

A TEACHING TOOLKIT FOR CRITICAL MATERIALS RESEARCH

This toolkit comprises design methods that take new natural design materials and their unique properties as a point of departure and offers hands-on activities to critically engage in sustainable material research and (re)discover new and ancient techniques of material making.

Our aim is to inspire students, researchers, and educators to say goodbye to petrol-based plastics and toxic materials in favor of more sustainable ones. Building on ancient and contemporary knowledge, we label these materials ‘new naturals’ as they don’t fit in the traditional material families of metals, plastics, ceramics and glass, composites, or natural materials such as leather or wood. These ‘new naturals’ can for instance be composites- hybrid materials made from abundant resources such as food waste or plant fibers – or made with microbes, fungi, yeasts, and other organisms that create fascinating substances that we can use in design.

The toolkit exists out of [X] cards that support users in developing teaching activities, classes, and courses about critical materials research, and offers directions and resources on setting up your own small DIY lab. The cards contain four themes that each contribute to understanding and making sustainable materials and sustainable modes of production. Depending on your aim you can combine cards about materials science, biofabrication, DIY microbiology and critical making, and depending on the level of expertise and time available you can choose between various levels of difficulty (explain, explore, or expand cards).

Use the [name toolkit] in combination with the materials archive [link] to collaboratively build an open-source material archive.

BIOMATERIALS TOOLKIT

TOOLKIT FOR CRITICAL CREATIVE RESEARCH  
INTO NEW NATURAL DESIGN MATERIALS

Recipes and samples of the biomaterials can be found at:  
[www.samplemanagementtool.com](http://www.samplemanagementtool.com)

project by Loes Bogers, funded with an NWO Comenius  
Teaching Fellowship

SET UP YOUR OWN BIOMATERIALS -FABRICATION SITE AND DIY MCIROBIOLOGY LAB

TOOLS, INGREDIENTS, AND RESOURCES

A BIOMATERIALS-FABRICATION SITE:

- Silicone baking mat (heatproof)
- Precision scale 0.01 g (e.g. bol.com for 5e)
- Old pot you can dedicate to non-food experiments
- Kitchen scale
- Strainer
- Glycerine, 1L (e.g. drogisterij.net)
- Denatured alcohol 96%, 1L (e.g. drogisterij.net)
- Gelatine powder (not sheets, look at online shops)
- Agar agar powder
- Sodium carbonate or cleaning soda (NL: kristalsoda) (supermarket)
- White vinegar (supermarket)
- Hand soap and dishwashing soap
- Cutting mat (hobby stores)
- Scalpel/hobby knife (hobby stores)
- Clamps or clips to hang things
- Ruler (min 30 mm)
- Roll of painting tape
- Roll of strong tape e.g. duct tape
- Scissors and if possible: small scissors for precision work
- Textile swatches 20x30 cm minimum (e.g. cotton, denim, can be cut-up old clothing/sheet/towel)
- Loose leaf green tea
- Rubber bands (supermarket)
- Cane sugar
- Whole cloves (NL: hele kruidnagels)
- Corn starch
- Coconut oil OR vaseline OR purol
- Fresh Kombucha Scoby (ekoplaza or <https://yayakombucha.com/products/organic-kombucha-starter>) > keep in the fridge until use
- Acrylic sheet PMMA 3 or 4 mm, minimum 50cm x 100cm e.g. <https://kunststofplatenshop.nl/>
- Roll of white paper (light gray/beige fine too), or a sheet of min 45 cm wide and 100cm long
- Glass jars several sizes (e.g bean jar 250ml, big mayonaise jar 500ml, big yoghurt jar 1000ml)
- Wide glass jar or plastic container (min 15 cm diameter or width)
- Handful of old rusty metal scraps

A DIY MICROBIOLOGY LAB:

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MATERIALS SCIENCE

information about materials science

DIY MICROBIOLOGY

information about diy microbiology

CRITICAL MAKING

information about critical making

BIOFABRICATION

information about biofabrication

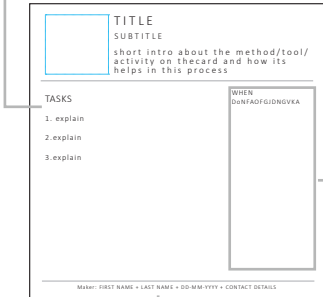
SELECT AND EXECUTE

INTRODUCTION

The short description allows you to quickly assess whether the activity or method on the cards suits your needs.

CATEGORY

Depending on what learners already know and depending on what topic you want to center your activities, the toolkit is divided in four categories. Cards can be about materials science, biofabrication, diy microbiology, or critical making.



TASKS

The steps that need to be taken in order to execute the activity or method

RECOMMENDATIONS

The recommendations section can list ingredients, tools, tips, notes and references about the activity or method mentioned on the card.

ATTRIBUTION

The maker or source on which the card is based.

EXPLAIN - EXPLORE - EXTEND

*Explain* cards are knowledge cards that support your understanding of (working with) biomaterials.

*Explore* cards contain activities and methods for learning and critically engaging with biomaterials.

*Extend* cards build on the previous cards and help to deepen your practical knowledge of biomaterials.

ESTIMATED DURATION

This is an estimate of how long it will take to execute the activity.