
CHEMARTS
SUMMER SCHOOL 2017

CHEMARTS

CHEMARTS is a long-term collaboration between two Aalto University schools, The School of Chemical Engineering (CHEM) and The School of Arts, Design and Architecture (ARTS). The schools merged their forces 2011 with the aim to invest new ways to harness wood and cellulose. The idea is to research the performance and design of advanced cellulosic materials for innovative uses. The main objective in to inspire students and researchers to explore biomaterials together ond create new concepts for the future use of cellulose and other biomaterials.

CHEMARTS consists of various actions, such as multidisciplinary study courses, minor studies starting 2016 and externally funded research projects.

SUMMER SCHOOL 2017

PHOTOS	Eeva Suorlahti	Cover, 4-36, 38-67
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	Kaisa Syrjänen	55 upper photo
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PRINT Copy-Set Oy

LAYOUT Eveliina Juuri

SUMMER SCHOOL 2017

CHEMARTS summer project for Aalto University students has been organized since 2012. This year the overall theme was 'Plants'. The main objective was to familiarise students with the basic and applied materials research and the concepts of biomimicry and syntechic biology.

CHEMARTS 2017 participants: Manuel Arias Barrantes, Lumi Barron, Lotfi El Salah, Iines Jakovlev, Martha Jessen, Eveliina Juuri, Sanna-Liisa Järvelä, Anna Kokki, Päivi Lehtinen, Fanni Lyytikäinen, Lumi Maunuvaara, Sara Lucia Rueda Mejia, Petra Nokelainen, Mariana Núñez Sánchez, Anna Semi, Mengmeng Sui, Annukka Timonen.

Tutors: Andreas Lindberg, Nina Riutta, Tapani Vuorinen, Pirjo Kääriäinen, Anastasia Ivanova and Jinze Dou.

INSPIRED BY ECO LUXURY

Iines Jakovlev
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This jewelry is carefully handcrafted from natural materials designed to be environmentally sustainable. They are lightweight and feel comfortable on the skin; they offer a new option for jewelry with natural luxury.

Materials: Cellulose acetate (from wood), starch, flower petals, blueberry powder, plants, saw dust, silver and gold.

NATURAL FANTASY - EXPLORING BIOMATERIALS WITH CHILDREN

Sara Lucia Rueda Mejia
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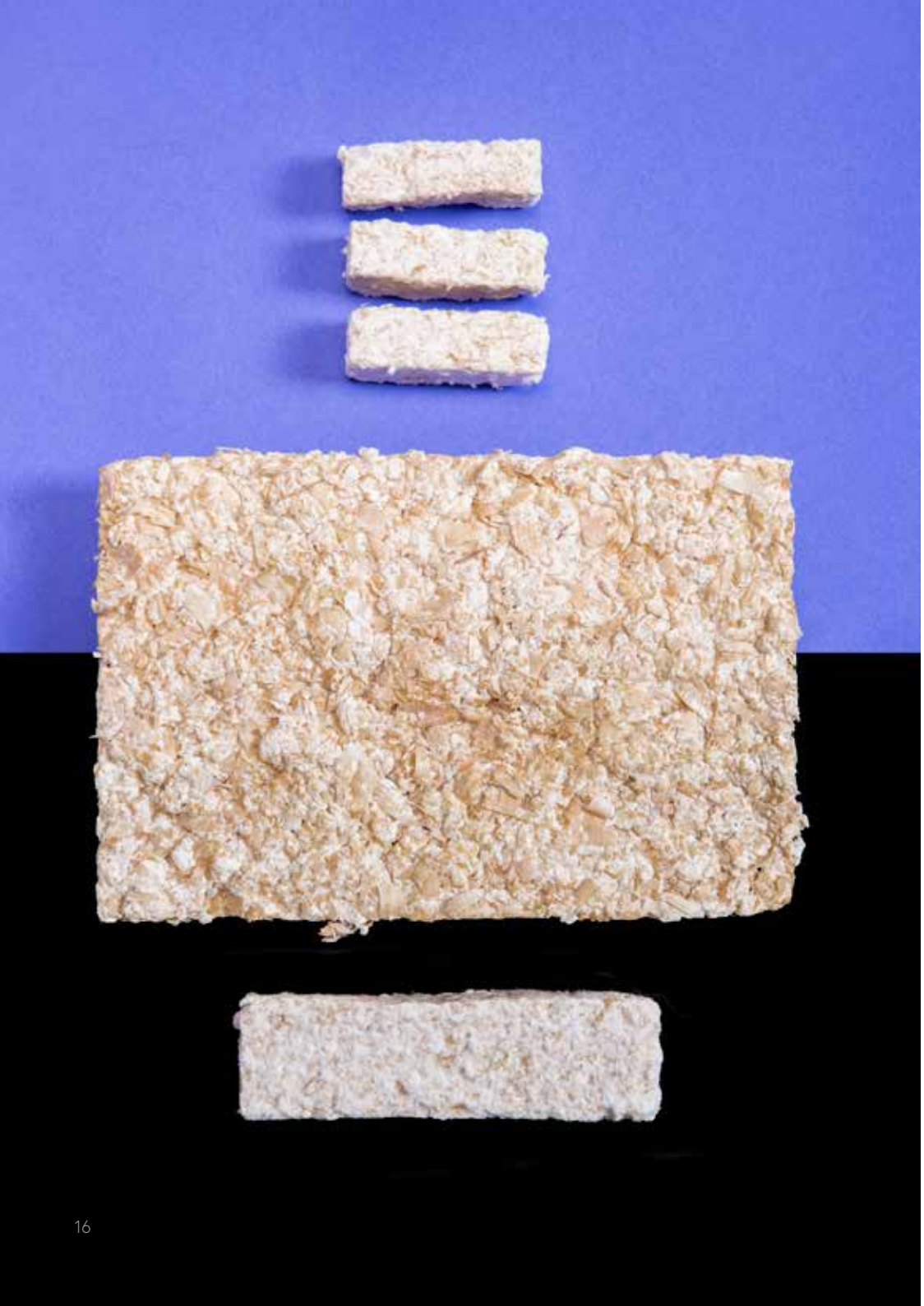
Natural Fantasy is a service that aims to create experiences for kids to increase their awareness of materials in our daily life. It allows children to get inspired by local biomaterials and enhances their imagination for material experiments and supports their creativity. The process is based on a workshop where kids and their families explore different biomaterials, and make a design for their own bio-compost container. These samples are examples of various material combinations and a prototype for the bio-compost container.

Materials: Natural colors like turmeric, beetroot, red pepper and peas. Recycled coffee grounds and chai tea leaves. Carboxymethyl cellulose (CMC) and recycled paper.



CELLULOSE BRICKS

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Cellulose bricks are made out of wood industry's waste materials. My project idea was to explore new kinds of building materials that could be used in architecture. These samples are created for space dividers, but with further development these cellulose bricks could be used in the future as actual bricks in buildings.

Materials: Cellulose pulp and saw dust.

EARTH TO EARTH

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Earth is an abundant material; it can be found everywhere. It is also one of the planet's most ancient construction materials. Nanocellulose, a wood-based substance, can be used to bind it together. These samples seek to explore the potential of this biodegradable and compostable composite material in product design

Materials: Soil and nanocellulose.

NANOCELLULOSE AND SELF-ASSEMBLY IN DESIGN

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Self-Assembly: A process in which a system of pre-existing components form an organized structure or pattern as a consequence of specific, local interactions among the components themselves (Wikipedia).

This project explores whether the shrinking and curling caused by water evaporation from a nanocellulose substance, could have potential for application in this self-assembly context. Essentially asking; could I create a two-dimensional design, that through the process of drying, would shrink and curl itself into a pre-decided, specific three-dimensional shape. These samples exemplify different degrees of curl based on application thickness, contents and ratios of the mixture itself, structure of the directing material (paper-thin plywood sheet, foil), as well as heat distribution during the water evaporation process.

Materials: Nanocellulose, sawdust, plywood sheets, and aluminium foil.

ALL-CELLULOSE NONWOVEN GARMENT

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Our project idea was to experiment fast and sustainable production process for throwaway garments, to serve for example the needs of fast fashion industry. If we can't change the unsustainable fast fashion system quickly enough, could we replace the existing materials with biodegradable ones? As a result of material experiments, we created an idea for 100% zero waste garment. It is produced by new foam forming technology from pine pulp and viscose fibers, dyed with reactive dyes or printed with pigments mixed with nanocellulose paste.

Cellulose buttons were made in collaboration with Iines Jakovlev. Our project was supported by VTT.

Materials: Pine pulp, viscose fibres and sodium dodecyl sulfate (SDS).

AURORA - NATURAL SUNSCREEN WITH SPRUCE BARK EXTRACT

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Our team wanted to create a natural alternative for skin UV protection by using spruce bark which is known to have antibacterial and UV protective properties. We tested several recipes to achieve a pleasant texture and consistency. The spruce bark extract was added to the mixture and the UV property of the cream was tested with sun sensitive paper, also used in cyanotype photo-making. This test showed that the UV property stayed in the mixture. Aurora sunscreen contains only natural ingredients and it can be either fragrance free or with a fragrance contained in spruce essential oil, extracted from oleoresin.

Materials: Spruce bark extract. Natural oils: coconut oil (organic), jojoba oil (organic), camellia oil and olive squalane. Aloe vera extract, plant-based e-wax (emulsifier), green tea extract and water.


Aurora
Aurora
Aurora


Aurora
natural sunscreen
with spruce extract
SPF 30

KAARNI - BIODEGRADABLE PLATE MADE OUT OF WILLOW BARK

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https://spark.adobe.com/page/LjAymOeeXDNJF/

Kaarni with its creative design and 100% natural material is a new option for disposable dish. It has been designed especially for finger food at cocktail parties. The plate is water-resistant, easily compostable and offers a Finnish alternative for party catering. Kaarni is produced out of willow bark fibres. The dark brown color is natural.

Materials: Willow bark fibres and beeswax.

KAARNI - BIODEGRADABLE PLATE MADE OUT OF WILLOW BARK

CHUNCHES - COMPOSTABLE SURPRISE BALLS

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Chunches is a project based on a Native American tradition, where people used to tell their life stories with a ball made of grass, thread, branches, etc. The first layer represented the birth and as important events passed, more layers were added. It ended up being a very personal and valuable ball.

Nowadays in Mexico a Chunche is a surprise ball made with throwaway crepe paper and filled with toys. The aim of my experimental project was to replace the current wrapping material with more sustainable one. I made prototypes for compostable shells, each created with different components. The idea is that after breaking the shell and finding the surprise, you can plant the shell, water it and flowers will grow from the seeds hidden in the material.

Material: Birch pulp, pine pulp, high viscosity carboxymethyl cellulose (CMC), seeds, small plants and food colorant.


PICTURE
BOOK

COMMON REED COMPOSITES

Päivi Lehtinen
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The concept of common reed composite panels is simple: saving the globe while producing food for the soul and new options for furniture design. The idea is to make beautiful composites out of plant based waste materials for nomad life style.

The panels are strong and lightweight, sustainable and biodegradable and can be used in various furniture design objects: as doors, room dividers, tabletops, lighting etc. The use of energy and chemicals is minimized in the production. The composites are formed from common reed stem parts and glued together to panels with cellulose pulp. A single stem is fragile and brittle, but together they become strong, and so should we as humans act in taking steps towards a more sustainable world.

Materials: Common reed and cellulose pulp.

CULTIVATING THE ERROR

Martha Jessen
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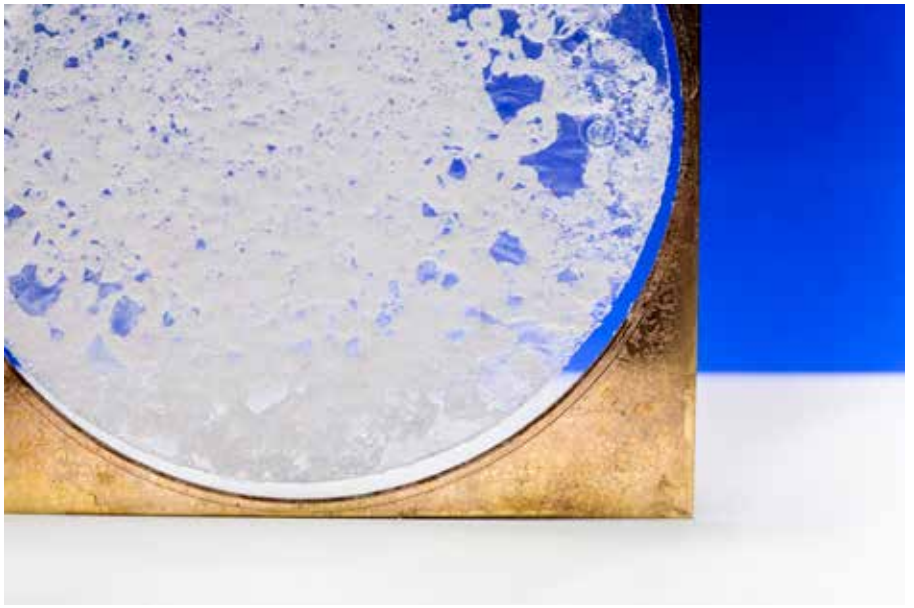
During experimenting within the phase where dissolved cellulose acetate sets into solid form, I encountered a possibility to trigger a reactive process. Caused by exposing the solution to a massive influence of heat, the material expands rapidly and takes on a fibrous structure with raw aesthetics and a surprisingly white hue. What was initially a consequence of a slight misunderstanding of controlled testing, led to intentionally provoking the protocol of the process allowing the material to deviate from the clear film it forms when the transition is left uninterrupted.

Material: Cellulose acetate



HAVU COSMETICS FROM THE FINNISH NATURE

Lumi Maunuvaara
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In this project I wanted to combine branding and design and at the same time learn the basics of cosmetic chemistry. My inspirations come from the Finnish nature, wood and minimalism. The ingredients of the Havu cosmetics are completely natural and the products could be certified as natural cosmetic products. The package prototypes are produced from Finnish birch and they are handmade by Amanda McPartlin.

Materials: Natural ingredients

COLORING NANOCELLULOSE AND SAWDUST

Annukka Timonen
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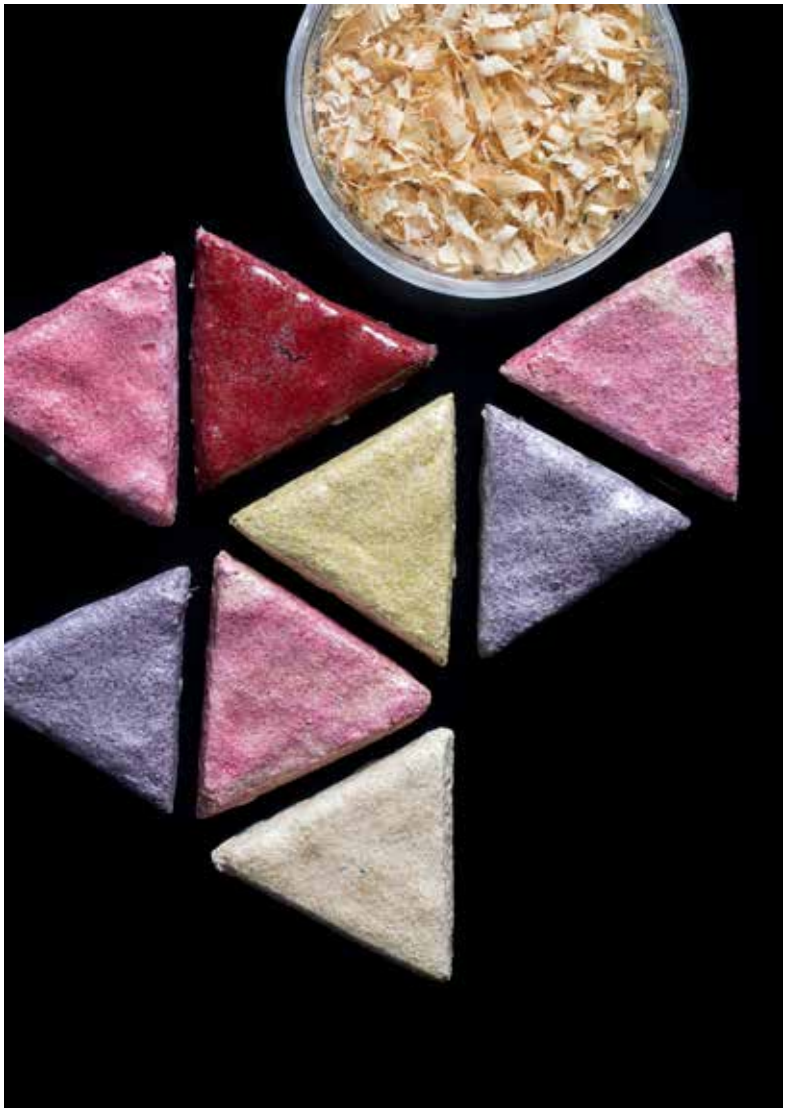
I tested how nanocellulose mixed with sawdust could be colored with natural colors and food coloring. In these samples I have used sawdust from four different trees: maple, birch, larch and rowan. My hypothesis was that all of these wood species would behave differently when colored with natural colors.

Materials: Nanocellulose, sawdust, natural colors.



FUN-GI

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This project is an exploration to mycelium using different types of fungi mixed with other natural agents like bacterial cellulose, nanocellulose and wood. The result, new kind of fungal materials and pigments with different properties, could serve as a sustainable alternative for the creation of accessories or household objects in the future. The project was made possible by the close collaboration with VTT.

Materials: Mycelium, bacterial cellulose and nanocellulose.

VTT
TECHNICAL RESEARCH CENTRE OF FINLAND LTD

WOODEN CERAMICS

Nina Riutta
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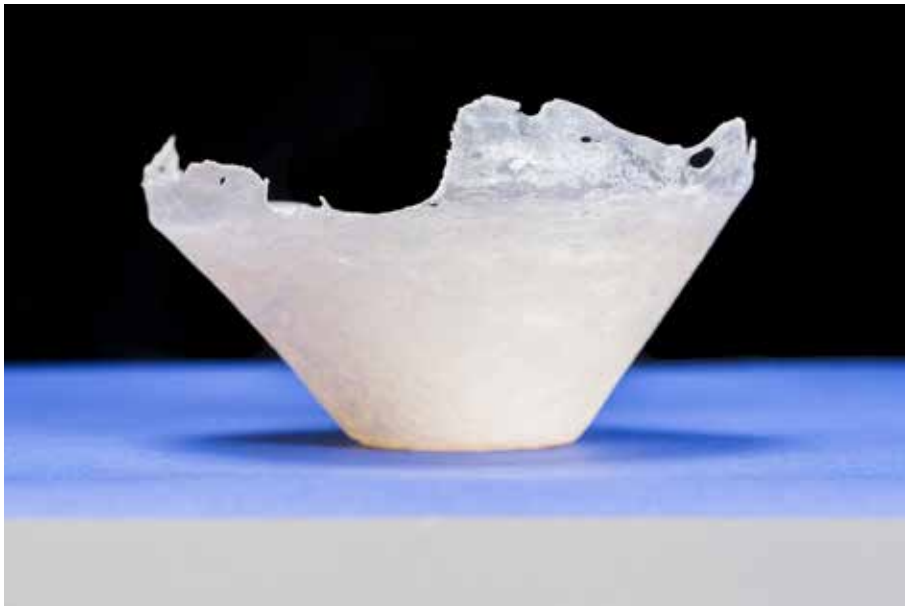
Wooden ceramics is an experimental design project on how traditional ceramic techniques can be applied within a new material field. It started as a personal project with series of material behavior tests. The material research gave insight on how 3D shapes could be formed by using form-forming methods used traditionally in ceramics. The exhibition pieces are made out of 100 % wood based material called tempo-oxidized nanocellulose.

Material: Tempo-oxidized nanocellulose



HABITARE 2017

Aalto University CHEMARTS project combines biomaterial research and creative design. The main objective is to inspire students and researchers to explore and create new concepts for the future use of cellulose and other biomaterials.

Throughout the summer 2017, the CHEMARTS students worked with a variety of biomaterials, ranging from willow and spruce bark to soil, common reed, nanocellulose and cellulose acetate. Based on their material explorations, the students developed several concept ideas and prototypes for more sustainable material world. All the CHEMARTS Summer School works were on display in Habitare 2017 interior, design and furniture fair.

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