Materials in Context

Mapping opportunities of “waste” in Poblenou

Sessions: 3rd & 10th February from 10-13th
Tutor: Laura Freixas

Name of members of the group (2/3 persons): Roberto Broce and Vikrant Mishra

1 What are your material research and experimentation interests?

Mycelium as a material for acoustics and insulation.

Chitin or Chitosan as a material for composites due to its strong atomic structure, polarity and availability.

2 Select 5 images of projects related to your material experimentation interest.

Reference #1:
Chitin Textile

Reference #2:
Mycelium Acoustic Panels

Reference #3:
Mycelium Insulation Panels

Reference #4:
Chitin Fibre/Yarn

Reference #5:
Chitin Textile

3 Choose an area of interest in the Poblenou neighbourhood from which to begin your research into material opportunities.
Personal Tip: Look at the type of waste or surplus materials you are looking for and the type of businesses in the area.

Map of Poblenou.

4 Enter and talk to those businesses where you think there may be material opportunities of interest to you.
Personal Tip: Introduce yourself briefly and comment on the motivation of your project and what you would like to experiment with their waste. The aim is to establish a bond of trust and collaboration and to keep them informed in case the results are promising.

Local Businnes #1:

“Waste” #1:

Local Businnes #2:

“Waste” #2:

Local Businnes #3:
Can dende

“Waste” #3:
Coffee grounds

Local Businnes #4:

“Waste” #4:

Local Businnes #5:

“Waste” #5:

Local Businnes #6:

“Waste” #6:

5 Submit 3 to 6 material opportunities (waste and surplus) and fill in the following form with your project information by 3/2/2022 at 10am. We will need the information of the project and the material opportunities to be able to carry out the session in class.

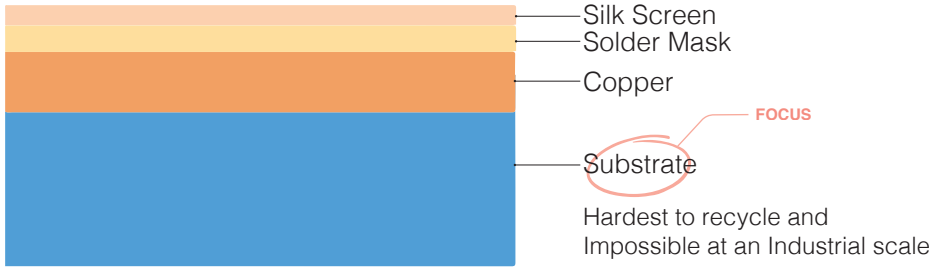
If you wish, you can find more information on the subject in the following links:
https://laurafreixas.gitlab.io/laura.freixas/-/organicmatters.html
https://fablabbcn.org/projects/siscode-remix-el-barrio

Objective

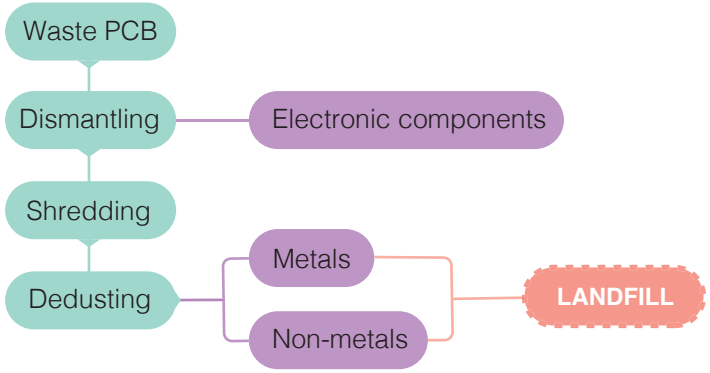
Reasons for pursuing the initiative

PAIN POINTS

Components of a PCB



Current PCB disposal system



Electronic waste + Environmental Emergency

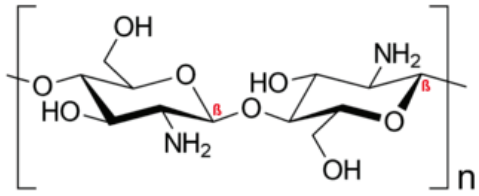
Accumulation and Scale

Energy + labor-intensive Process

FOCUS

The focus lays in exploring a material that could replace the substrate in the PCB which acts as the skeletal and structural entity.

The bio-composite or material that is explored for this activity is **Chitosan** which is derived from Chitin. It is a sugar based hydro-carbon that can be extracted from the fungal and shellfish mediums. The common source of Chitosan is the **outer skeleton of shellfishes**, including crabs, lobsters, and shrimps.



The material has various interesting properties like polarity, carbonising, compounding, conductivity and cohesivity that can be explored.

Process

Explorations and experimentations involved

1

Mixing 45 gm pine resin, 15ml alcohol and 5gm of carnauba wax

2

Two concentrations of 28% and 75% to explore rigidity

3

28% set with 0.08mm thick copper sheet and 75% with 0.3mm

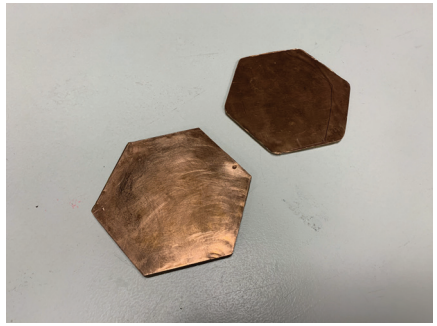
4

Artificial compression technique to aquire a more definite shape

5

A few extra hours of compression for a dense and compressed sample

RESULTS



The composites are yet to go through a CNC and rigidity test for PCB fabrication.

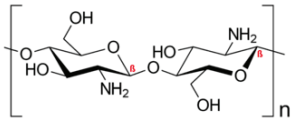
A simple circuit would be developed to test durability, threshold, melting point and conductivity.

Cradle to Grave

assessing the lifecycle of the material

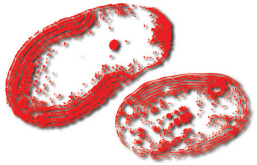
1

Chitin substrate



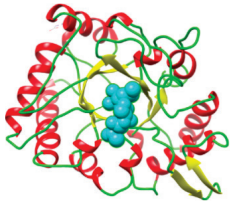
2

Chitinase producing & Nitrification Bacteria



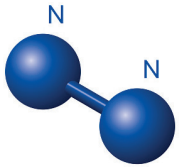
3

Chitinase Enzyme



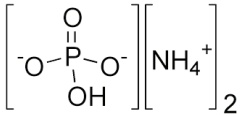
4

Dinitrogen



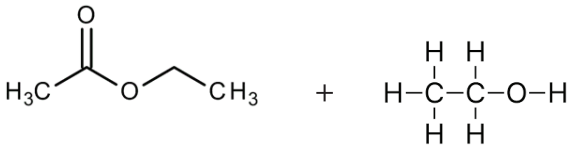
5

Agricultural Aid



2

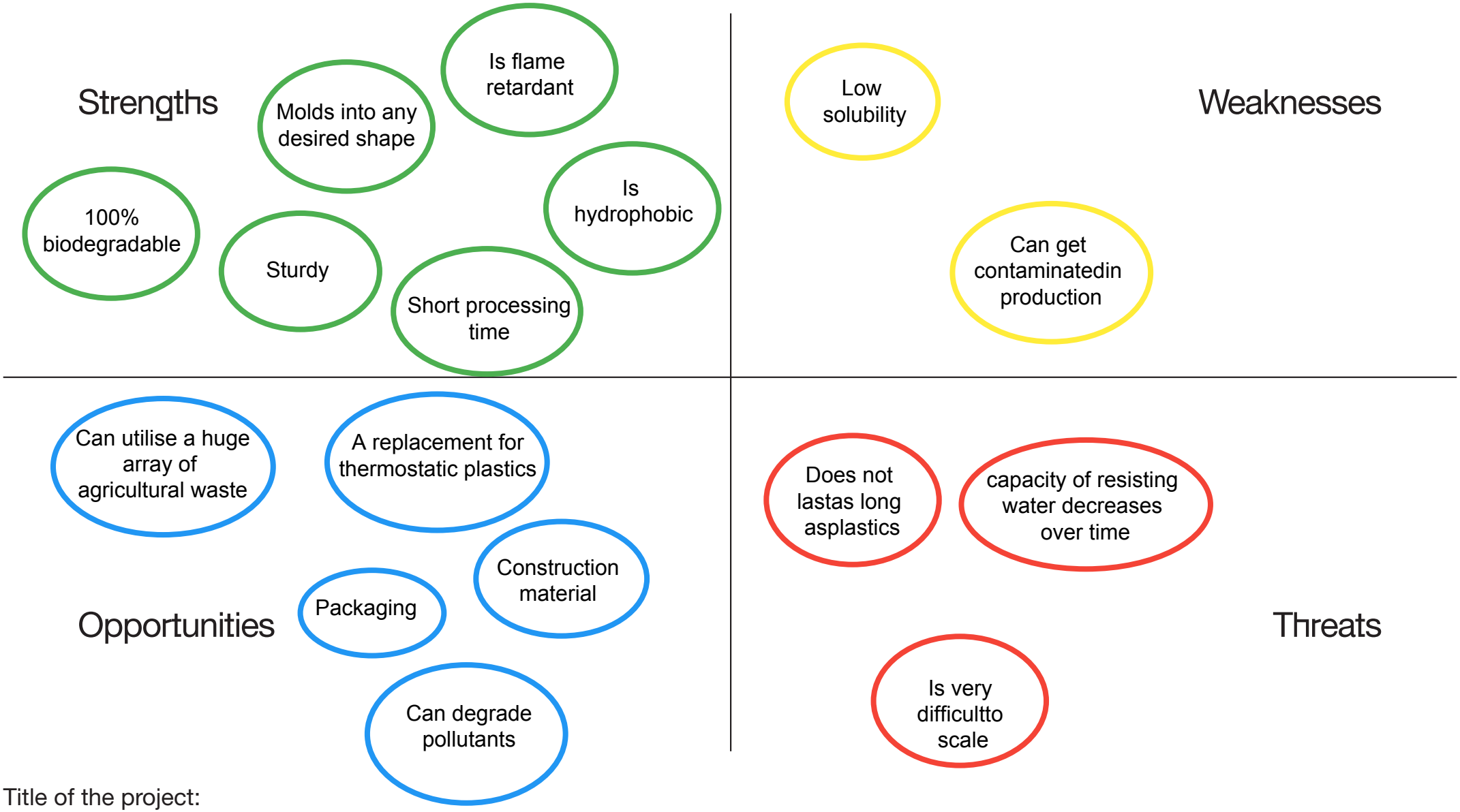
Dissolving bath



Ethyl acetate and Ethanol

Material SWOT Analysis

Assessing the potential of material explorations

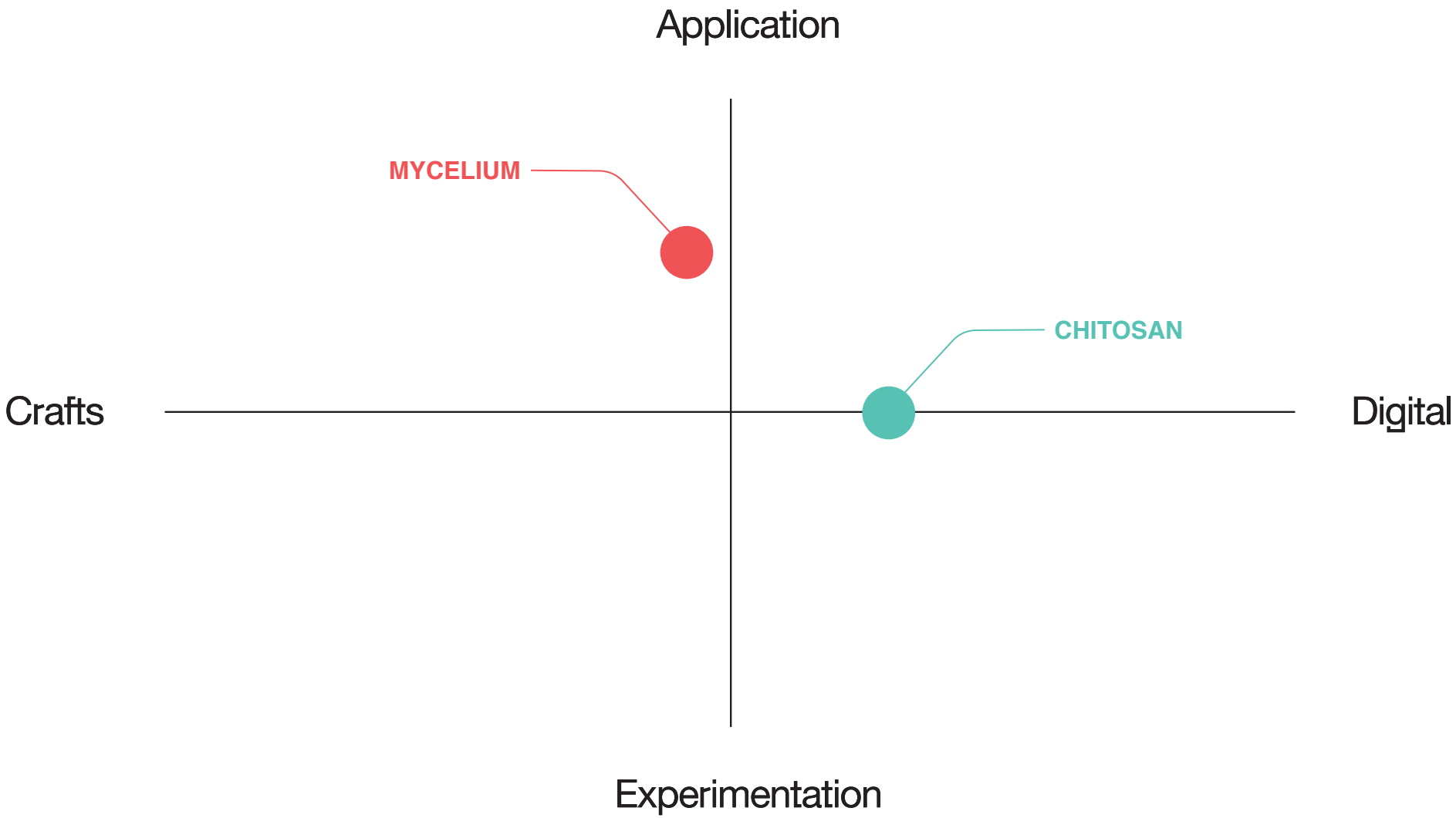


Title of the project:

Members of the group (3 persons): Roberto Broce and Vikrant Mishra

Material Feedback

Assessing the potential of material explorations



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Material Feedback

Assessing the potential of material explorations

Material Properties	DIY Recipies	Experimental Processes	Possible Applications	General Feedback
MYCELIUM Sturdy, Malleable, Fire retardant, low-density, Hydrophobic and Self-assembling	Agricultural waste + sawdust, rice husks, wood shavings, straw + Mycelium strains	Extraction of the lignocellulotic material - Hydration - Sterilizing in the pressure cooker - Colonising - Molding - Drying	Insulation, Acoustics, Foam-alternative, Construction, Architecture	Easy maintenance post-processing Versatile and sustainable Slow processing because of challenges with scaling and contamination
CHITOSAN Structurally strong, resilient, polar, Ionised (to some extent) and Bio-degradable	Binder + plasticizer (if) + additives + Chitosan derivative	Playing with the concentration of Chitosan to alter density and cohesivity of the composite Experimenting conductivity with additives like Graphene.	Yarns, Insulation, Bio-ceramics and PCBs (Printed Circuit boards)	Abundant availability Brittle Interesting way to fix carbon from kitchen-waste

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Ecodesign Strategy Wheel

Assessing the impact of material explorations

Legend

- Actual Material
- Ideal Scenario Material

1 More Impact
2 Intermediate
3 Less Impact