Remanufacturing Mycelium Biocomposites

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The construction industry has considerable environmental and social effects. Typically, Expanded Polystyrene (EPS), is the material chosen for thermal insulation in buildings. However, a more sustainable alternative is Mycelium Biocomposite (MBC).

Results



EPS Expanded Polystyrene



Koolfoam, "Expanded Polystyrene EPS", 2024

- Based on fossil fuels [1];
- It isn't biodegradable [2];
- Weak market for remanufacturing process
 [1].

MBC Mycelium Biocomposites



MNEXT, "Mythic" 2024

- Based on agricultural waste [3];
- It is biodegradable [3];
- It can possibly be remanufactured.

The present research aims to assess the characterization and technical feasibility of remanufactured mycelium biocomposites.



Discussion

Contamination

- Higher contamination rate in samples with glucose:
 - 50% of old substrate samples with glucose;

Methodology

Research questions

- How do the properties, such as mechanical and thermal of mycelium foams change after recycling compared to new ones?
- How many times can mycelium foams be recycled without compromising the properties?

Properties to test



- 30% of old substrate samples without any nutrient;
- Solutions:
 - Making a ratio between new and old substrate;
 - Add more spawn.

Properties change

- Compression strength increased with remanufacturing;
- Thermal conductivity increased with remanufacturing.



Times remanufacturing

- With the adition of flour, more cycles were reached with less contamination;
- It is **possible to remanufacture** MBCs at least 3 times without compromissing the properties.

Samples

• Strain: *Ganoderma lucidum*;

Substrate: Rapeseed straw;

• Nutrient: Glucose or flour.

Old substrate samples MBCs should be recycled regardless of the duration of their use. Some were added with glucose.

New substrate samples Control group with samples produced with the same strain since the first time. They were added with flour.

References

[1] J. R. Zhao, R. Zheng, J. Tang, H. J. Sun, J.
Wang, "A mini-review on building insulation materials from perspective of plastic pollution: Current issues and natural fibres as a possible solution", September 2022.

[2] Nature Pack, Sustainable Packing, "Is EPS styrofoam biodegradable?", 2024.

[3] M. Jones, A. Mautner, S. Luenco, A. Bismarck, S. Johna, "Engineered mycelium composite construction materials from fungal biorefineries: A critical review", February 2020.

To know more about the **MycEoLA project**:



To know more about the **MYTHIC** project:



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