MYCELIUM SKIN

Research the production method for mycelium composites with different mycelium skin types

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Introduction

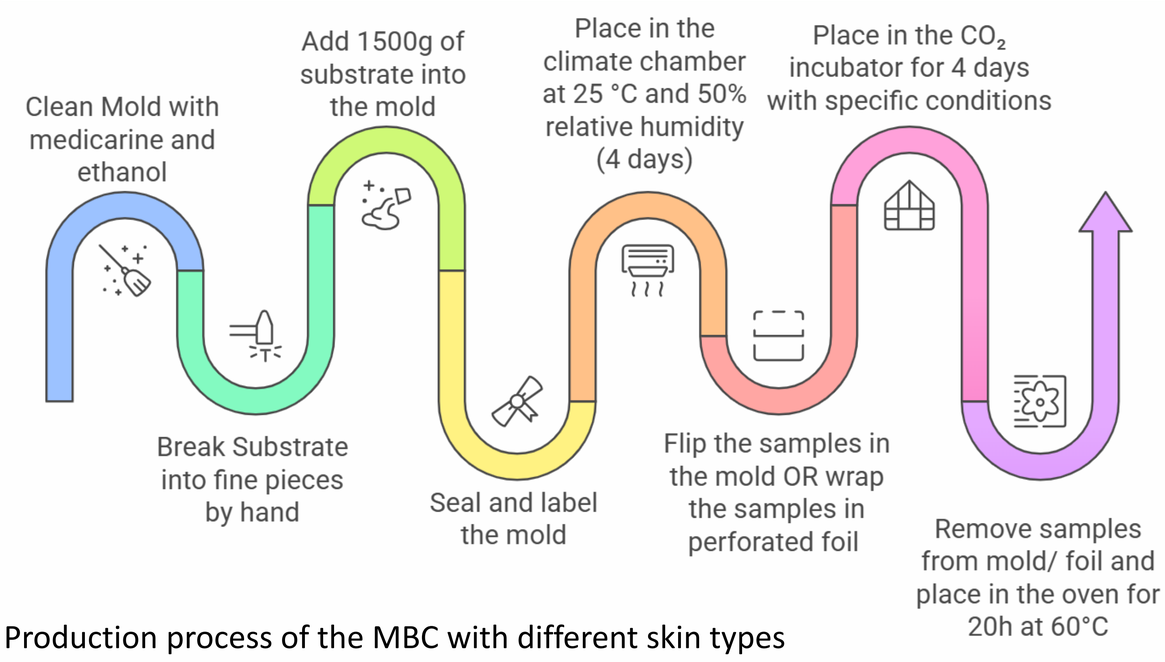
Mycelium biocomposites (MBC) represent a versatile sustainable material with various industrial uses. However, their organic nature present some challenges. This project explores how different mycelium skin will be produced and performs in a range of physical tests.

Different mycelium skin types (Leather-like and Fluffy skin)

Goal of the project

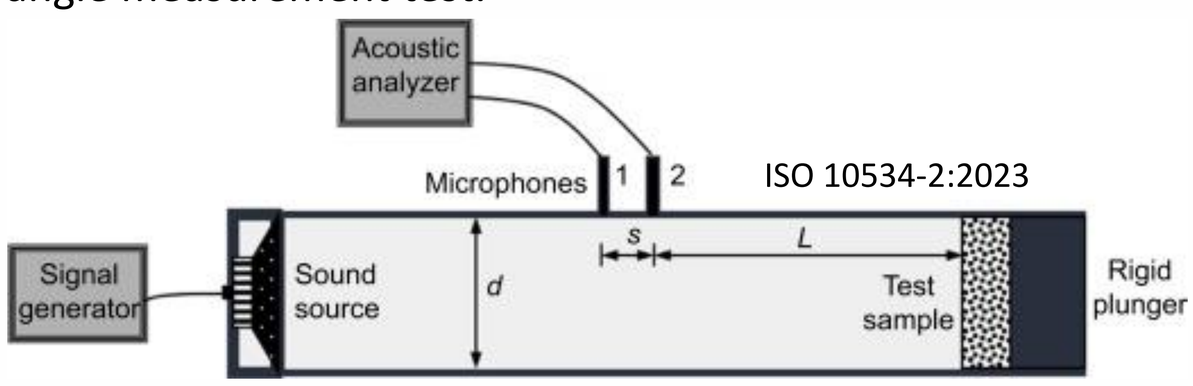
To develop a standardized protocol for producing high-performance MBCs by investigating different fungal skin types and growth conditions. This protocol aims to create reproducible samples with distinct skin characteristics, enabling the testing and determination of their effects on physical properties.

Methodology



Production process of the MBC with different skin types

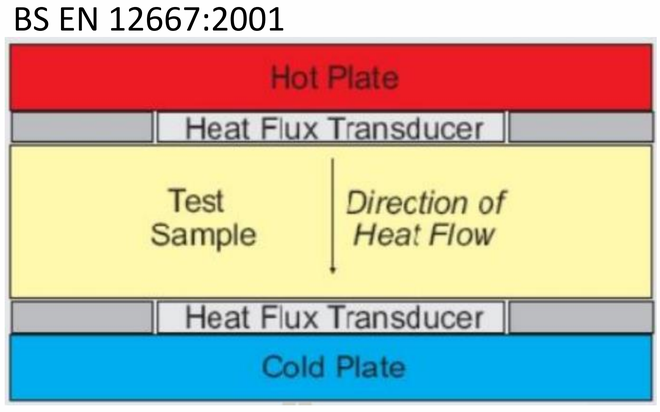
The samples were tested for its acoustic absorption, thermal conductivity and water hydrophobicity properties. This was achieved with the usage of the Impedance tube, Heat flow machine and water contact angle measurement test.



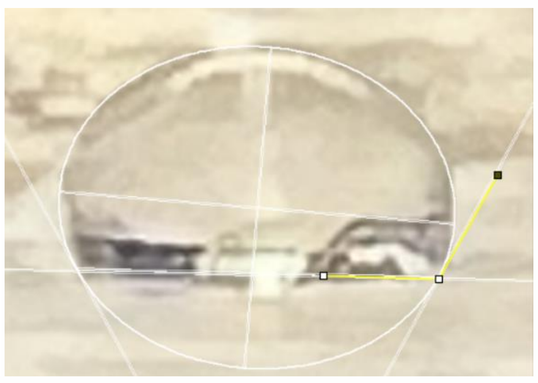
ISO 10534-2:2023

Impedance tube setup visualized

BS EN 12667:2001



Heat flow machine mechanism visualized

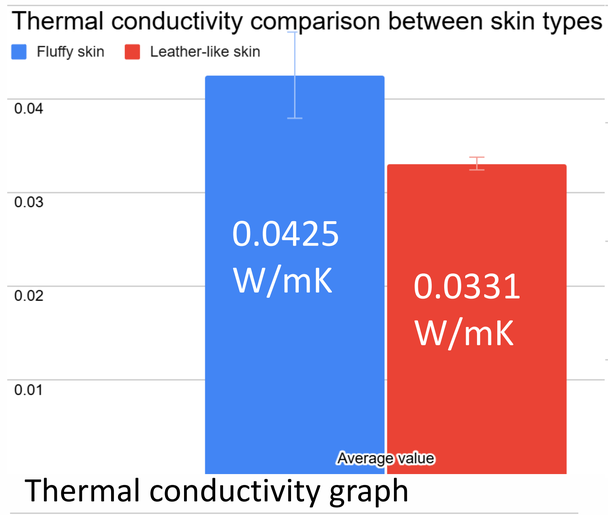


Water contact angle visualized

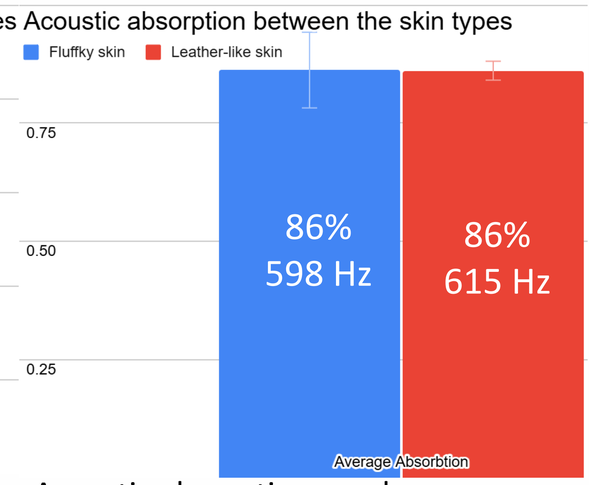
Results

Fluffy mycelium skin

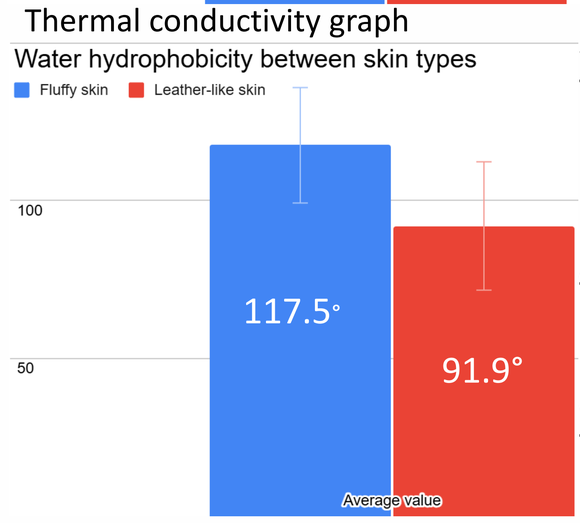
Leather-like mycelium skin



Thermal conductivity graph



Acoustic absorption graph



Water hydrophobicity graph

<u>Thermal conductivity</u>
Fluffy = 0.0425 W/mK
Leather = 0.0331 W/mK
Fluffy skin is 28.5% better
<u>Acoustic absorption</u>
Fluffy = 86% at 598 Hz
Leather = 86% at 615 Hz
<u>Water hydrophobicity</u>
Fluffy = 117.5°
Leather = 91.9°
Fluffy skin is 27.8% better

Conclusion

The developed protocol produced MBCs with distinct skin characteristics to some degree by controlling growth conditions. Results show skin type influences MBC performance. Fluffy skin exceeded leather-like skin in thermal conductivity by 28.5%, water hydrophobicity by 27.8% and sharded equal acoustic properties.. The findings offer insights for MBC optimization in targeted industrial use.

References

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Nen, "Acoustics - Determination of acoustic properties in impedance tubes - Part 2: Two-microphone technique for normal sound absorption coefficient and normal surface impedance (ISO 10534-2:2023)," October 2023. [Online]. Available: file:///C:/Users/jerre/Downloads/ISO%2010534-2%20(1).PDF.