

## Community Paper

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Research  
Directions



# Material beyond materials. An interdisciplinary workshop for biodesigning

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## Paper

### Extended Abstract (300-500 words)

Design has the responsibility of being a promoter and facilitator of the ecological transition, but, as highlighted by several authors (Oxman, 2016; Ito, 2016; Lucibello, 2019; Langella, 2019 and 2019a), if it wants to respond in a profound and concrete way to urgent global challenges, such as climate change, the loss of biodiversity and the depletion of material resources, must be nourished by interdisciplinary contributions and collaborate with other sciences. Therefore, we increasingly need designers capable of understanding and interacting with the hard sciences in a more conscious and complete way to develop future application scenarios in every aspect of design, from materials to everyday products. As a case study of what was previously stated, the Design Laboratory for Sustainability of the DIDA Department (UNIFI) created an educational path of 3 credits in 2021: the Material beyond Materials (MbM) Workshop, within the Three-year degree course in Product, Interior, Communication and Eco-Social Design, with the aim of introducing students to Materials Design and Biodesign (Myers, 2012; Ginsberg & Chieza, 2018), training the first generation of biodesigners within of the University of Florence. The participating students were led to investigate the relationship between material tinkering (Parisi et al., 2017) and circular economy, through contamination with the hard sciences to create innovative materials and applications, in which Nature participates in the design and production process as co-worker (Collet, 2021; Roudavsky, 2021). The design and research methodology started therefore from the concepts of Material Experience (Karana, Pedgley, Rognoli, 2014) and Materials Driven Design (Karana, Barati et al., 2015) attempting to include interdisciplinary skills in the process from the early design stages and experimentation with materials. In particular, in the last workshop the students were led to experiment with "biotinkering" solutions with mycelium inside a biosafety Level (BSL) 1 Lab. In the first classroom activities, the students acquired theoretical knowledge from experts in Biodesign, Biology and Mushroom Agriculture with the aim of combining Design and Life Sciences. Contents specifically covered the scientific definition of life and its implications, cellular theory, metabolic processes, the transfer of energy through living beings, the chemical-physical vision of the biosphere and specific details on the cultivation of mushrooms. Furthermore, resources and notions relating to scientific method and ethics were provided to the students as well as an introduction to the instruments and behavior in the laboratory. From a methodological point of view, this knowledge has served to provide future biodesigners with greater awareness of biotechnological processes and biological laboratory work. Guided by a systemic design thinking (Bistagnino, 2009) oriented towards the circular economy, starting from by-products coming from local supply chains or other types of common waste, the students developed design sketches starting from the micro scale of the material to compare directly with experts from other disciplines - sciences sketches (Langella, 2019) -; in this sense the students also designed the laboratory experiment. Then material designs were created through a bio-manufacturing process using the mushroom species *Pleurotus ostreatus*. The workshop will be held annually, aiming to increasingly strengthen the link between Design and Hard Sciences, defining new skills and related methodologies and tools capable of providing biodesigners with the possibility of designing starting from the micro scale, making the dialogue with other disciplines easier.



(a)



(b)

Figure 1. Sciences sketches (a) and the biotinkering phase (b). (Image credits: MbM workshop)

### Connections references

Vijayakumar V, Cogdell C, Correa I, et al. How do we grow a Biodesigner? Research Directions: Biotechnology Design. Published online 2024:1-4. <https://doi.org/10.1017/btd.2024.1>

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