do not have this feature as of yet.



Close-up:  
Birch leaf

## LIVING DISPLAY



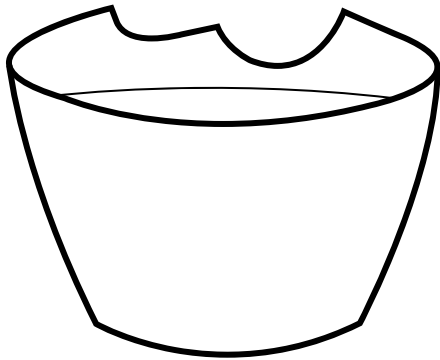
With the constant impressive developments in technology, living displays will soon be a thing of the present. The gradual replacement of walls and other stale surfaces to interactive surfaces would allow a person to modify his/her space in more fascinating ways. A valid application for such technology would be the customization of a living/working space by changing what is displayed in all three dimensions. This would lower the need of having to purchase separate decoration, and changeability can occur more often within a space in a refreshing way.



Close-up:  
Water



## EDIBLE PACKAGE



Paper, board and plastics total for 59% of waste in Europe, according to Eurostat. These materials, being the main components for packaging do give good enough reason to urgently approach the issue of packaging and come up with more sustainable solutions. The ability to eat the packaging itself would reduce the amount of waste immensely, and some nutrients could also be applied to the edible packages. The only criteria being set here is that external packaging (the layering that protects consumables during transportation) should still remain as waste due to the high risks attained in that. Inner layerings of packaging waste, though, could be edible.

## Reference:

(1) Eurostat. Packaging waste statistics. European Commission. 2013. Available in www-format: [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Packaging\\_waste\\_statistics](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Packaging_waste_statistics)



Close-up:  
Maple




## SHOWER GARMENT



A person perspires on a daily basis, and the amount of water lost while sweating varies from 0,7 L to 2,5 L within a day, and up to 1 L alone per hour of exercise. With so much liquid matter wasted throughout the period of 24 hours, the clothing that a person tends to wear for extended periods of time within a day can have the ability to absorb the water from the perspiration glands and filtrate it so that it would be suitable for washing. Appropriate quantities of liquid - in order not to make the garment too heavy - would be stored appropriately within the clothing, and used when needed.

## References:

- (1) Drymax. Sweating and the Body's Evaporative Cooling Process. Drymax Sports. 2012. Available in www-format: <http://www.drymaxsocks.com/sweatandcooling.php>
- (2) Bernhardt, G. Cracking the Code on Sweat Rates. The Active Network Inc. 2013. Available in www-format: <http://beta.active.com/nutrition/articles/cracking-the-code-on-sweat-rates>

A close-up photograph of a tree trunk, showing the rough, textured bark. The image is oriented vertically and occupies the right half of the page.

Close-up:  
Tree trunk

**HYDRO-REPELLANT CLOTHING**

One of the many minor annoyances regarding the weather is how wet you can actually get during rainy seasons. A solution for that would be the introduction of hydrorepellance within the clothing itself, where liquids do not stick on the surface at all and constantly remain dry. Additionally, this feature would be available in a variety of clothing formats (eg. satin silk dress, casual t-shirt, etc.), in which you can activate and deactivate the function when needed.

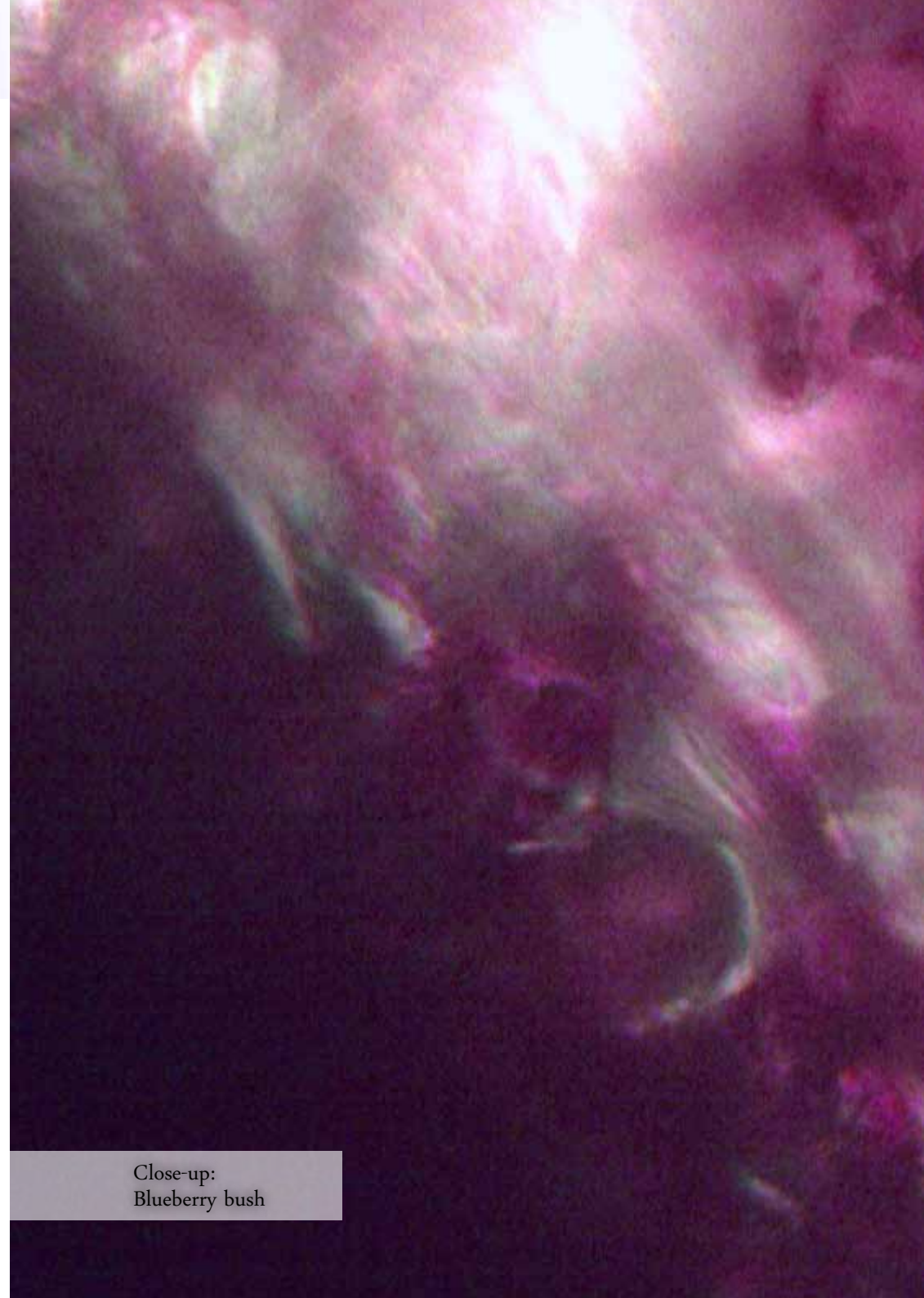
Close-up:  
Acid and Base solution



## ILLUMINATED CLOTHING

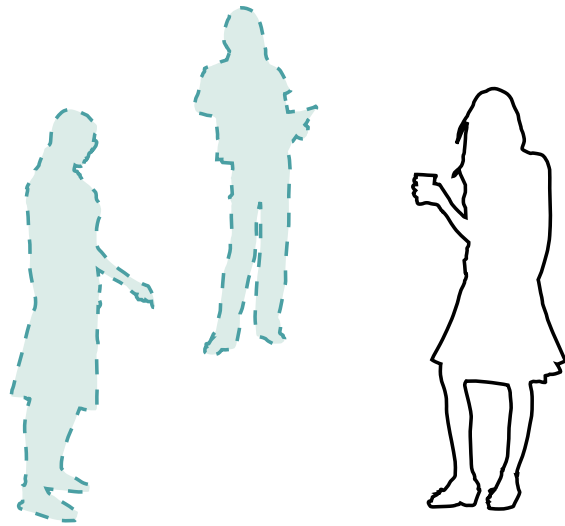


Light has become a human necessity and a thing we take for granted. Its applications are numerous, and yet there are still moments when lighting is not available when most needed. Flashlights may provide some lighting, but that is also very limited. Illuminating your clothing on the other hand, though, could provide you with enough light whenever needed. The user would be able to adjust the intensity of the light, and the needed energy would be retrieved from the motion of the person him/herself. The applications for illuminated clothing are numerous, and could vary from personal lighting to various professional and industrial uses.



Close-up:  
Blueberry bush

## SOCIAL SIMULATION



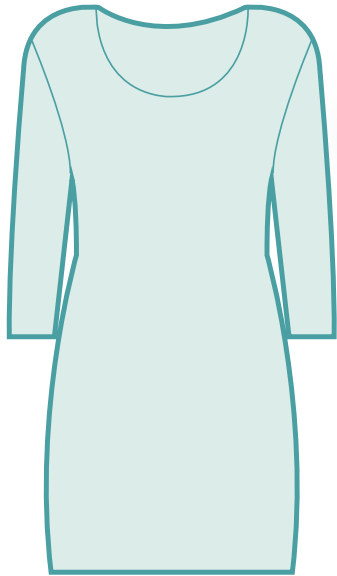
The next level of social media, could be a simulation of social circumstances with people of your network(s) despite their physical location. With the development of technologies around three-dimensional simulations, the next generation of virtual communication may occur through the uses of simulations. With such functionality, relatives and friends from all around the world could all gather in your own physical space without actually being there.



Close-up:  
Blueberry leaves



## AFTER-PARTY RECOVERY CLOTHING



You have 0,2 BAC of alcohol in your bloodflow. Hydration sequence initiated!

Sometimes during celebrations the going might get rough. The consumption of alcohol and need for physical agility even at times (standing for many hours, dancing, etc.) can exhaust a person quite a lot, with veisalgia (otherwise known as a hangover) being a common symptom. These symptoms mostly occur because of the lack of action from the person him/herself. The clothing may act, in those cases, as a reparatory platform by providing, or absorbing, necessary amounts of water from the body to ensure the well-being of the person. Clothing should not only help us look good when going out, but also feel good after the party is over.



## THE VISION

The aforementioned applications are only part of a wider vision that CHEMARTS 2013, and consequently AEREA, has resulted into. With many infrastructural changes happening within the Finnish forest industry and even the institution of Aalto University, the opportunities for new initiatives are immense and to be taken advantage of. Within the next pages, you are invited to become a visionary for what could happen in the near future.



## WHAT IS AEREA?

In an attempt to revolutionize an industry in Finland that works somewhat in conventional ways, AEREA was established through the CHEMARTS 2013 summer project. Despite the major developments going on behind the doors of laboratories and other facilities, the awareness towards the public on what is actually going on in the cellulose material industry is limited mostly to toilet paper and bad smells, based on a public gallup that was conducted. Cellulose is faceless, both on a national and international level, and that is where AEREA comes in as a brand for luxurious products that are foreseen to be available in future markets.

Cellulose is used in a plethora of consumables, which is proof of how many applications it can actually serve. The immense technicality, though, pertained by the processing of cellulose has not provided the foundations needed for the industry to be attractive. The low profile that is kept in public on cellulose, has forced the material to succumb to other branding giants in a way that it would not interest a consumer. The same, of course, applies for many raw materials used in consumables.

With a forest industry that thrives in the available resources of Finnish forests, and hence the availability of cellulose, the need for innovations and awareness is evident at such difficult financial times. Factories have been shut down, personnel has been fired, and sales have dropped. A need for a strong brand is apparent.

The AEREA brand brings forward the values of sustainability and Finnishness to a new level. The Finnish forests are sustainable already as they are due to heavy legislation aiming to ensure the availability of a green scenery for the generations to come. Finnishness is related to the beauty of the lakes, the forests and the calmness of a culture located far in the North, resulting into an identity that is not seen elsewhere. The combination of these values are applied on a brand - the AEREA brand - that fully supports a bio-mass based lifestyle.



AEREA

Open accessibility, involvement of the public and a stronger collaboration between the scientific and artistic communities are key attributes for the establishment of AEREA. A physical space is needed to pragmatize these bonds, where interactions take place in various formats. The AEREA Forum attends to these needs.

The AEREA Forum is an inseparable part of the brand, as it is the space where the administration takes place. This space is meant for the public, where people can come and enjoy a cup of coffee or a proper meal, made with organic ingredients of an internal urban garden. The scientific community receives more attention through a concept similar to a showroom, where results of research made are displayed in a fascinating way to initiate a discussion between visitors. All the developments in cellulose, and specifically within the disciplines dealing with the possibilities of nanotechnology, no longer need to be hidden behind closed doors of laboratories. The AEREA Forum becomes a channel for people who wish to explore what their own natural resources can provide, along with a peek to the future of various consumables.

### 2015: OTANIEMI

In 2015, Aalto University is due to open its doors to a new campus site intended for the School of Arts, Design and Architecture in the Otaniemi region of the City of Espoo. Otaniemi has already a strong scientific network, and the opportunities that would arise with the appearance of the creative fields are vast.

Naturally, the AEREA network of Forums could first be established within the new campus. The physical presence of engineers, scientists and designers in the same area can give space to great product revolutions made with cellulose in the future.

The extensive available know-how, as well as the willingness of the Finnish forest industry to evolve, could make Otaniemi as one of the hubs that would spark start-ups and innovations for a sustainable future, both financially and environmentally. Within this establishment AEREA Forum could work naturally as a link.

The exposure of scientific development, the involvement of the public, as well as an open sales channel are some of the many benefits that the Forum could provide for both sides of the

# AEREA FORUM

spectrum between the forest industry, the innovators and the consumers. When AEREA becomes a stronger brand, the collaborations between various stakeholders are ensured and the awareness reaches to international levels, it is safe then to speculate on the initiation of an international network of Forums. The network would assist in making the brand stronger at an international level and would uphold the discussion for new nuances to appear within the innovation range of cellulose as a material. AEREA aims to make people talk, and Finland is only the beginning.

Next page:  
Visual of spatial concept for the AEREA Forum in Otaniemi. The space would include cafe/restaurant services, a showroom for scientific developments and other services for consumers. Interiors and offerings would abide by the values of AEREA as a brand.



# AEREA FORUM



## CONCLUSION

Our society is undergoing a major shift that involves changes in academic infrastructure and project-based teaching, as well as an increasing need for the 'next big thing'. The effects of the financial crisis are still evident, but a slow growth is noticeable in some regions (Eurostat, 2013). In order to gain up, new innovations and approaches are needed to escape the old-fashioned and established ways of operating in various industries.

The forest industry is one of the oldest ones in Finland, which has undergone many changes and has been a platform for ground-breaking innovations in the past. In an attempt to sustain itself, the value of design thinking has slowly received more exposure within the cycles of the industry. So far, design was traditionally considered only as the discipline for aesthetics and form-giving. The suggestion to establish a global brand - AEREA - is one of the evident results where the disciplines from wood technologies and design have been combined to create a vision that deals with various instances between the gamut of macro- and nanoscales.

A vital part of the plan is the new Otaniemi campus to be built in

2015 for the new School of ARTS of Aalto University. The availability of a physical space to act as a platform (AEREA Forum) that connects consumers, the research and development scene and the creative community is essential to create the awareness needed for activities that otherwise are left unnoticed. This link would give space for start-ups to appear, where the Otaniemi campuses could act as hubs - in a similar way as today. Simultaneously, the existing international networks of dominant companies and organizations could be utilized in order to establish an international network of Forums. Through this activity, the attention received would create a pathway for collaborations to take place with fashion houses and other producers of various consumables.

Our world is slowly becoming, indeed, a world of cellulose where AEREA will bring forward the solutions people need and revolutionize the vigorous forest industry of Finland.

Reference:

(1) Eurostat. Real GDP Growth-Rate Volume. European Commission. 2013.



1<sup>st</sup> phase  
2015

- Otaniemi new campus, first AEREA FORUM is located there
- Awareness raised through virtual channels and social media

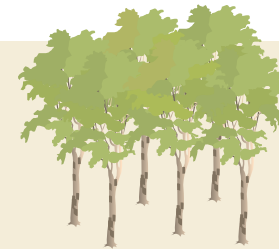
- "Sixta fiber" available in bigger quantities/first products to be made
- Start-up scene around forest cluster supported by the forest industry
- Cross-professional R&D projects within the forest cluster



2<sup>nd</sup> phase  
2020s'

- Collaborations with fashion houses
- More Forums established in Finland
- Forest industry companies reaching breakthroughs in new working models, embedding design thinking

- Big scale projects already being realized using co-operation in national and international levels
- Viscose/non-woven industry reborn in Finland with advanced technology and know-how
- Mass production of advanced and sustainable cellulose-based fibers



3<sup>rd</sup> phase  
2030s'

- Advanced technologies used for textile/yarn manipulation
- New materials (other than textiles) are emerging in the market
- The Finnish forest industry is thriving

- Collaborations with other producers in other material technologies
- International forum network utilizing existing networks of collaborators
- New cellulose-based materials are on the verge of getting developed





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