

Title: Market analysis and Environmental impact assessment of mycelium-based raw materials for aerospace

Problem statement

Mycelium-based raw materials are emerging biomaterials from fungi feedstock. Their versatile properties make mycelium-based products promising for a wide range of applications. Currently the main applications are packaging and building materials to replace petroleum-based conventional products. Due to their lightweight, acoustic damping and biodegradation properties, mycelium bio-composites are also promising alternative for aerospace applications, *e.g.* sandwich panels used for the partition walls. Vegan leather from mycelium might also be part of the future materials for aircraft seats. Furthermore, mycelium biomaterials are manufactured using a natural and low-energy process from agricultural by-products or wastes.



Mycelium-based materials have shown a huge potential to replace conventional petroleum-based materials towards a more sustainable and circular economy. However their application is still limited and some key challenges have to be solved to implement fungi biotechnology and mycelium-based materials in the aerospace industry.

Research question(s)

Today, although there are some promising opportunities, mycelium-based products are produced at a small scale. What are the challenges to upscale the technology and make mycelium-based products the materials of choice for our tomorrow's cabin materials?

Market Analysis:

- What are the aerospace needs? *e.g.* how many mycelium leather factories do we need for our aircraft.
- How to set-up this new fungi supply chain? Challenges and Opportunities, *e.g.* viable waste streams identification and if car industry is also interested, as well as leather for fashion (bags, etc.)
- Are there any economies of scale benefits?
- How to scale-up biological manufacturing processes?

Life Cycle Assessment

- What is the environmental impact of mycelium-based sandwich structures/bionic partitions?
- Extension for mycelium-based leather.

Expected type of work

Interviews, material flow analysis, stakeholder analysis, life cycle assessment

References

Fungal Biotechnology & emerging mycelium-based materials:

- V. Meyer et al., Fungal Biol Biotechnol 2020 7(5), <https://doi.org/10.1186/s40694-020-00095-z>
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- S. Vandeloos et al., Fungal Biol Biotechnol 2021 8(20). <https://doi.org/10.1186/s40694-021-00128-1>

Mycelium-based materials, challenges & opportunities:

- S. Bitting et al., Biomimetics 2022 7(2), 44. <https://doi.org/10.3390/biomimetics7020044>

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