MATERIABILITY
educating smart materials

Dr. Sc. ETH Zurich Manuel Kretzer

Visiting Professor Material and Technology
Dessau Departement of Design
Anhalt University of Applied Arts

Founder
materiability
www.materiability.com

Partner
responsive design studio, Cologne
www.responsivedesign.de

info@materiability.com

ADAPTIVE MATERIALS

color and optically changing

electrooptic

thermotropic

thermochromic

photochromic

electrochromic

photoadhesive

adhesion changing

titanium dioxide

piezoelectric

shape memory **alloys**

magnetostrictive

photostrictive

shape changing materials

ionic polymer gels

electroactive polymers

thermostrictive

thermobimetals

dielectric eap

conductive polymers

chemostrictive

thick film electro luminescence

electroluminescent

light emitting

light emitting diodes

phosphorescent

organic light emitting diodes

photoluminescent

fluorescent

matter exchanging

mineral ad-/ absorbents

gas/ water storing

absorbent polymers

energy exchanging

heat storing

phase change materials

chemoelectric

piezoelectric

thermoelectric

electricity generating

photoelectric

thin film solar cells

silicon solar cells

dye solar cells

organic solar cells

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Hylozoic Ground, Venice Bienale
Philip Beesley Architect Inc., 2010

PROBLEMS

. technological immaturity

. limited range of application

. architectural inadequacy due to constraints in size or durability

Organs on Chips
Harvard University, Wyss Institute, 2012

PROBLEMS

. scientific mystification

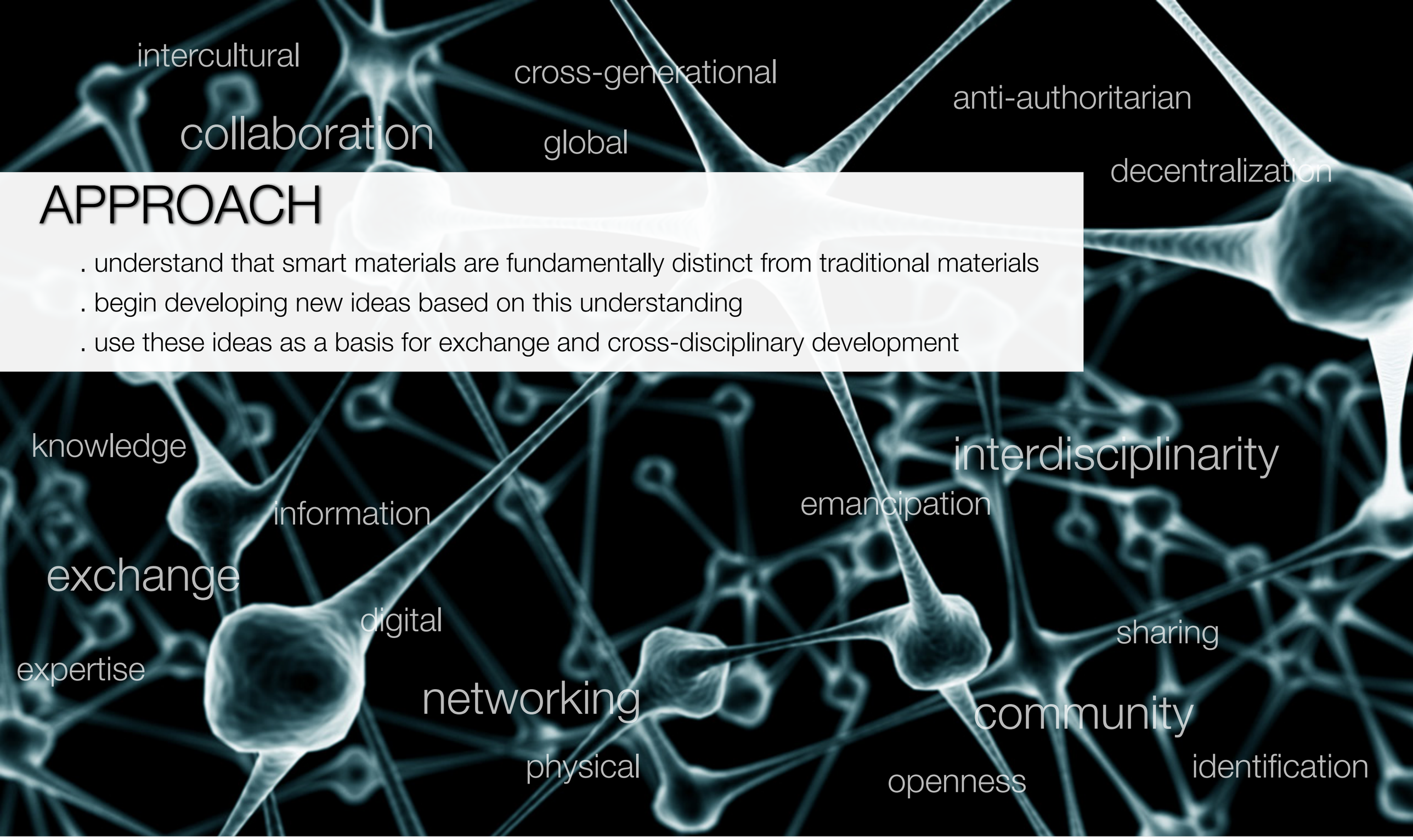
. commercial (un)availability

Laboratory
Mettler Toledo AG, 2012

PROBLEMS

. lack of ideological distinction
. replacement of existing technologies
. forced conjunction with rigid materials
. standardization and inclusion in established catalogues

Material Library
Material ConneXion, New York, 2010



APPROACH

. understand that smart materials are fundamentally distinct from traditional materials
. begin developing new ideas based on this understanding
. use these ideas as a basis for exchange and cross-disciplinary development

EDUCATING EMERGING MATERIALS

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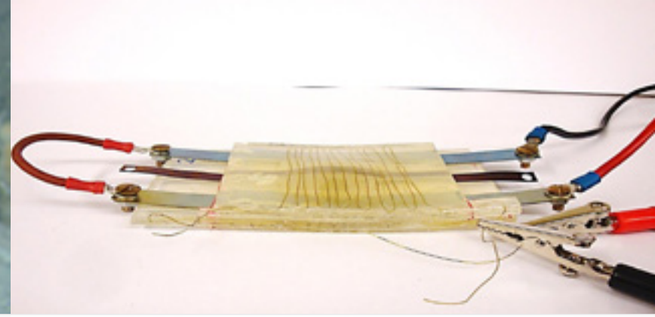
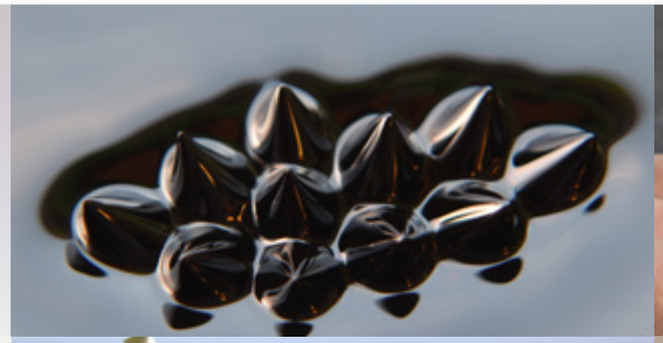
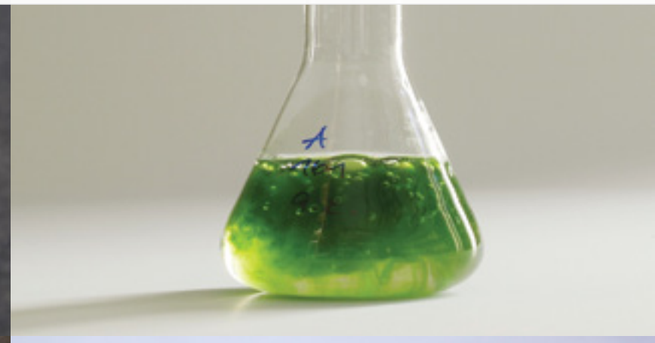
Selection of Educational Workshops
2010 - 2016



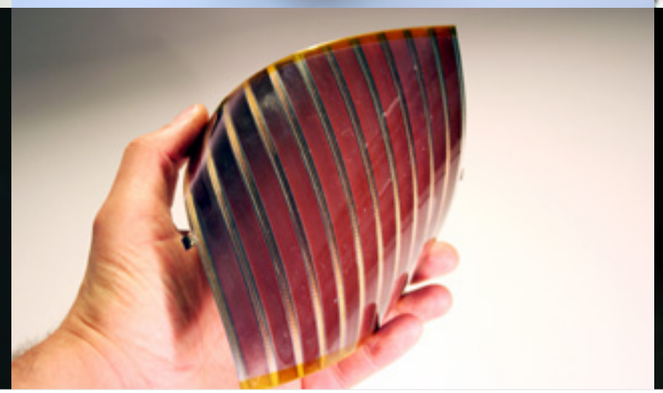
SELECTION OF MATERIALS

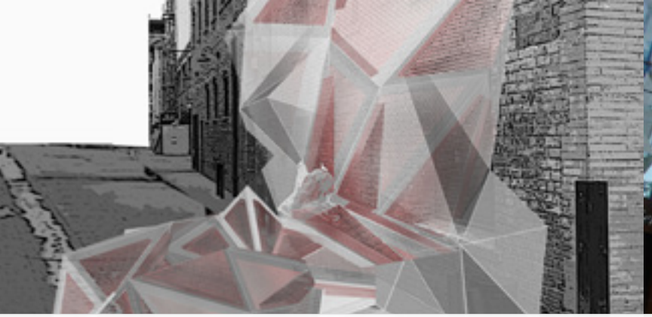



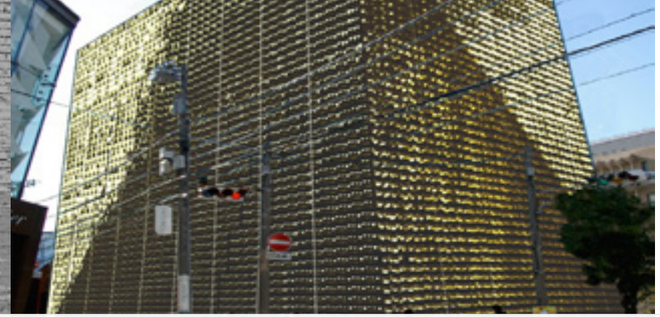


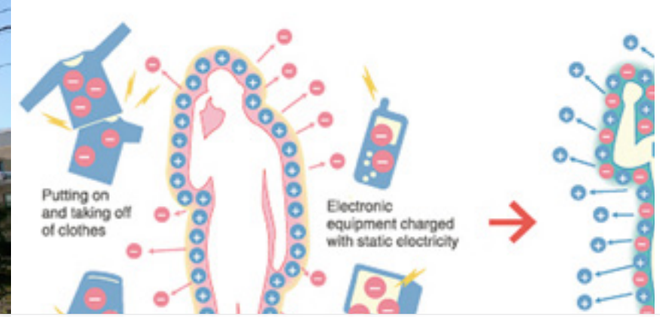


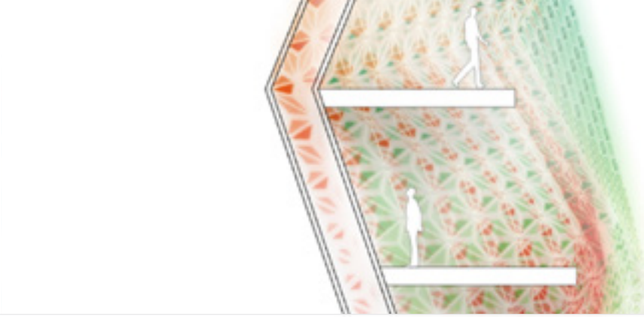




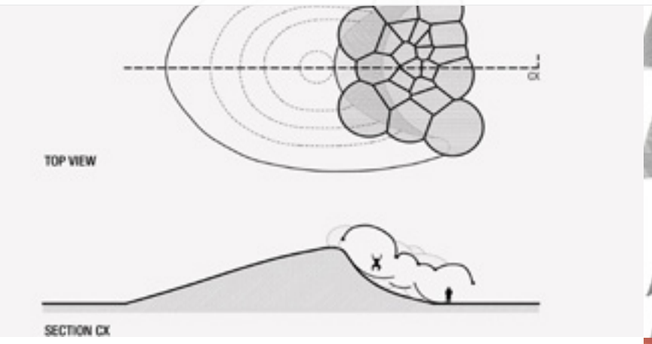


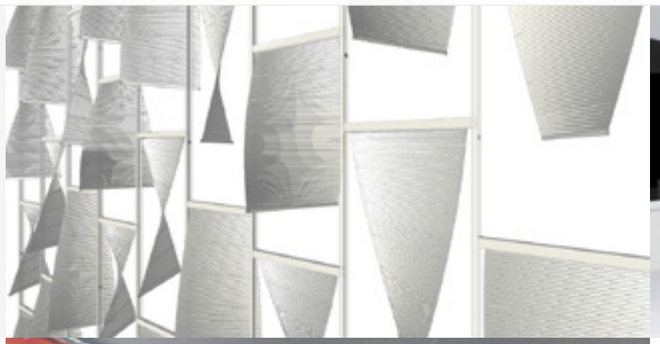


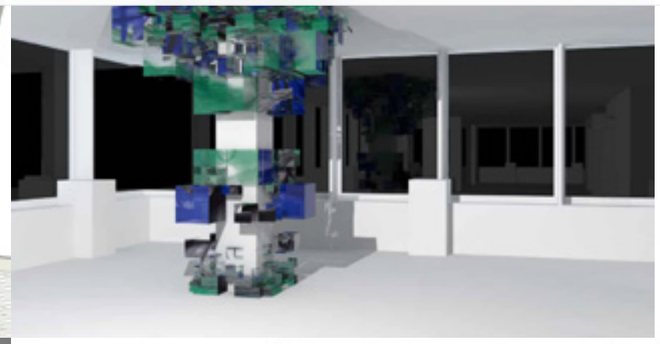


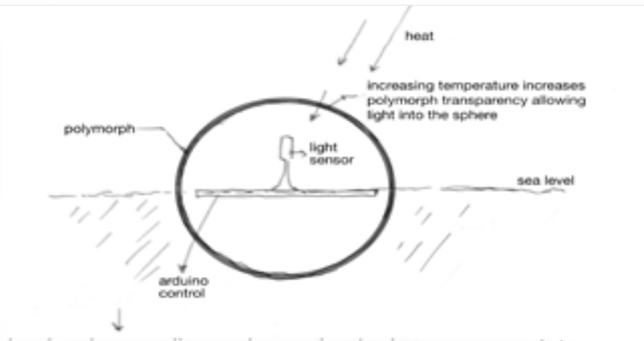


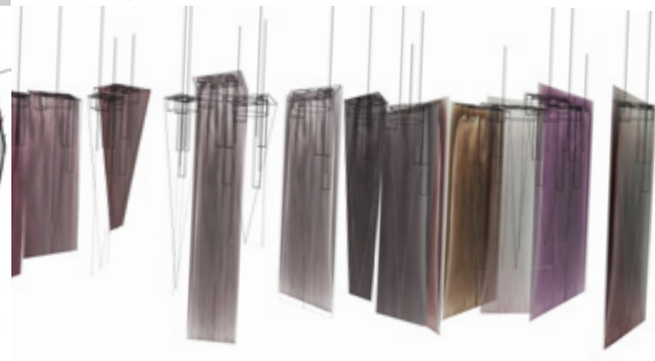
DESIGN SCENARIOS

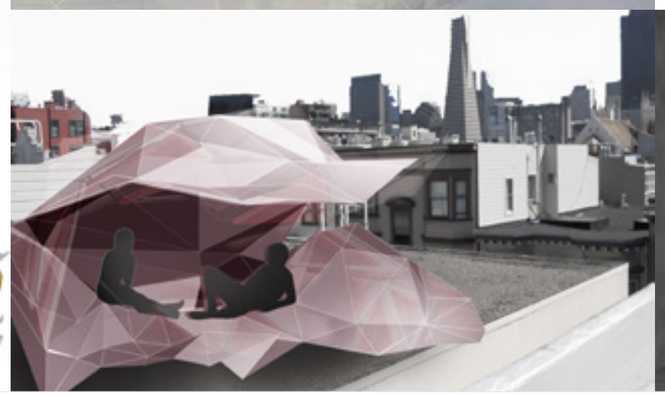






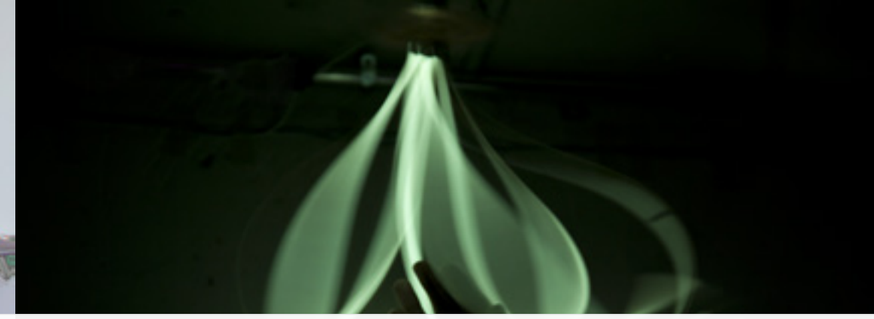




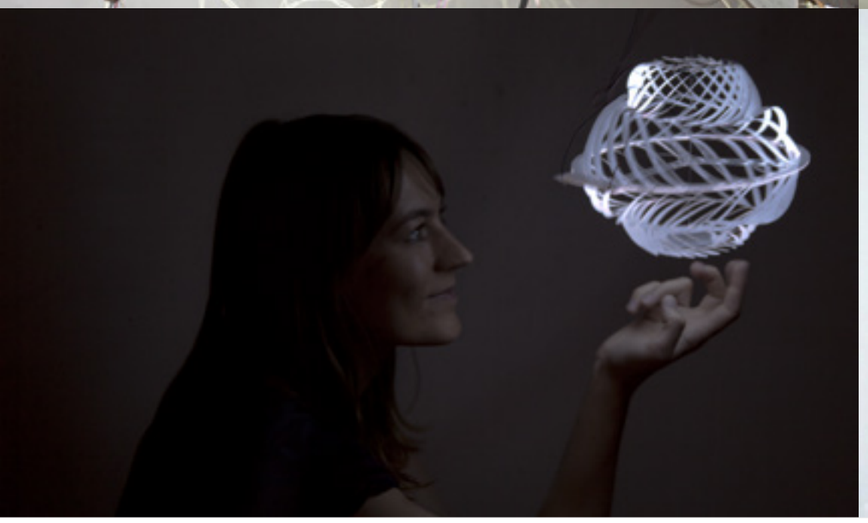
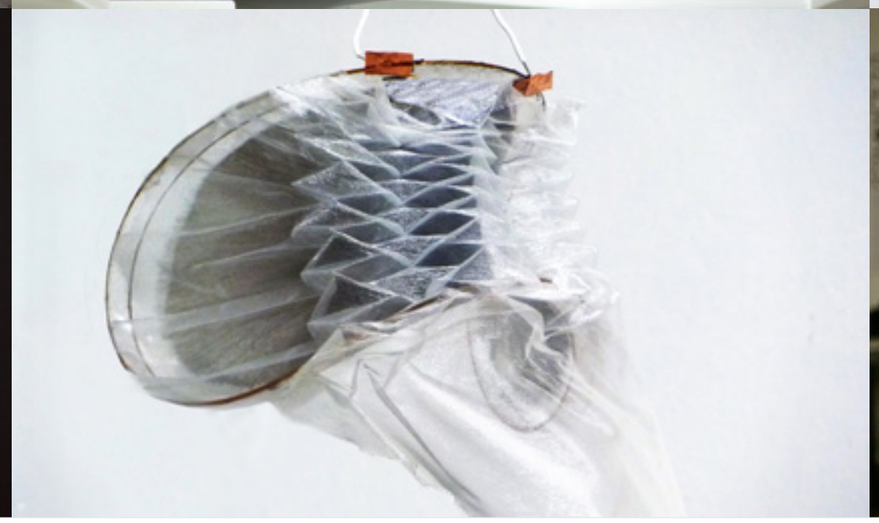


EXPERIMENTAL PROJECTS





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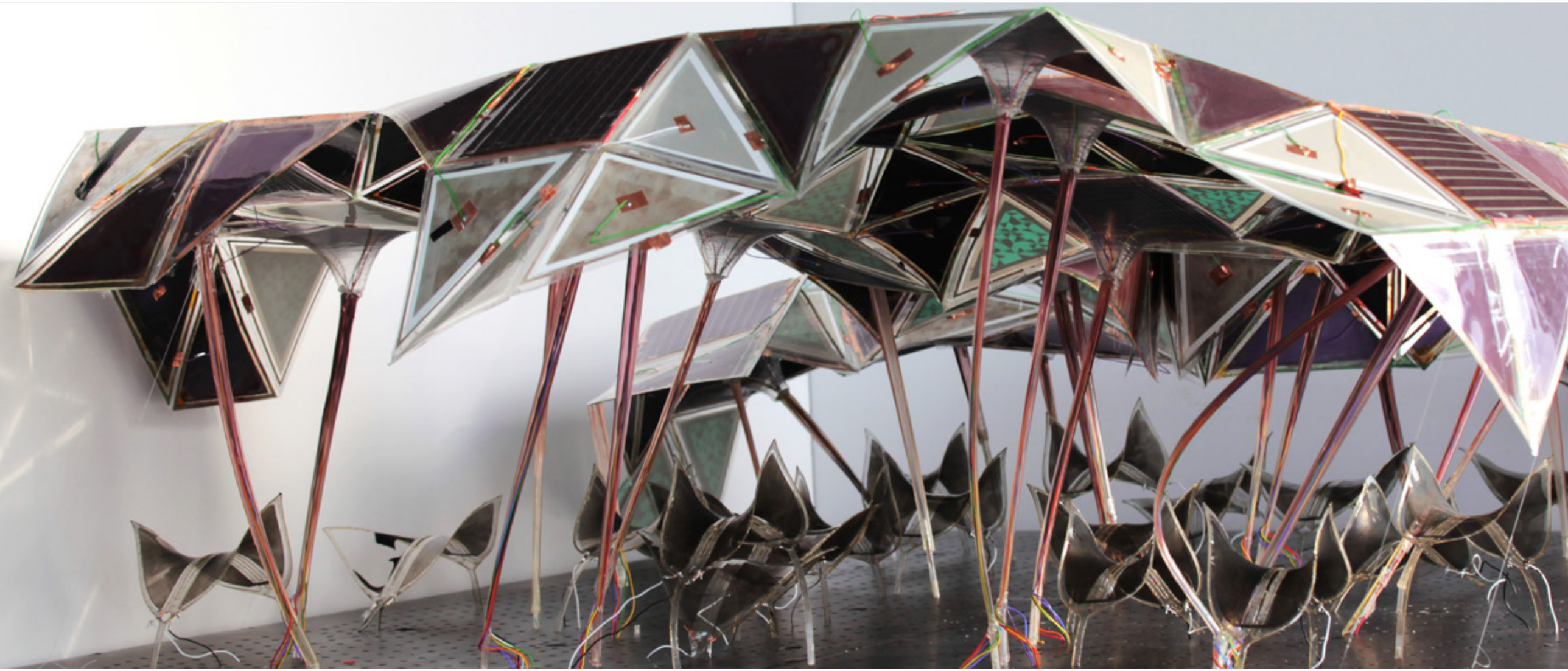
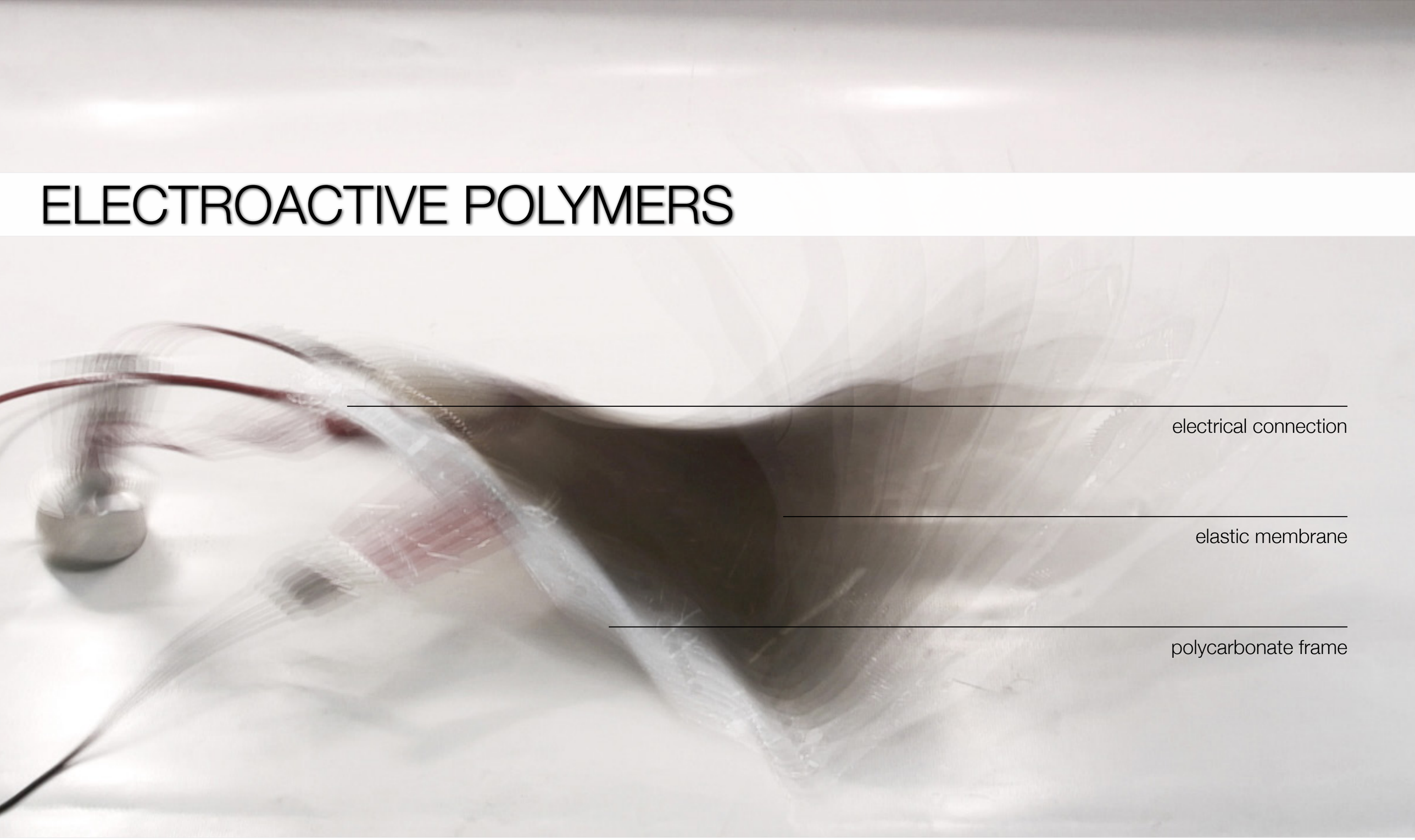
Selection of Experimental Projects

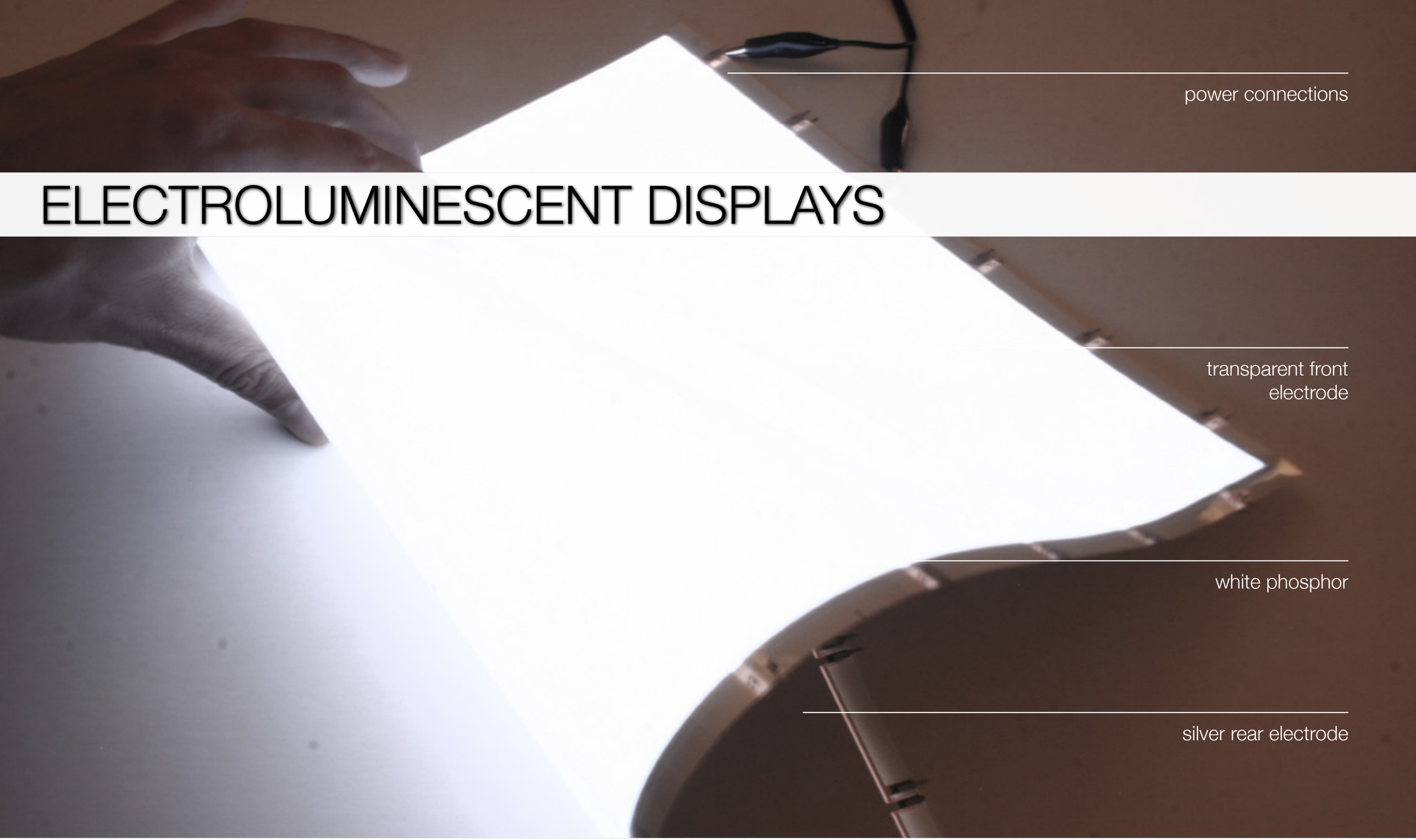
PHOTOTROPIA



ELECTROACTIVE POLYMERS



ELECTROLUMINESCENT DISPLAYS



DYE-SENSITIZED SOLAR CELLS

transparent front electrode

TiO_2 nanoparticles coated with dye

electrolyte

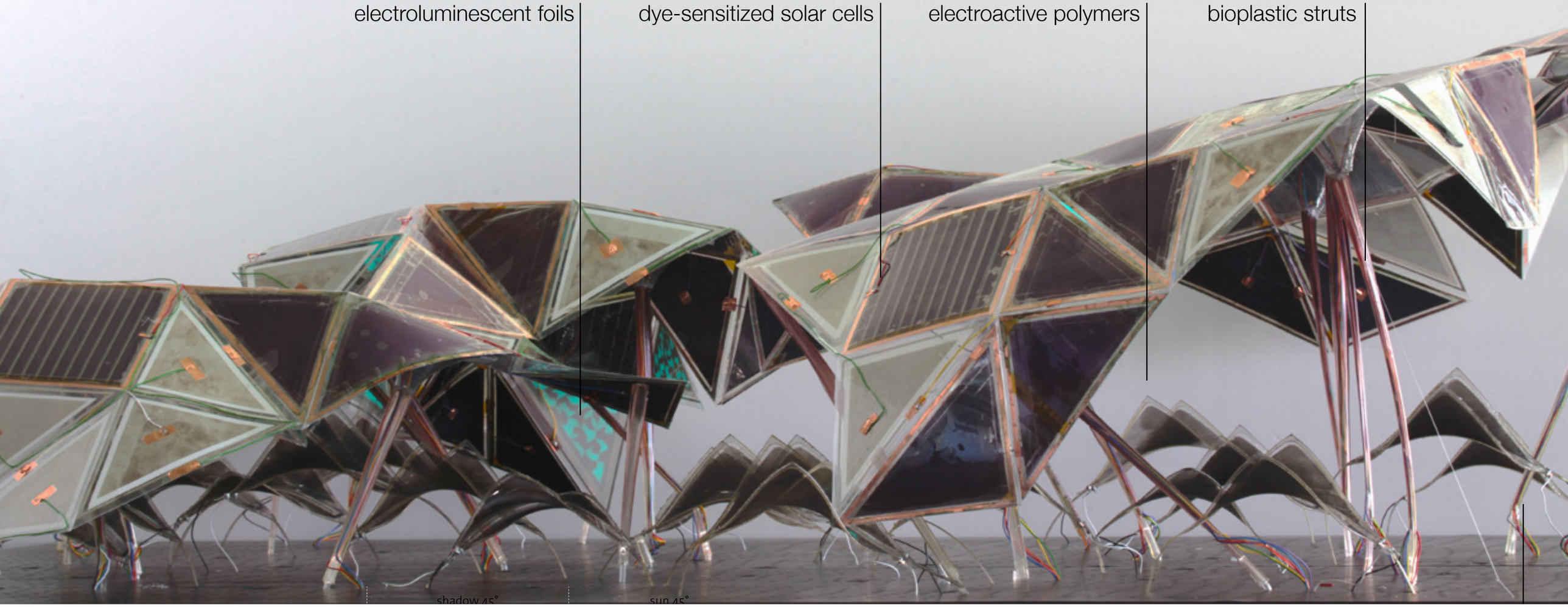
STRUCTURE

electroluminescent foils

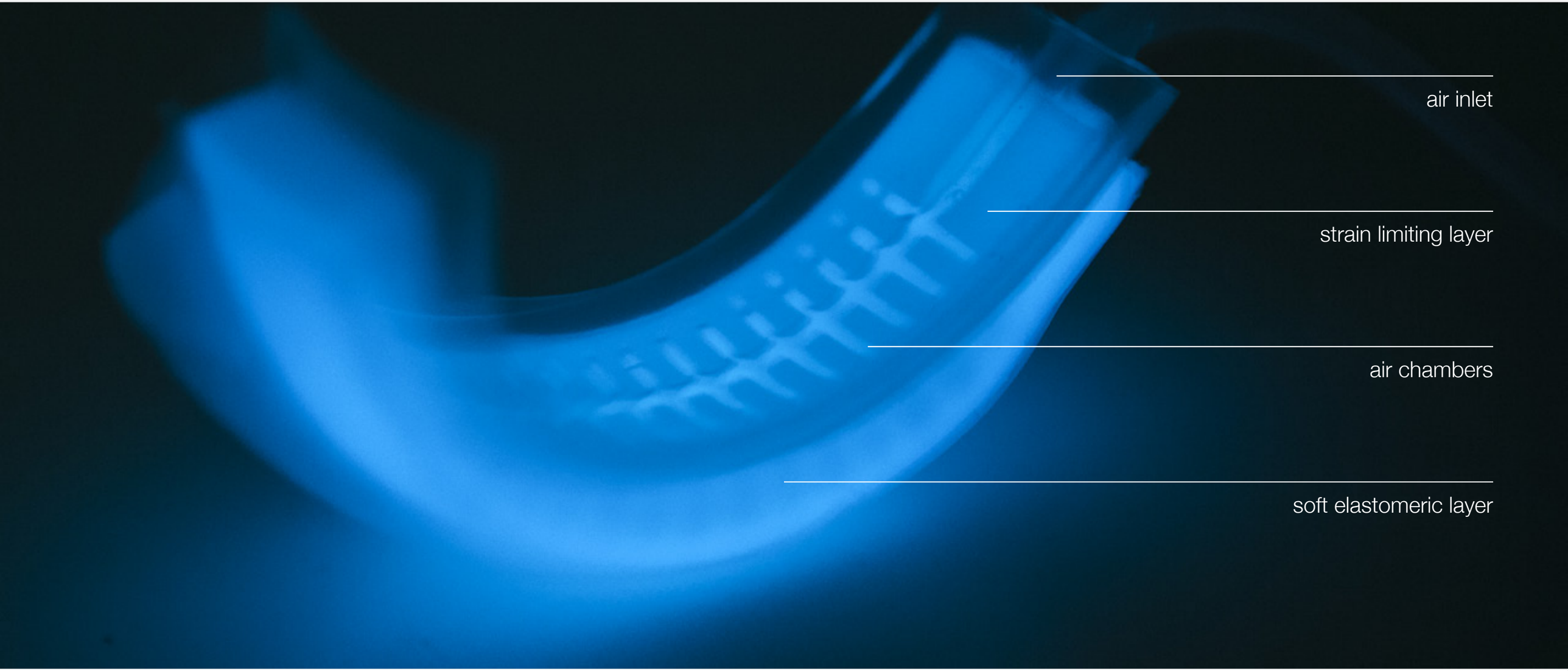
dye-sensitized solar cells

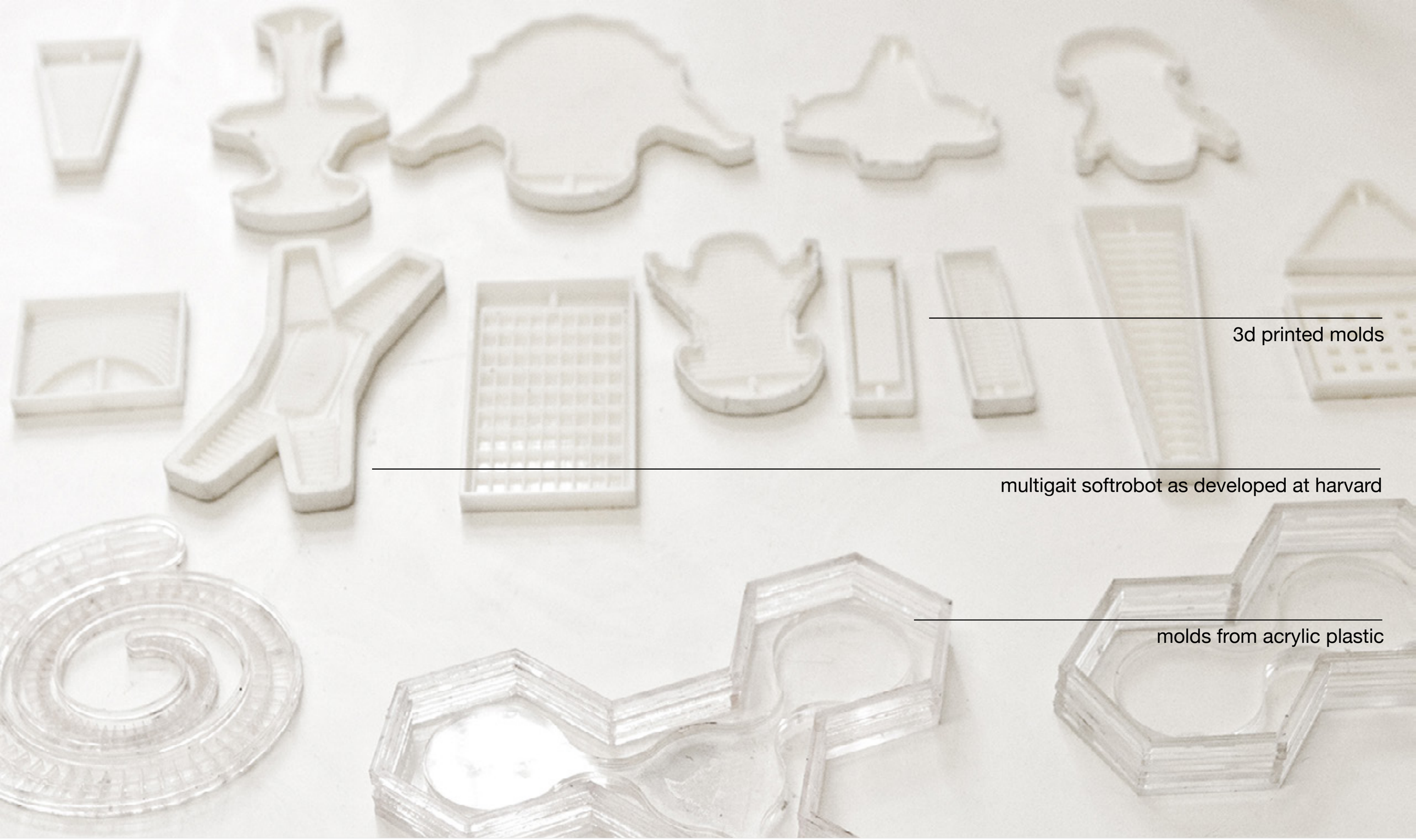
electroactive polymers

bioplastic struts



SOFT MOTION AND LIQUIDS





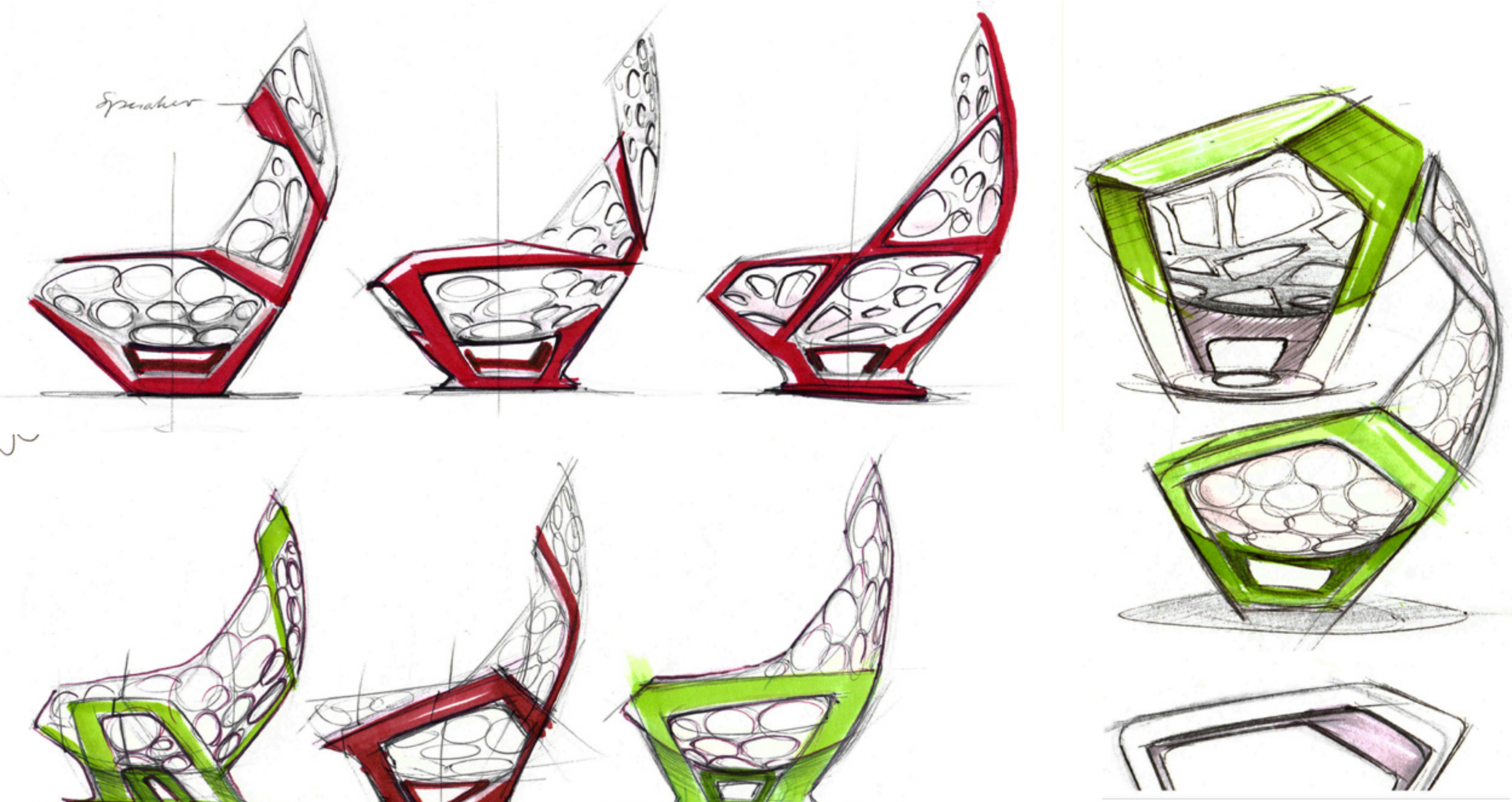
3d printed molds

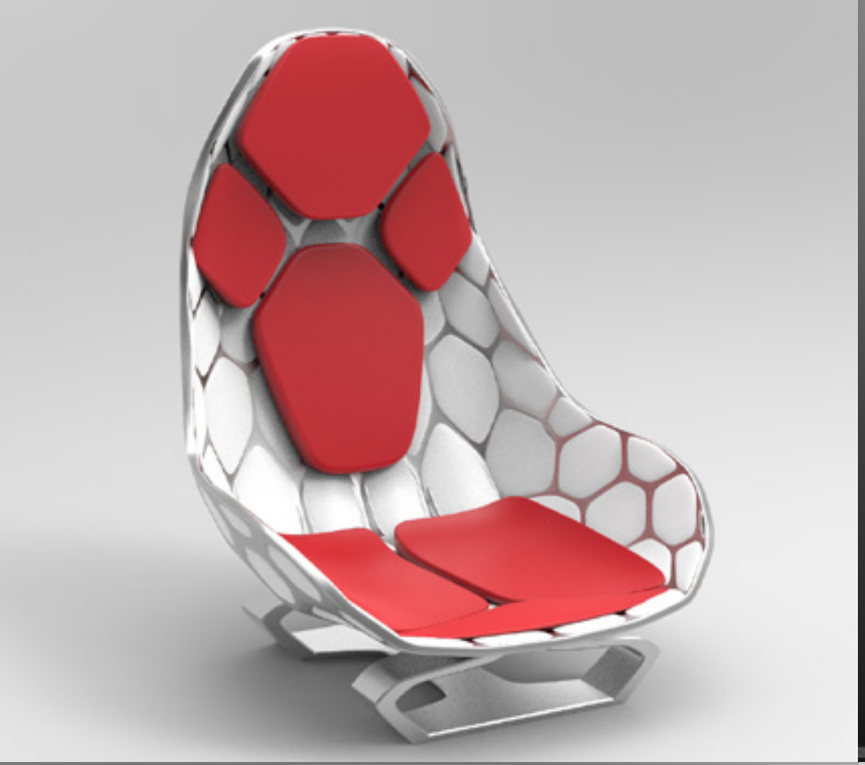
multigait softrobot as developed at harvard

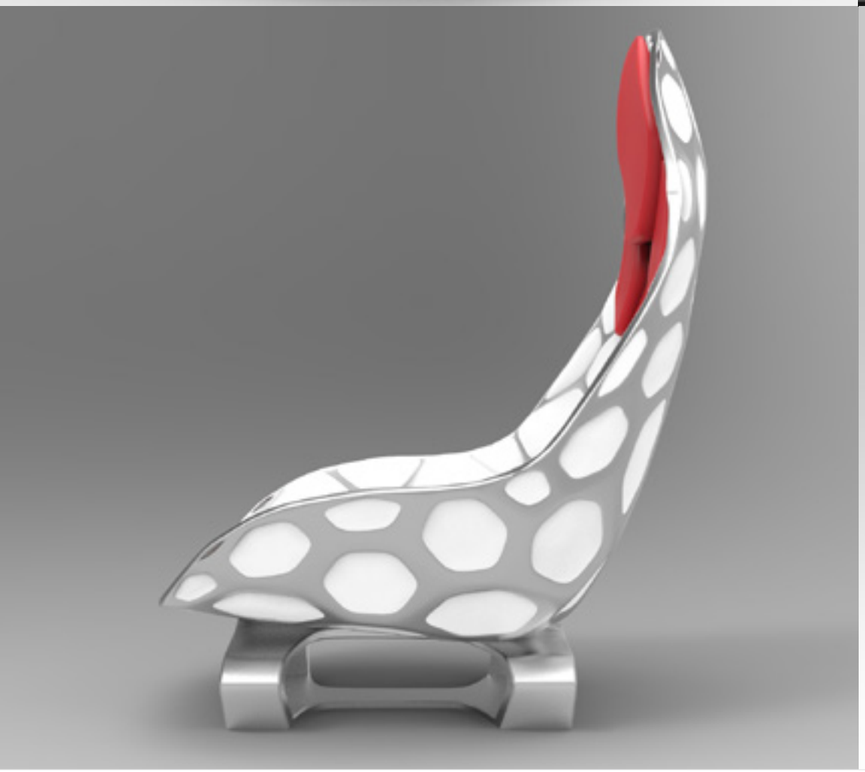
molds from acrylic plastic

CONCEPT BREATHE

BIOINSPIRATION


Speaker





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Concept Breathe
HBK Braunschweig Digital Crafting and AUDI AG

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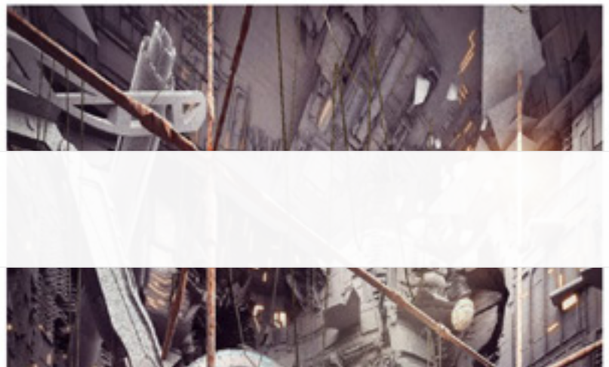




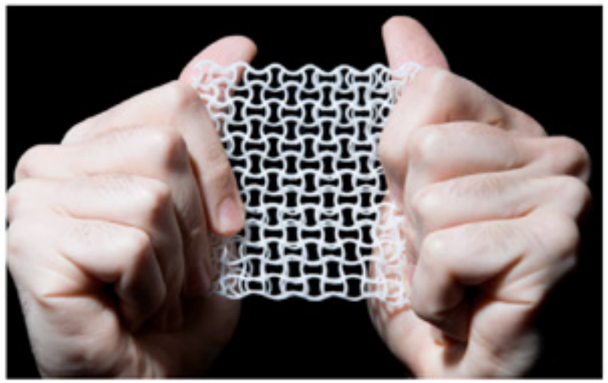


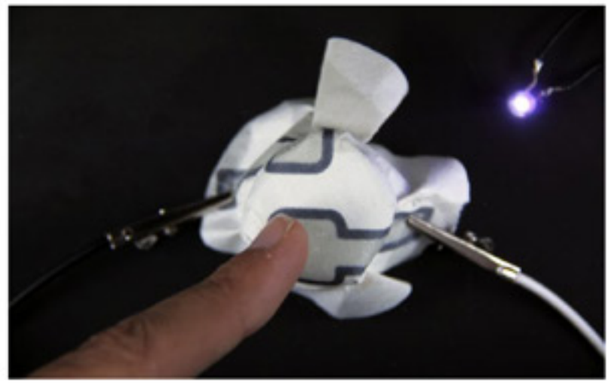



PROJECTS

109
0
0
2
111
shares

Braunschweig University of Art teams up with AUDI AG to develop concept of breathing car seat

"If I had asked people what they wanted, they'd have told me 'a faster horse'!"

Henry Ford

INSTITUTE

Braunschweig University of Art, *AUDI AG, I/EK-S1, Development / Innovation*

STUDENTS

Moritz Boos, Maximilian Dauscha, Leon Ehmke, Lydia Jasmin Hempel, Dong-Kwon Lee, Tim Daniel Ingo Lüders, Vanessa Paladino, Benedikt Schaudinn, Sebastian Spiegler

PIEZOELECTRIC CRYSTALS

TUTORIALS

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shares

Piezoelectric Crystals produce energy when mechanically stressed, distorted or twisted. The following instructions describe how to grow Rochelle Salt crystals, which can produce a comparatively large voltage upon compression and which are one of the first known natural materials found to exhibit piezoelectricity. The tutorial is based on instructions found on rimstar.org.

Materials and Tools

- 200g Potassium Bitartrate (Cream of Tartar)
- 120g Sodium Carbonate (Washing Soda or Soda Ash) or 120g Sodium Bicarbonate (Baking Soda)
- 250ml Distilled Water
- Beaker 500ml
- Pot
- Coffee Filter
- Filter Paper
- Thermometer
- Stove
- Small and Large Spoon
- Gloves
- Clear Containers with Lid

INSTRUCTIONS
Manuel Kretzer, Stig Anton Nielsen

PROJECT DATE
2014

CATEGORY
Tutorials

SHARE THIS

1. Sodium Bicarbonate to Sodium Carbonate

The first step is to convert the sodium bicarbonate into sodium carbonate. If sodium carbonate has been acquired in the first place this step can be skipped. For the transformation the hydrogen of the

POLYMER DISPERSED LIQUID CRYSTALS

MATERIALS

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shares

Introduction

Polymer Dispersed Liquid Crystal (PDLC) devices are a type of smart glazing or film that change their transparency in response to an electrical impulse. When inactive the liquid crystals are randomly arranged, thus scattering the light as it permeates the screen, which results in the translucent, milky appearance of the assembly. When however a voltage is applied, an electrical field is created between the two electrodes, which causes the liquid crystals to align, allowing light to pass through and essentially turning the screen transparent.

If desired, the degree of transparency can be controlled by adjusting the applied voltage. This is possible since at lower voltages, only some of the liquid crystals align completely in the electric field, so only a small portion of the light passes through whilst most of the light is scattered. As the voltage is increased, fewer liquid crystals remain out of alignment, resulting in less light being scattered. Most PDLC devices available today operate in on or off states only, even though the technology could easily provide for variable levels of transparency. PDLC screens have been used in both interior and exterior environments for privacy control (e.g. conference rooms, intensive-care areas, bathroom/shower doors, fitting rooms) or as a temporary projection screen. PDLCs are commercially available in

AUTHOR
Manuel Kretzer

PROJECT DATE
2016

CATEGORY
Materials

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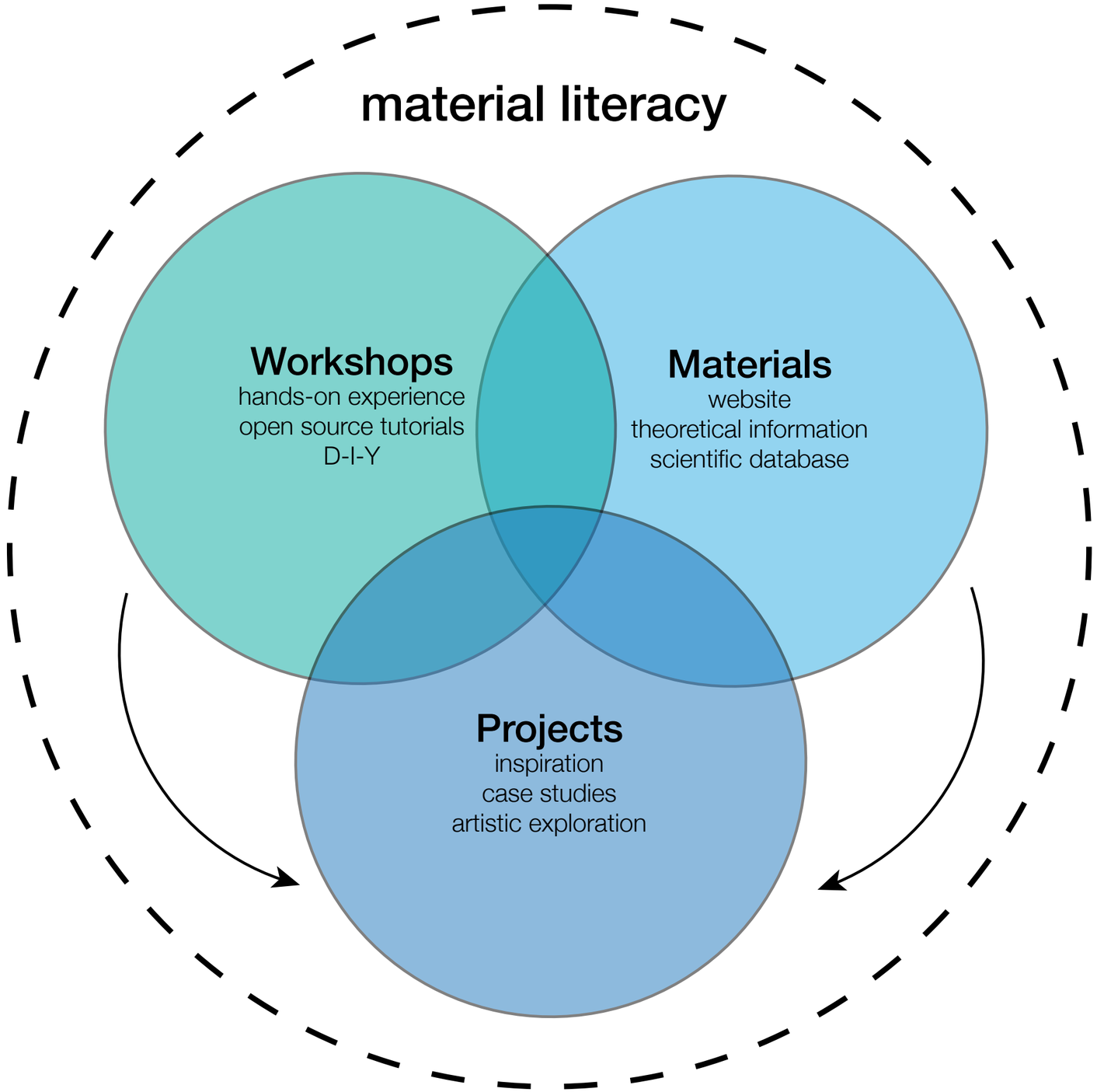
material literacy
Workshops
hands-on experience
open source tutorials
D-I-Y
Materials
website
theoretical information
scientific database
Projects
inspiration
case studies
artistic exploration

PROGRESS IS AN OPPORTUNITY

HOW DO YOU THINK ABOUT THE EFFECT OF THIS WEBSITE FOR GENERAL PEOPLE?

. platform makes abstract technology more accesible

. through individual experimentation the amount of information will continue to grow

. gained knowledge can form a base for cross-disciplinary collaboration

HOW TO MAINTAIN THIS PLATFORM TO PRODUCE NEW PROJECTS/TUTORIALS?

. has to be done on a professional and regular level

. tutorials content comes largely from personal teaching / research activities since they need to be consistent

. projects are submitted from various (un-)related individuals or groups

HOW TO CONNECT THIS OPEN ACADEMIC (EDUCATIONAL) INFORMATION TO REAL PRODUCTS?

. not main ambition of this platform to create real products

. industry collaborations mainly on advisory/consulting level

. real products will emerge from the individual consumers

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Dr. Sc. ETH Zurich Manuel Kretzer

Visiting Professor Material and Technology
Dessau Departement of Design
Anhalt University of Applied Arts

Founder
materiability
www.materiability.com

Partner
responsive design studio, Cologne
www.responsivedesign.de

info@materiability.com