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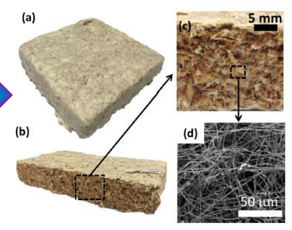
The growth of mycelium covering with sufficient oxygen permeation of PVC plastic food wrap

Pimpet Sratong-on*, Kanyarat Puttawongsakul, Nawin Kantawee
Composite Materials & Lightweight Structures, Faculty of Engineering, Thai-Nichi Institute of Technology, Bangkok 10250 Thailand. (*corresponding author's email: pimpet@tni.ac.th)

INTRODUCTION

Fungi of mushroom[1] "Mycelium"

Mycelium-based composite (MBC)[2]



Mycelium grows on agro-wasted materials

- Upcycling agricultural wastes
- Low carbon emission in entire life time

MBC comes from nature and decomposes in nature

Solution
Apply thin film between mold and MBC during shaping

MBC can be easily molded into various shape

Problem
MBC is brittle
→ Crack easily occurs upon demolding

(1) Stencil paper

(2) PVC food wrap film

MATERIALS & METHOD

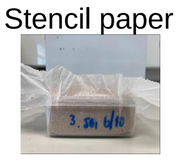
Inoculation

As-received spawn mixed with sawdust from local farm

Incubation

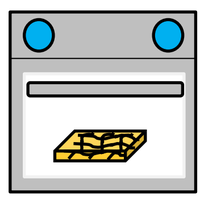
Breaking → Molding & Growing → Demolding

Stencil paper



PVC film food

Deactivation



Baking
125 °C, 8 hrs

Final product of MBC

Oyster mushroom mycelium/sawdust

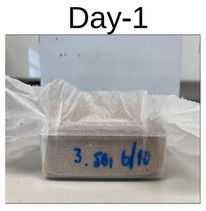
Objective

To investigate the effect of oxygen transmission rate (OTR) of PVC plastic food wrap and stencil paper on the growth of mycelium of oyster mushroom on sawdust

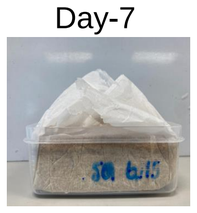
RESULTS & DISCUSSION

MBC/Stencil Paper/PP

Day-1

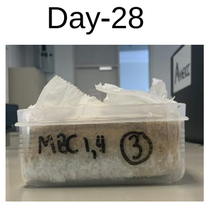


Day-7



Day-14

Day-28

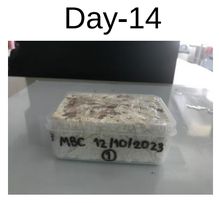


MBC/PVC film/PP

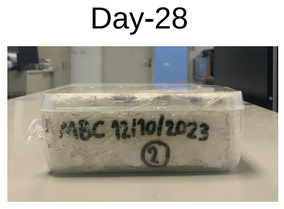
Day-1

Day-7

Day-14



Day-28

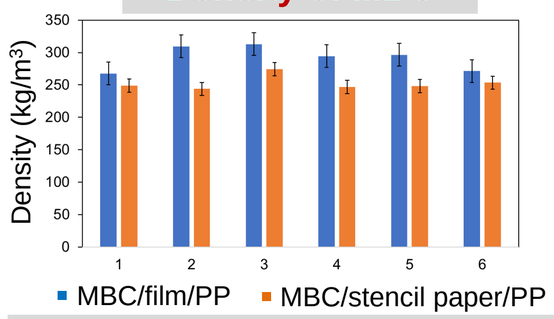


After baking at 125°C, 8 hrs

%Weight loss: 58.8%

%Weight loss: 43.3%

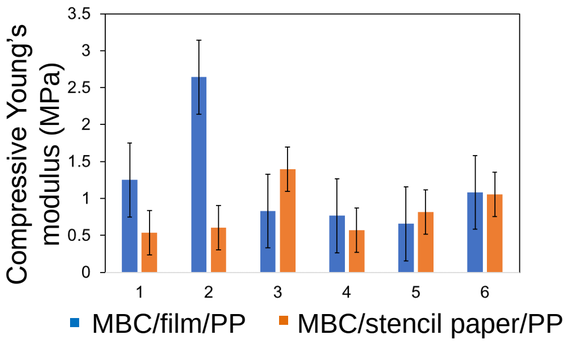
Density of MBC



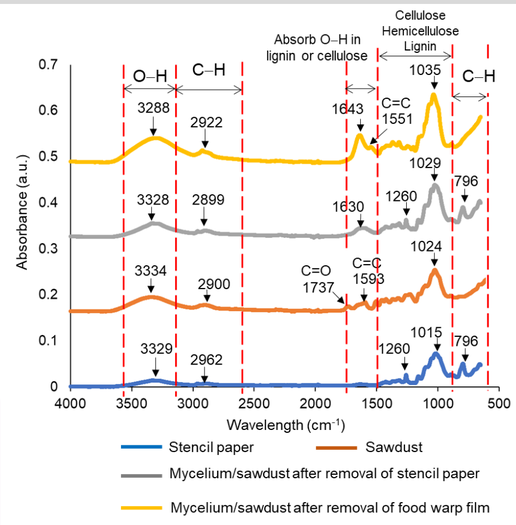
OTR of thin films

Thin film types	OTR (cc-mm/m²/day)
PVC Plastic food wrap	143.88
Stencil paper	11,777.78
PVC rigid tube [3,6]	3.0
PET-G [4,6]	9.7
PP cast [5,6]	76.0

Compressive Young's modulus



FT-IR spectrum



Day-28

Mycelium fully grown on stencil paper

Possibility of using stencil paper or paper as substrate!

CONCLUSION

1. Although the oxygen transfer rate of stencil paper is the highest, the density of mycelium grown on stencil paper/PP mold is less than mycelium grown on PVC film/PP mold.
2. The uniform growth of mycelium was observed at interface of MBC/PVC film/PP mold compared to stencil paper and previous literatures. It is not necessary to remove MBC from mold before 14 – 28 days
3. Mycelium decomposed stencil paper since it contained cellulose composition, which confirmed by FT-IR spectrum and the growth of mycelium on stencil paper in petri dish. Paper is not helpful to reduce friction during removal of MBC from plastic mold

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ACKNOWLEDMENT

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