Faculty of Chemistry
Institute of Materials Chemistry & Research
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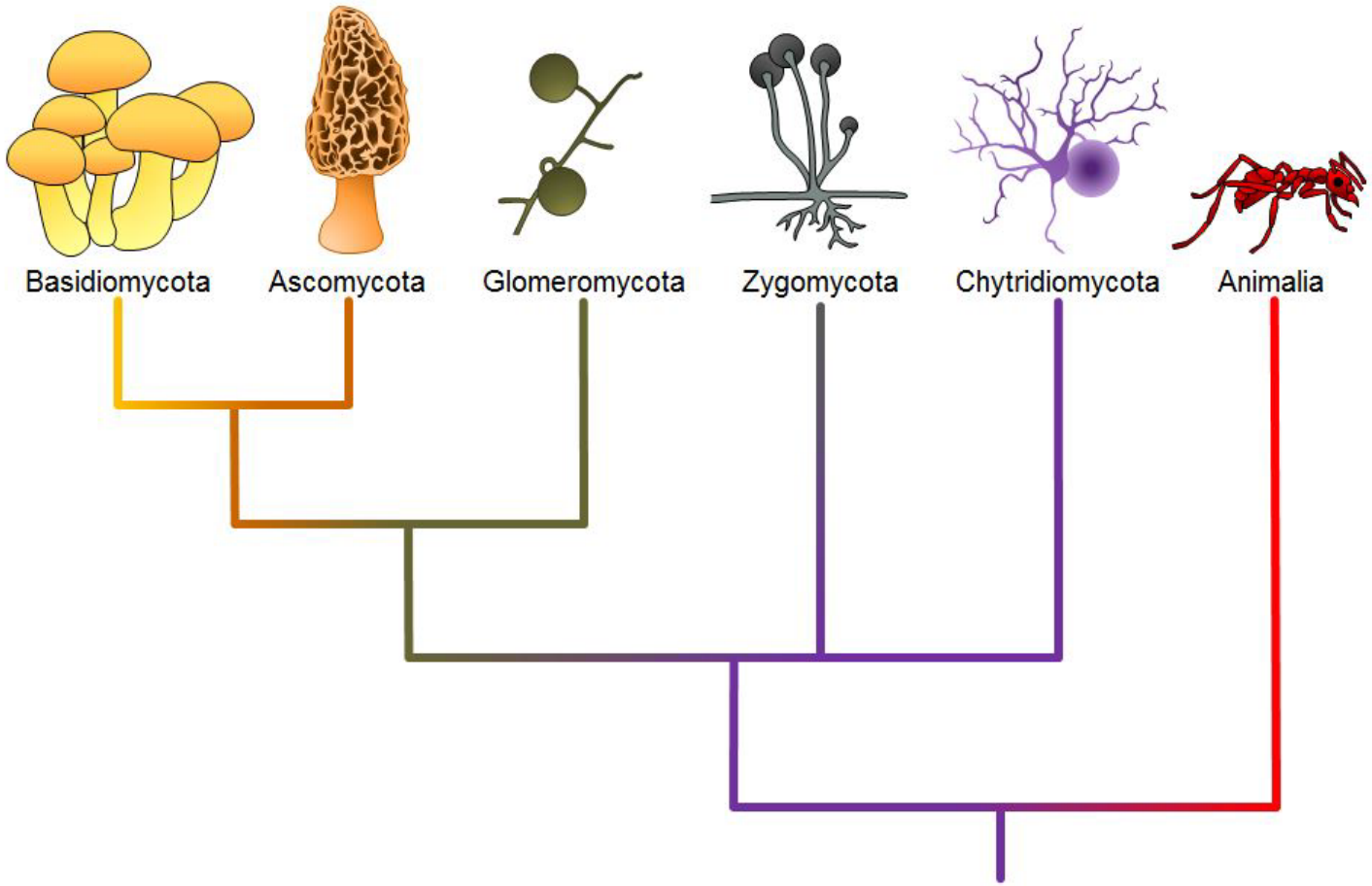
Upcycling Using Fungi

Dr. Mitchell P. Jones

imcr

Kingdom Fungi: Nature's Recycler



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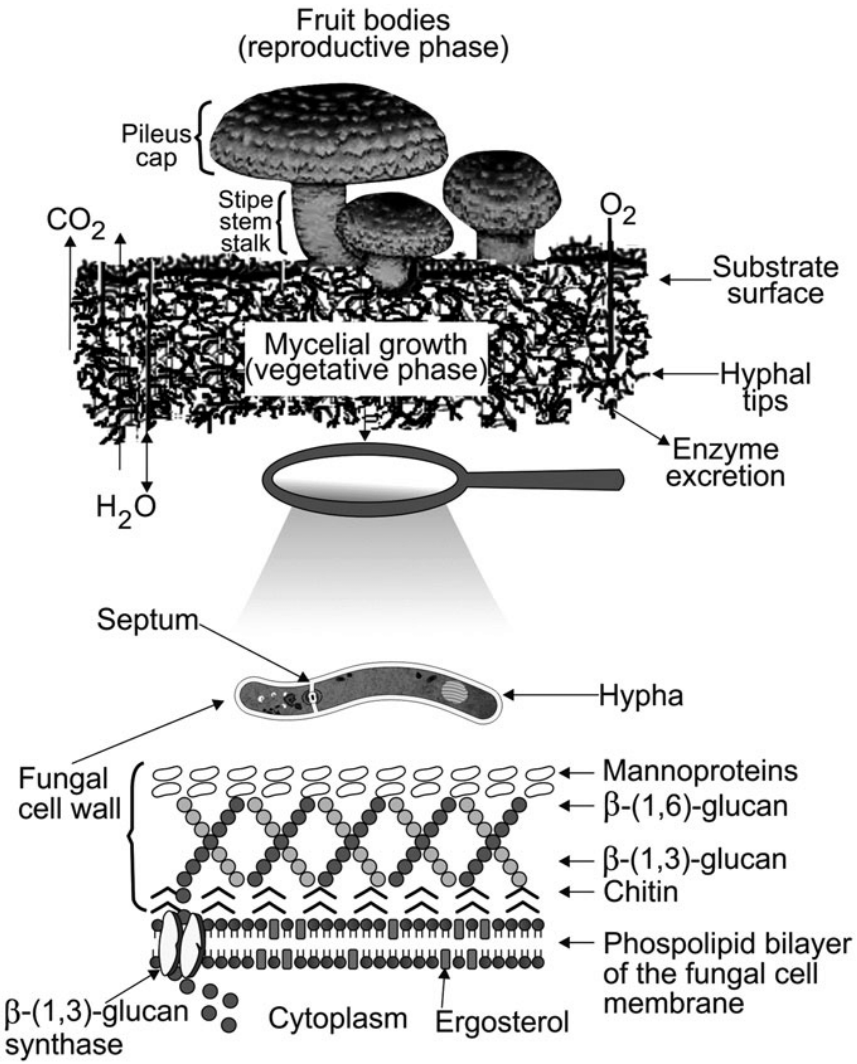

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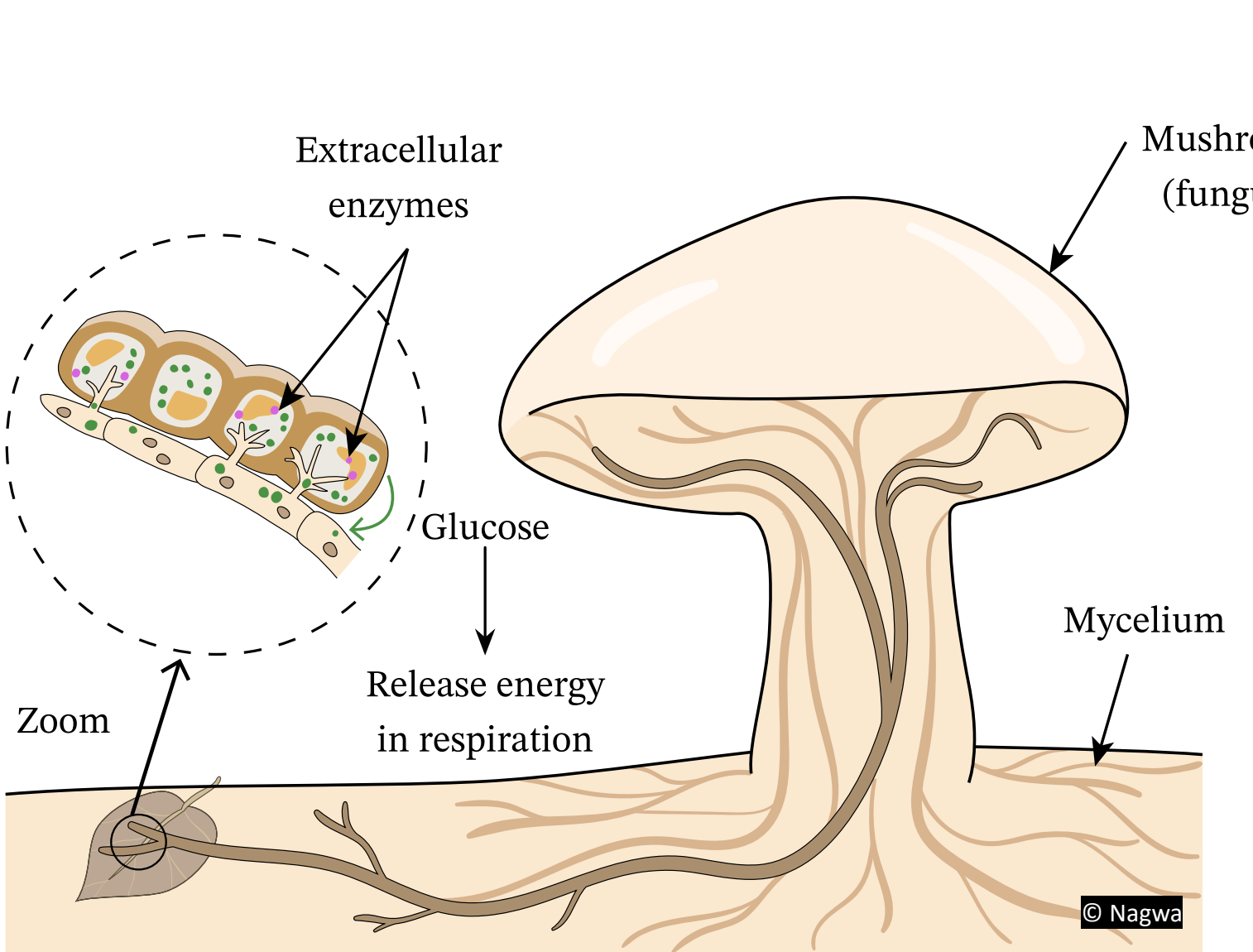
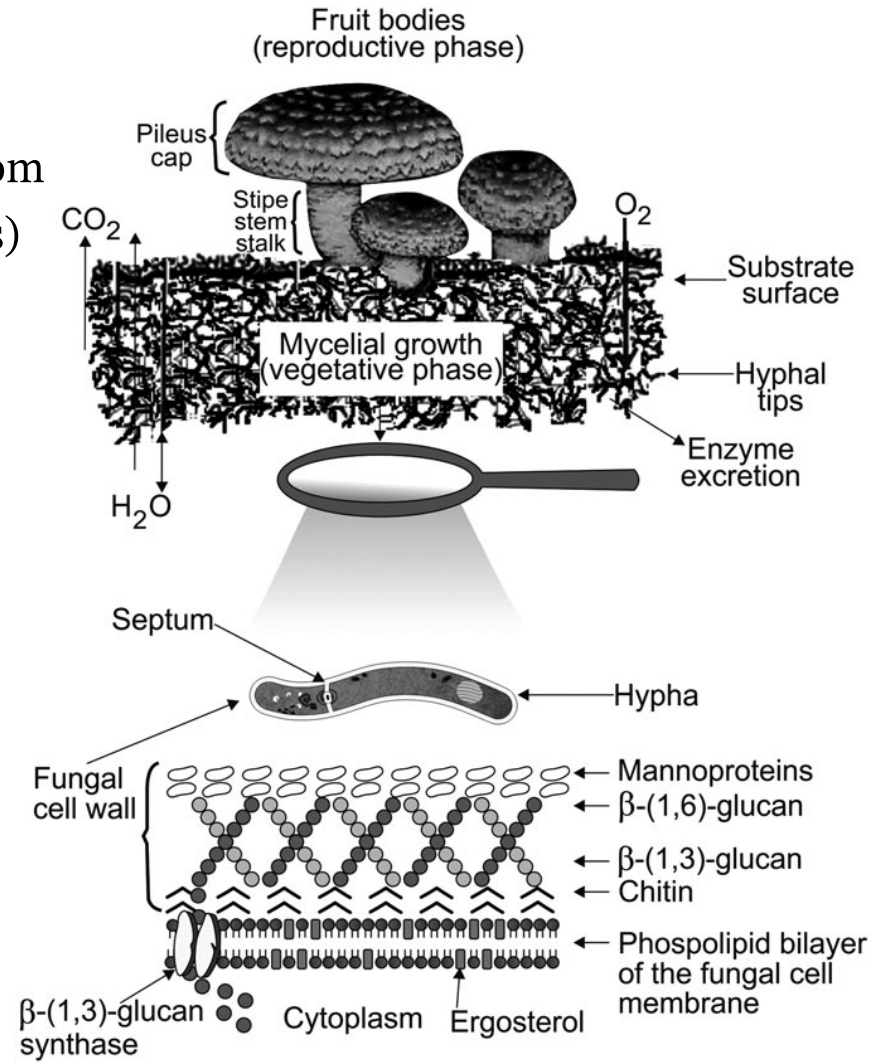
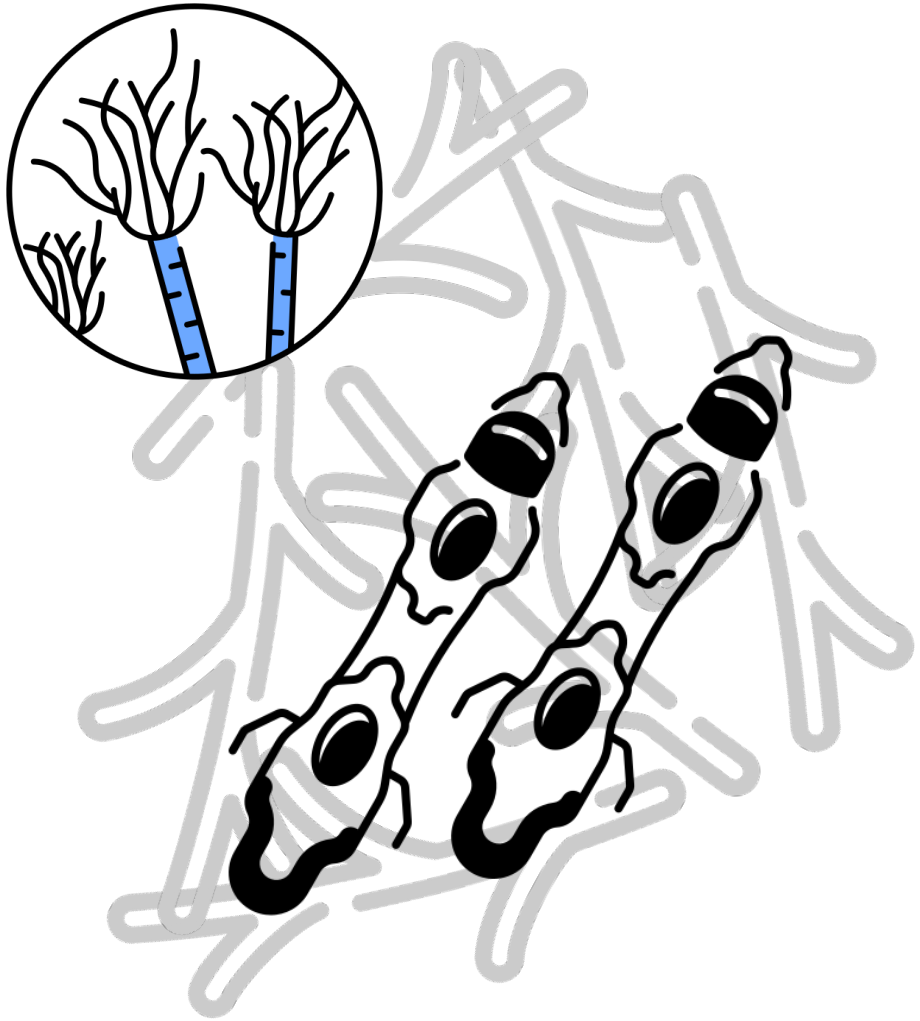
Kingdom Fungi: Nature's Recycler





Fungal Biorefinery for Waste Upcycling

(1)



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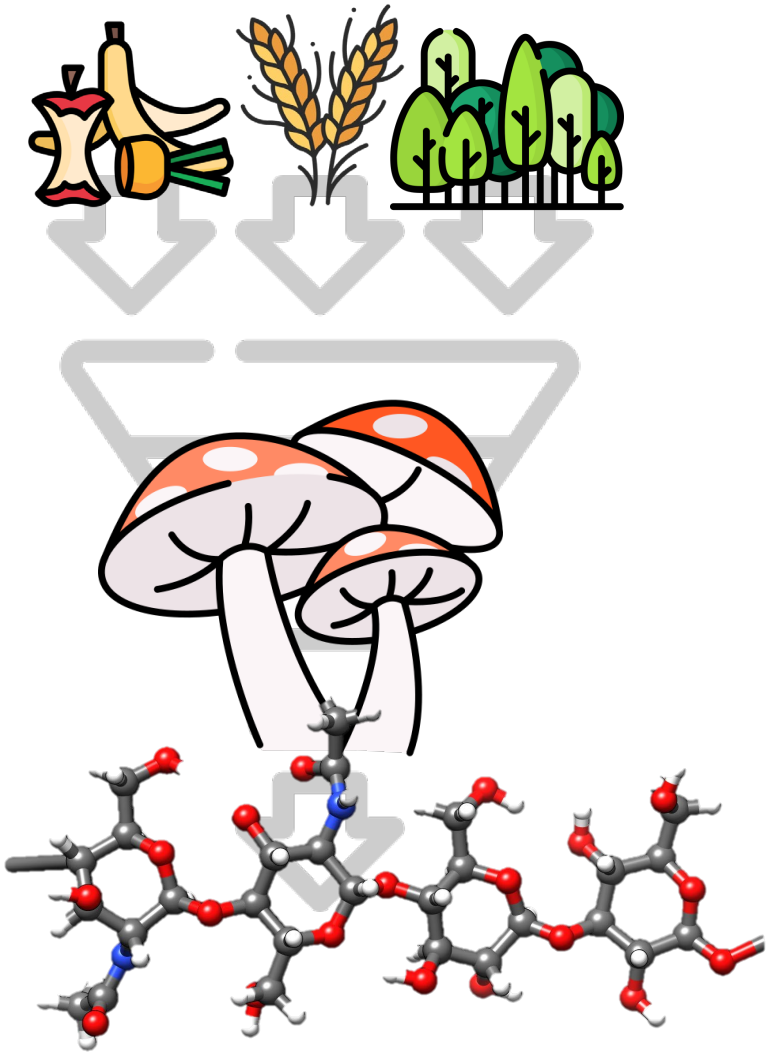
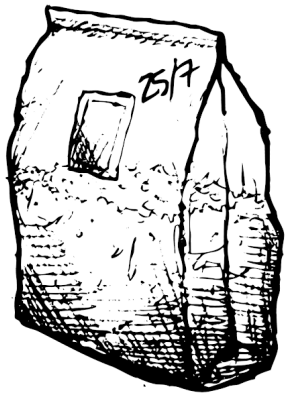


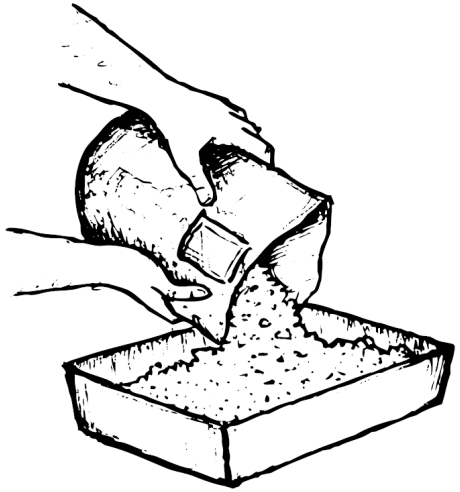
(1) Mycelium Foams: Bio-based Manufacturing

a



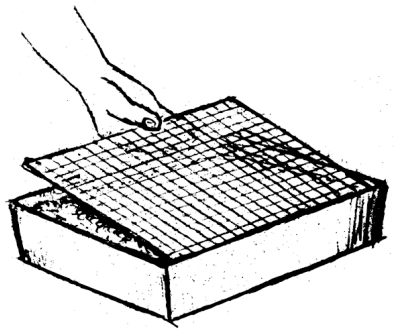
SSF grow bag
or solid-state bioreactor

b



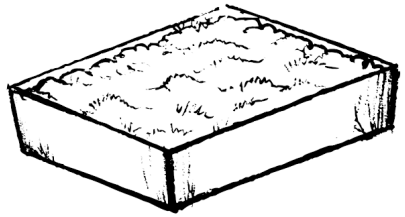
pouring pre-colonized SSF substrate
into trays or static bed reactors

c



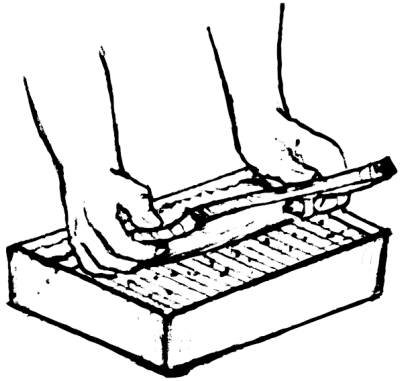
optionally, a porous material or grid
is placed on top of the substrate

d



during incubation a fungal mat forms
on the top surface of the SSF substrate

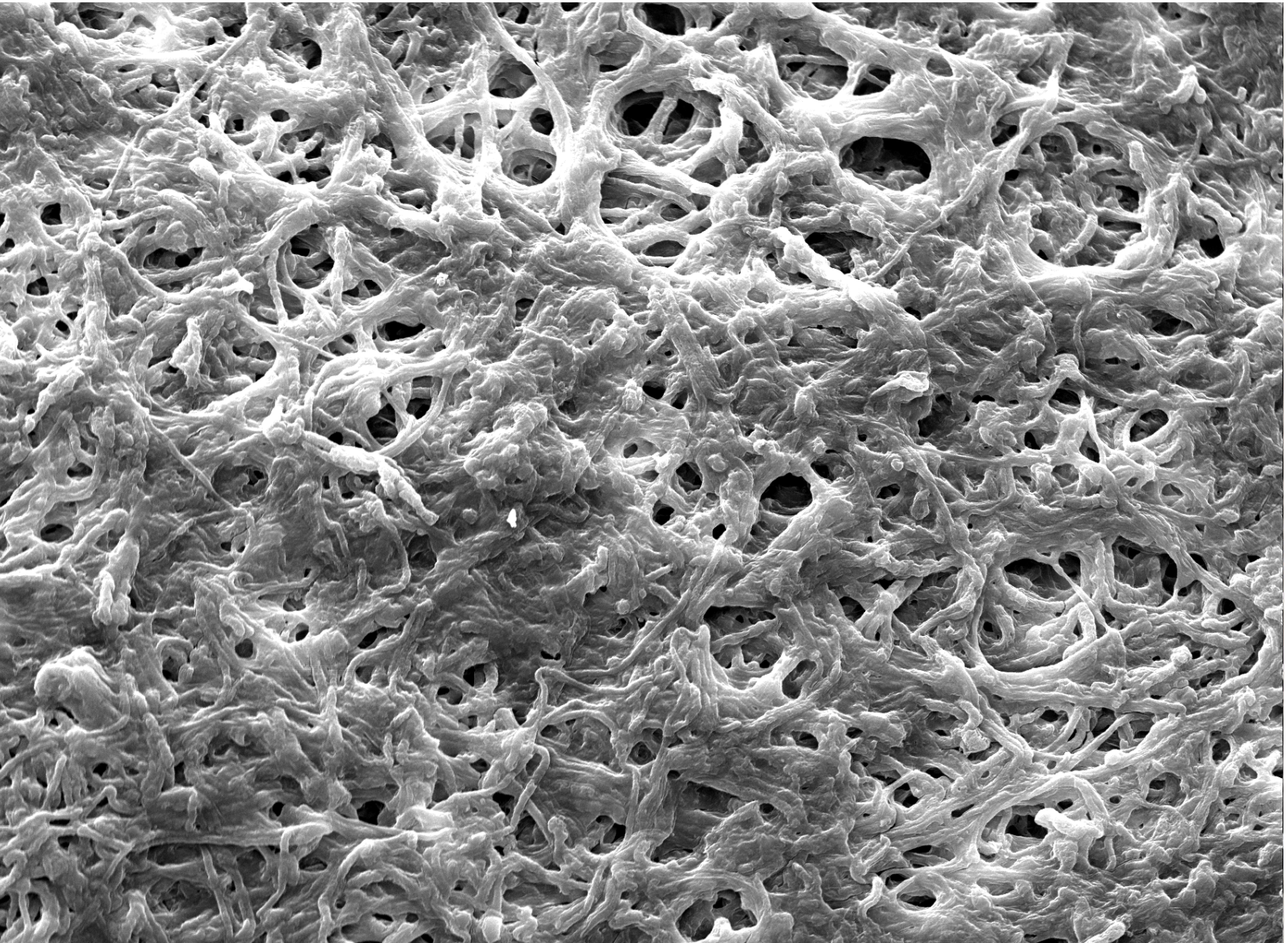
e



harvesting of the fungal mat (aka slab)
grown on the SSF tray

(1) Mycelium Composites: Bio-based Manufacturing

(1) Mycelium Foams: Bio-based Manufacturing



(1) Mycelium Foams: Non-structural Materials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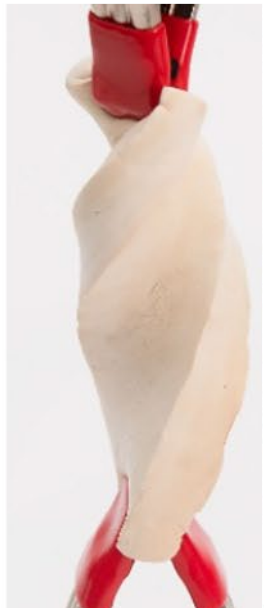
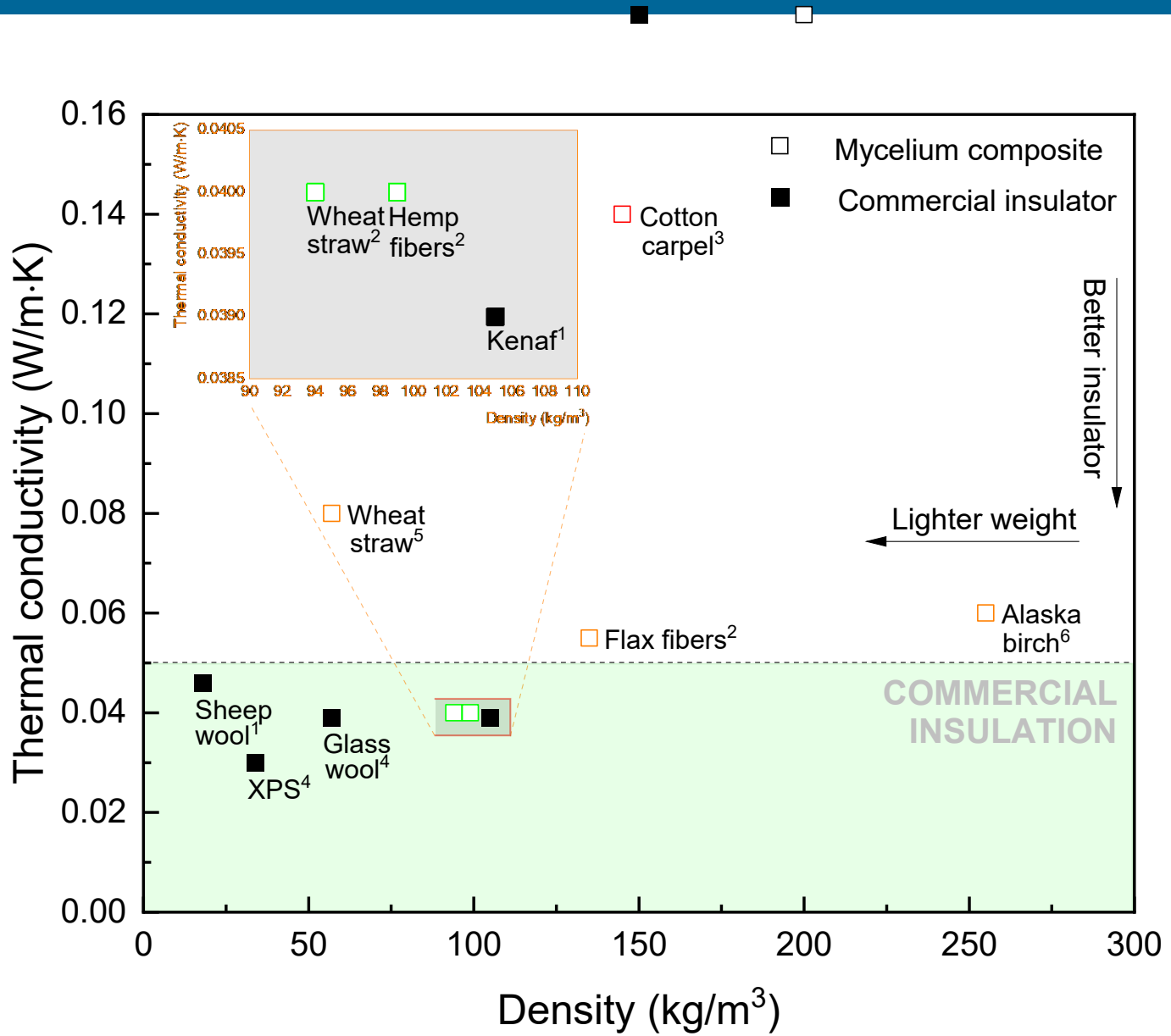
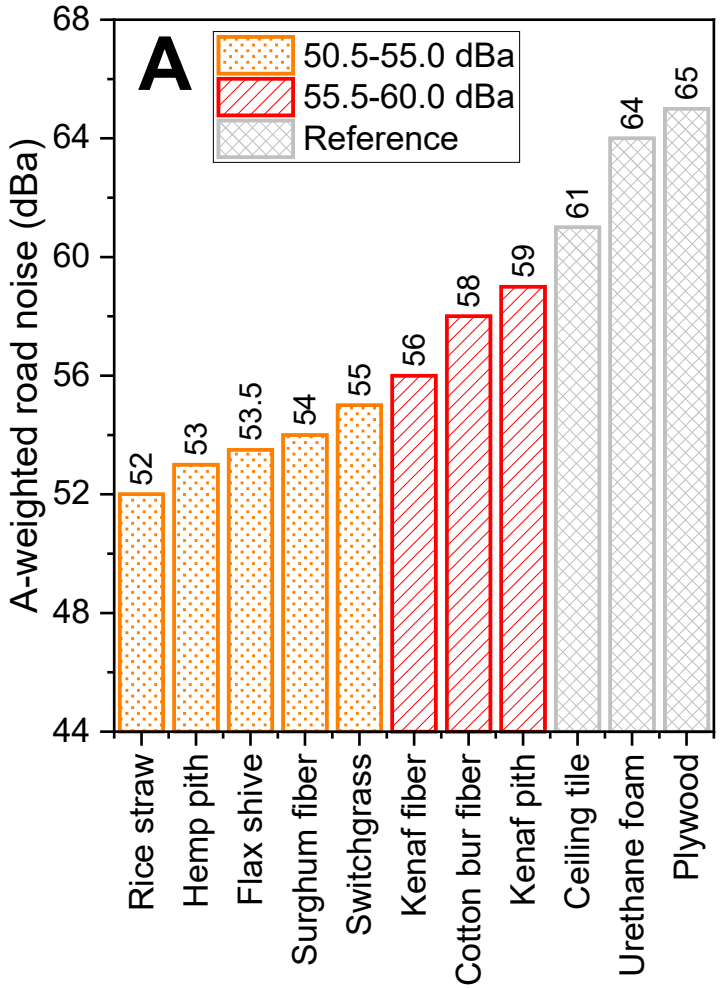
(1) Mycelium Foams: Semi-structural Materials

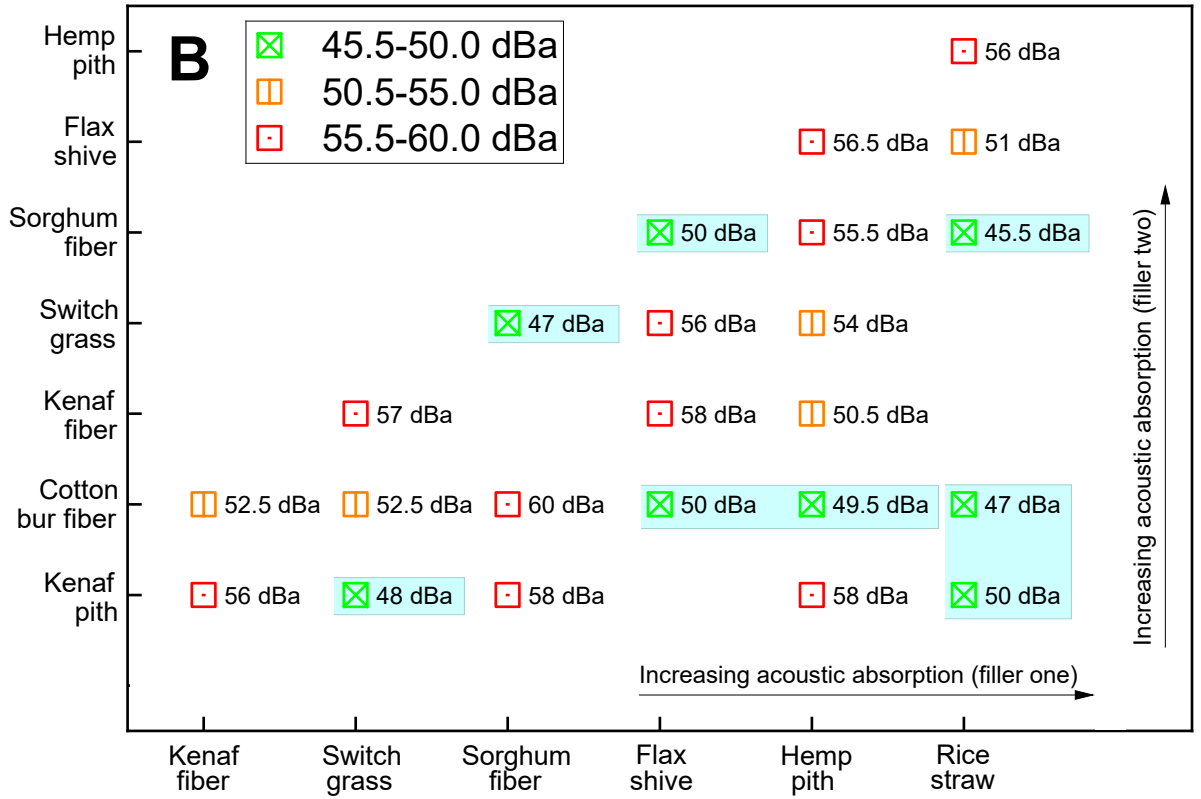


(1) Mycelium Foams: Thermal Insulation

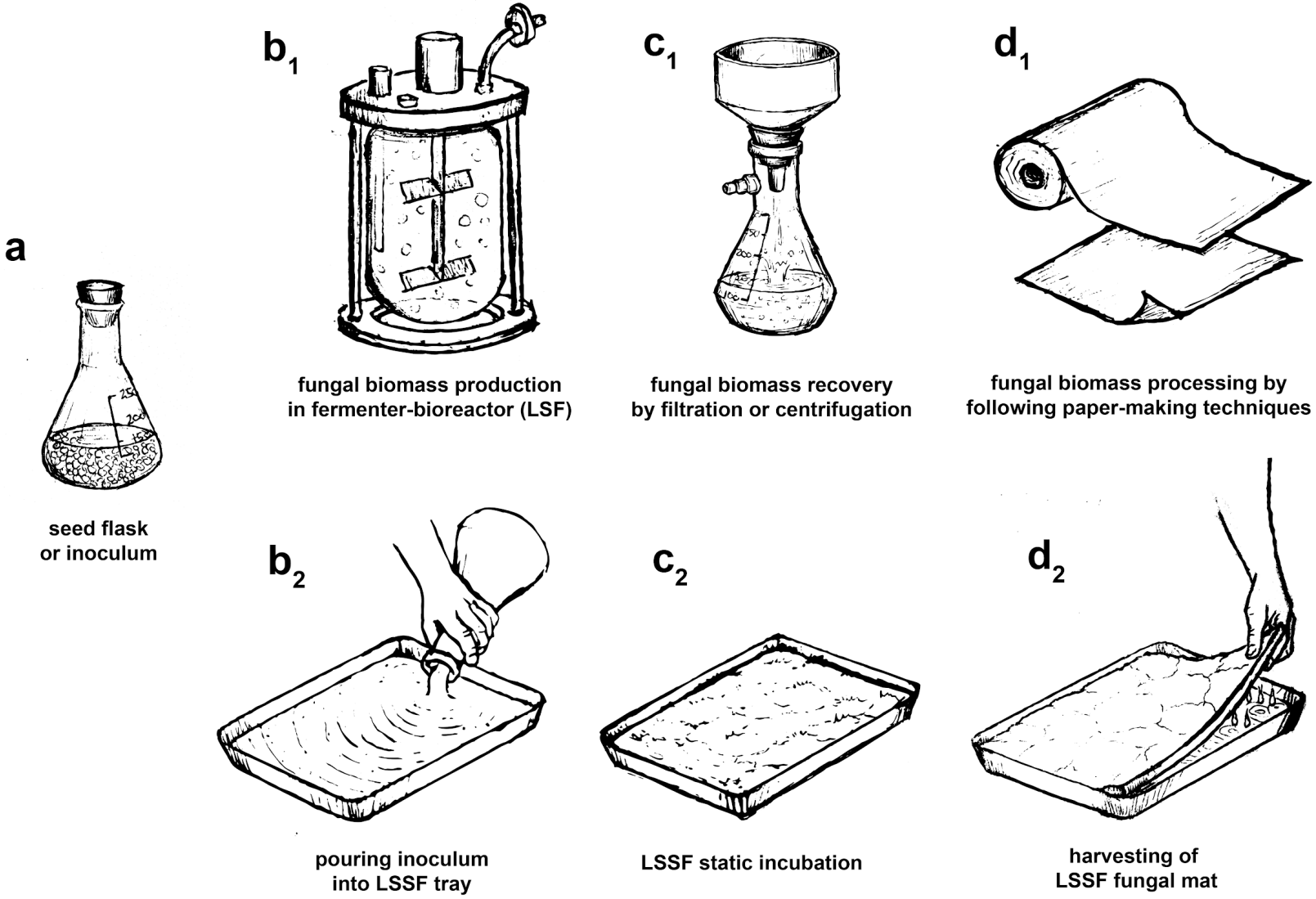


(1) Mycelium Foams: Acoustic Insulation

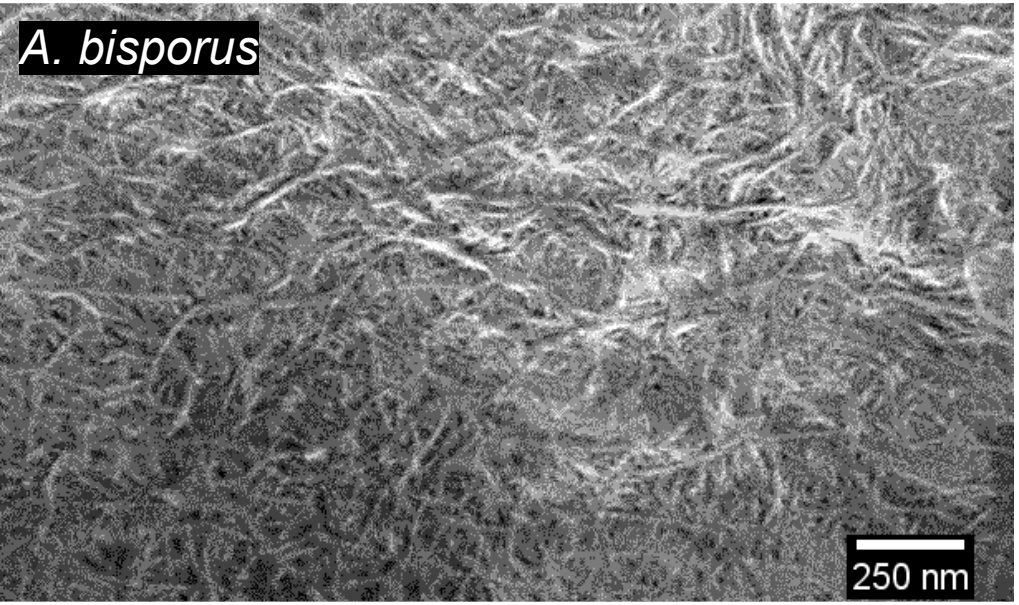


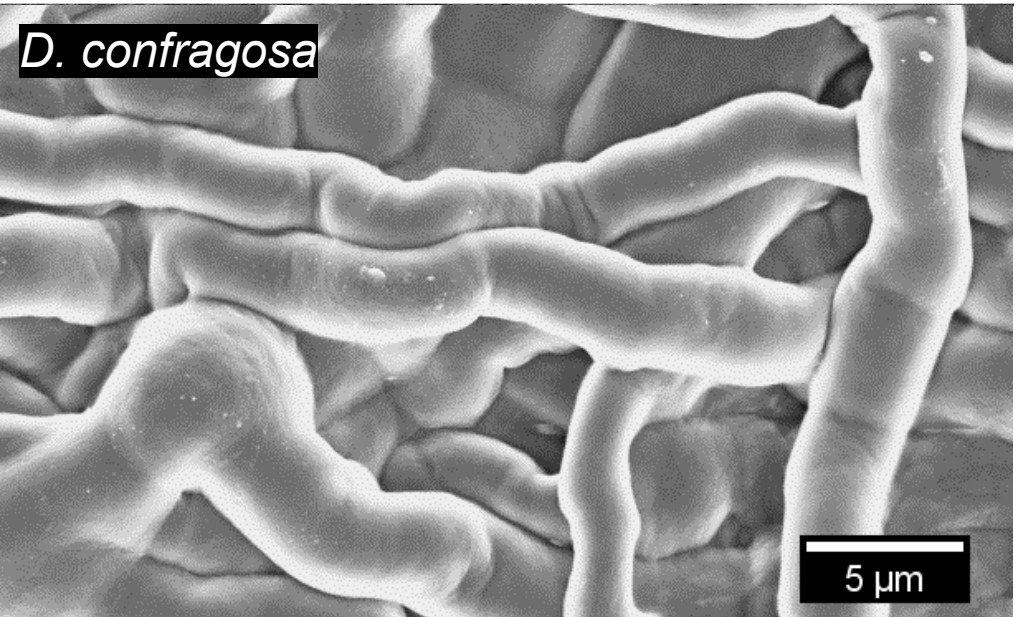


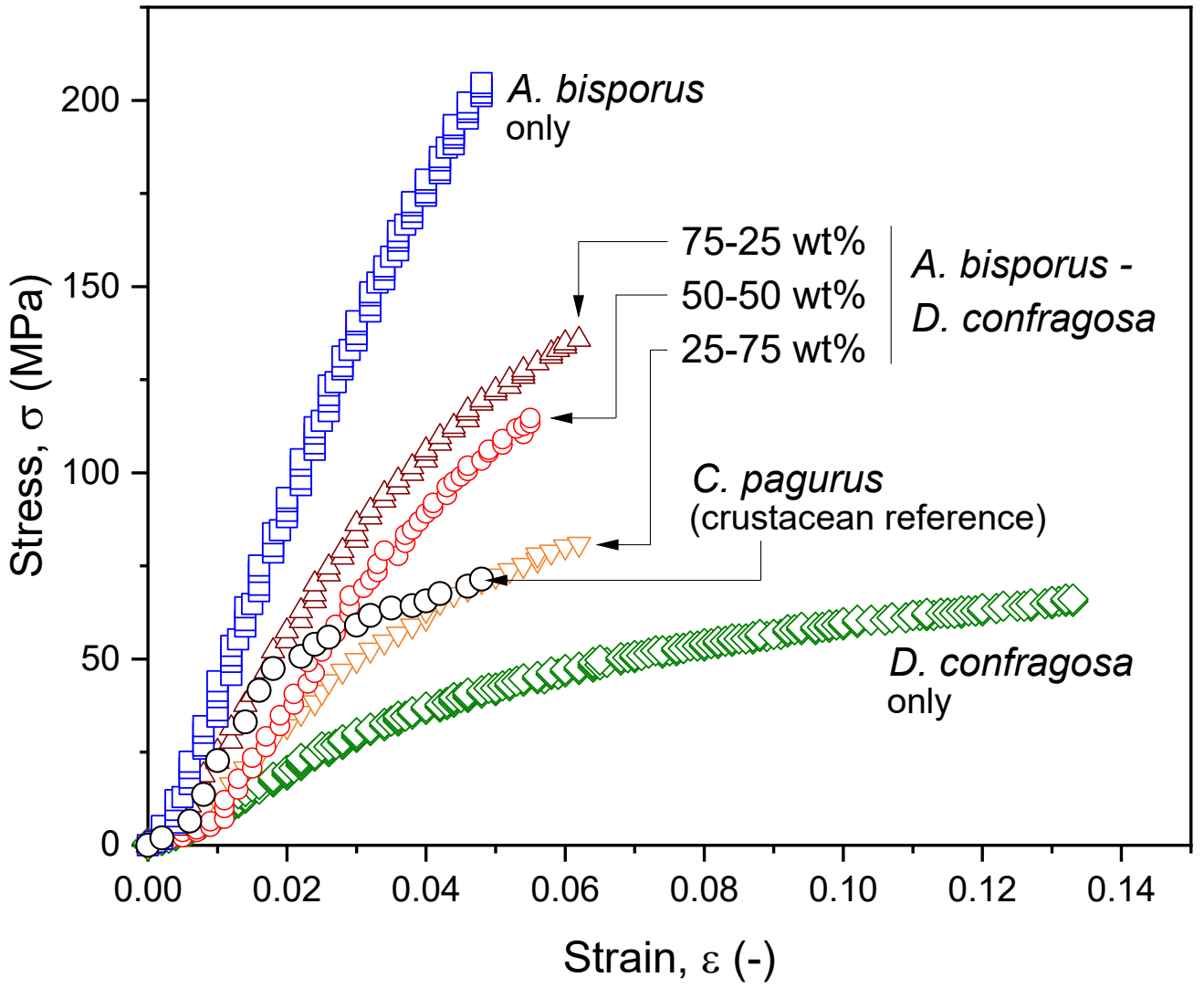
(2) Fungal Nanomaterials: Bio-based Manufacturing



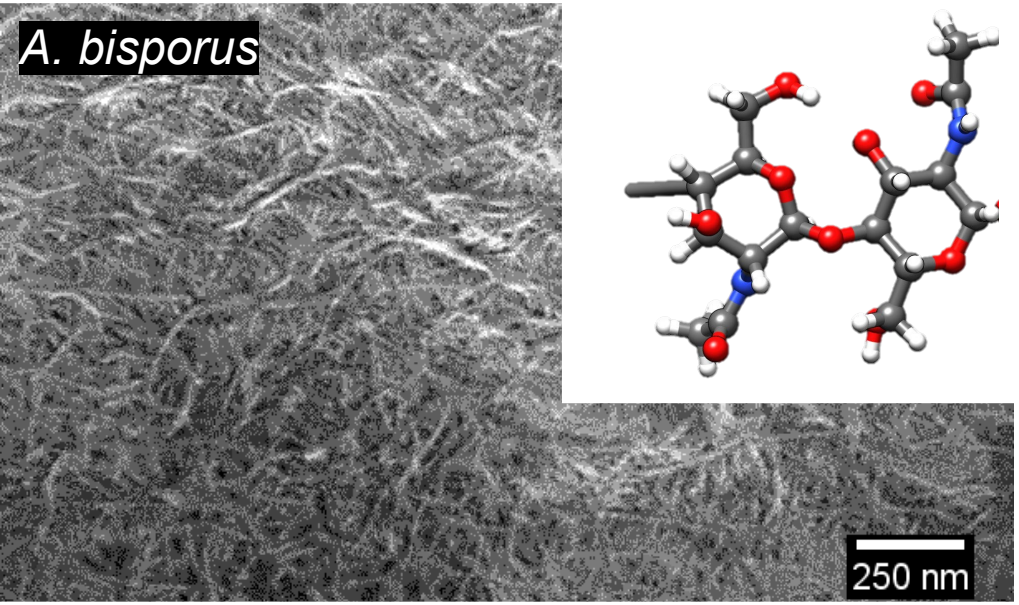
(2) Fungal Nanomaterials: Mechanical Property Tuning

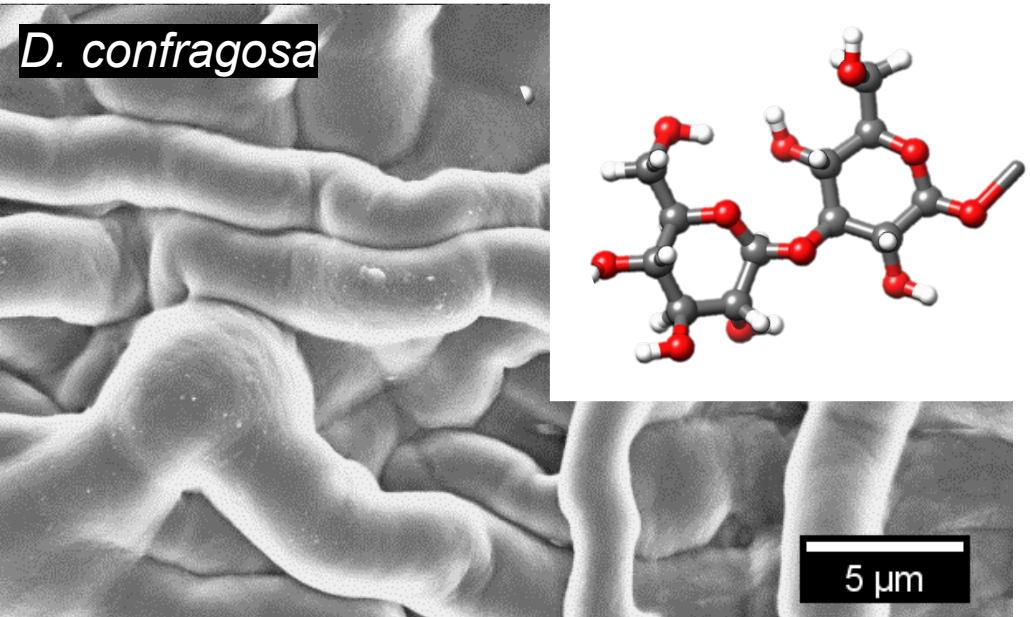


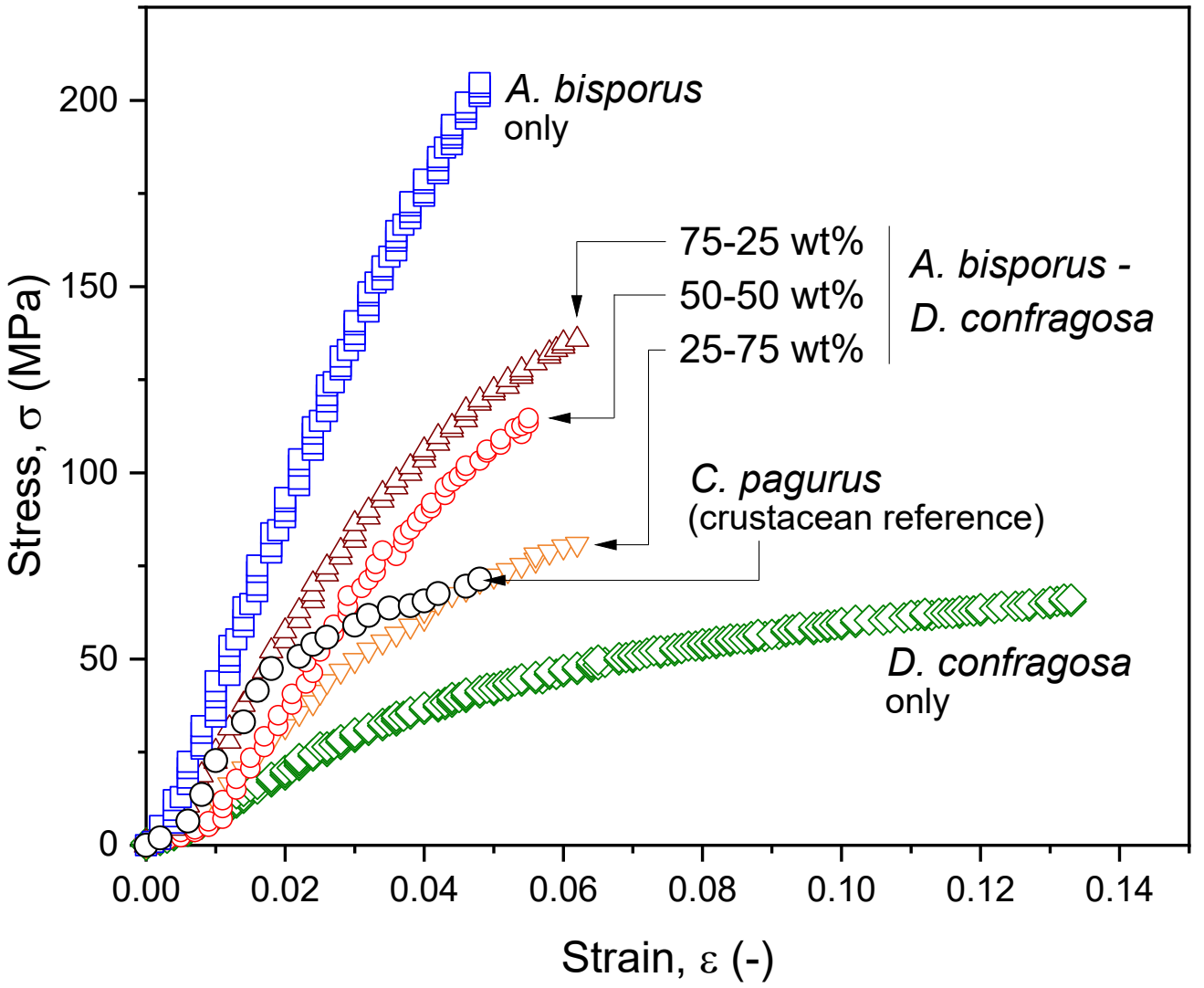




(2) Fungal Nanomaterials: Mechanical Property Tuning

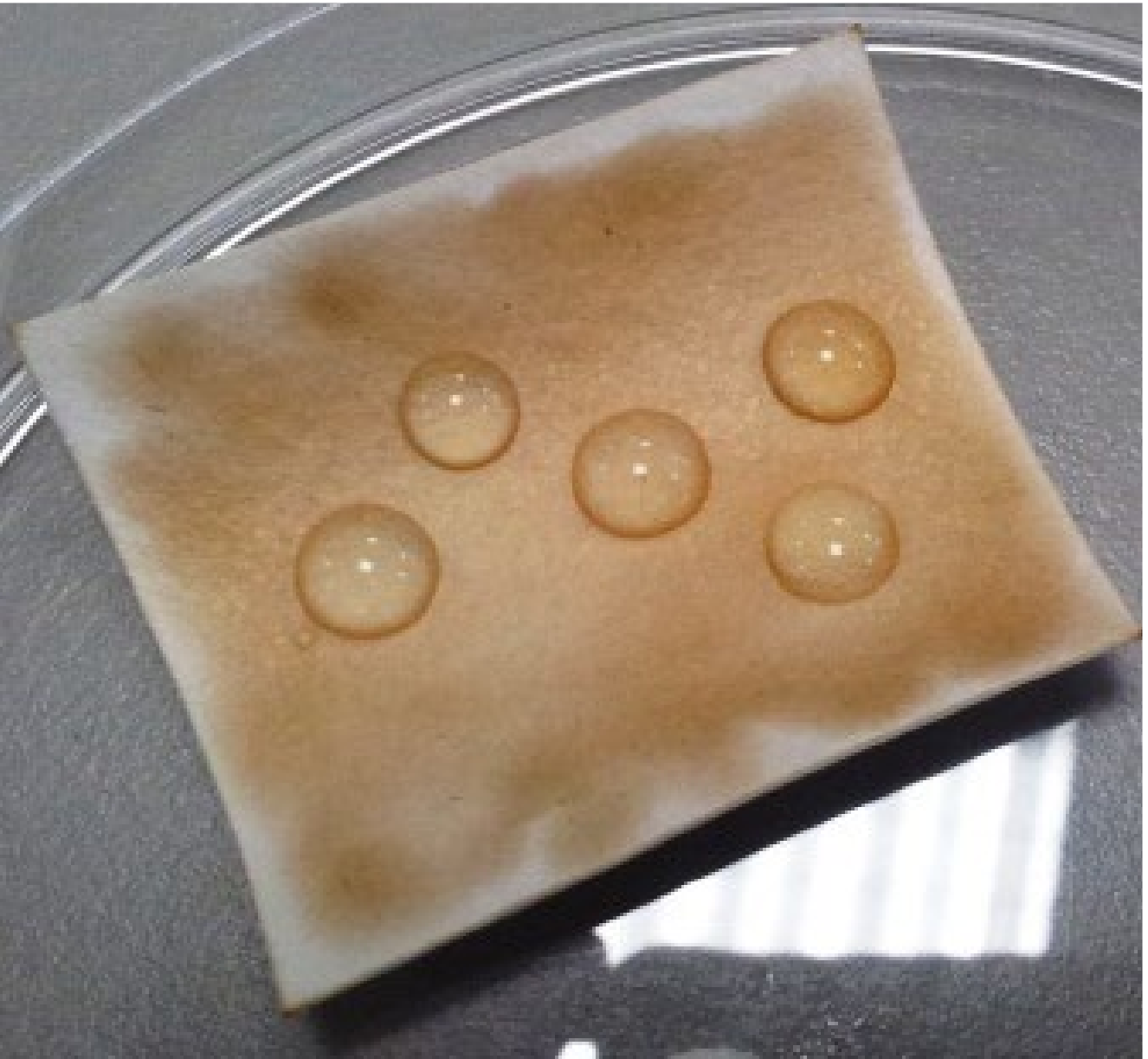


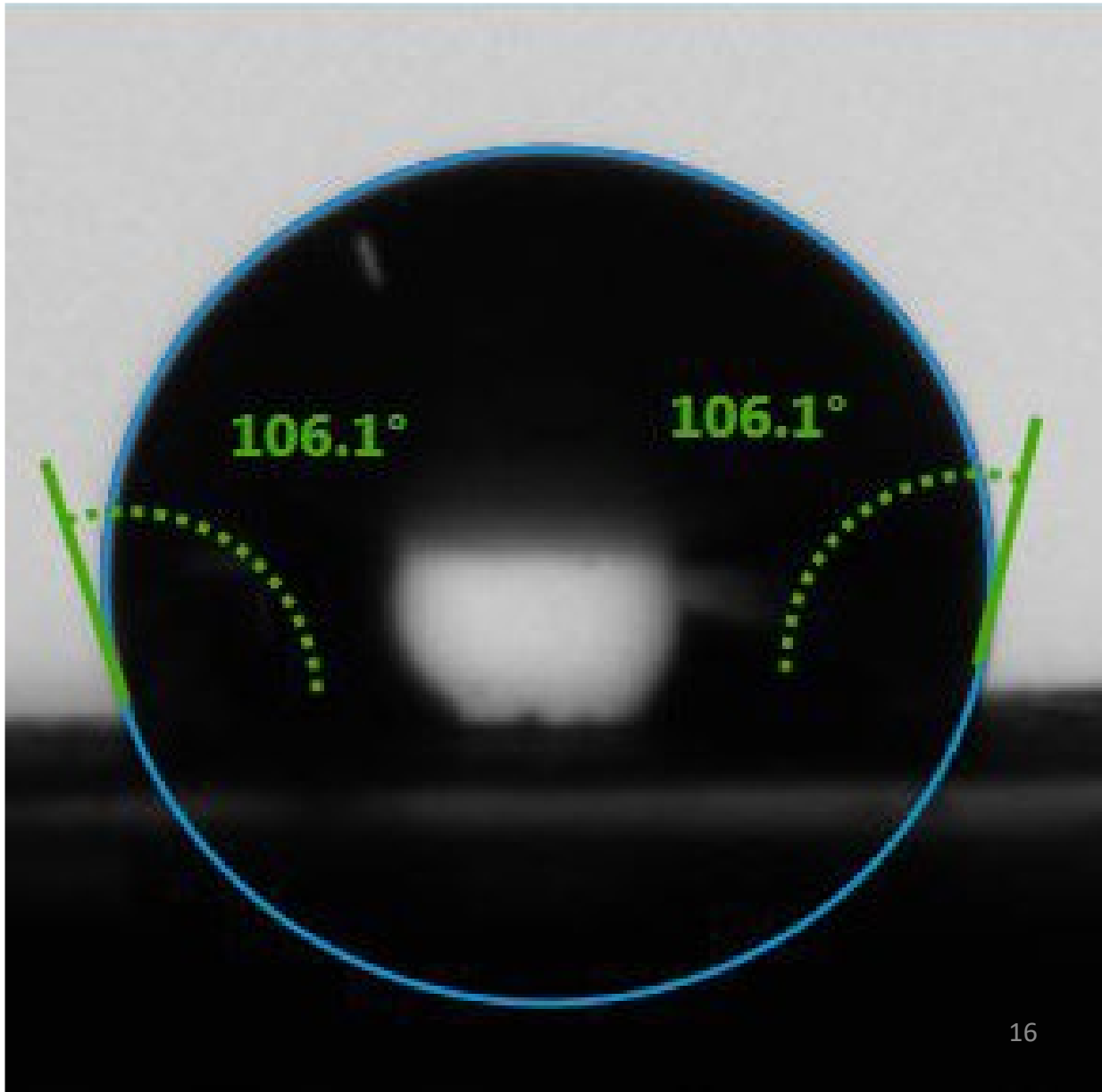




(2) Fungal Nanomaterials: Transparency

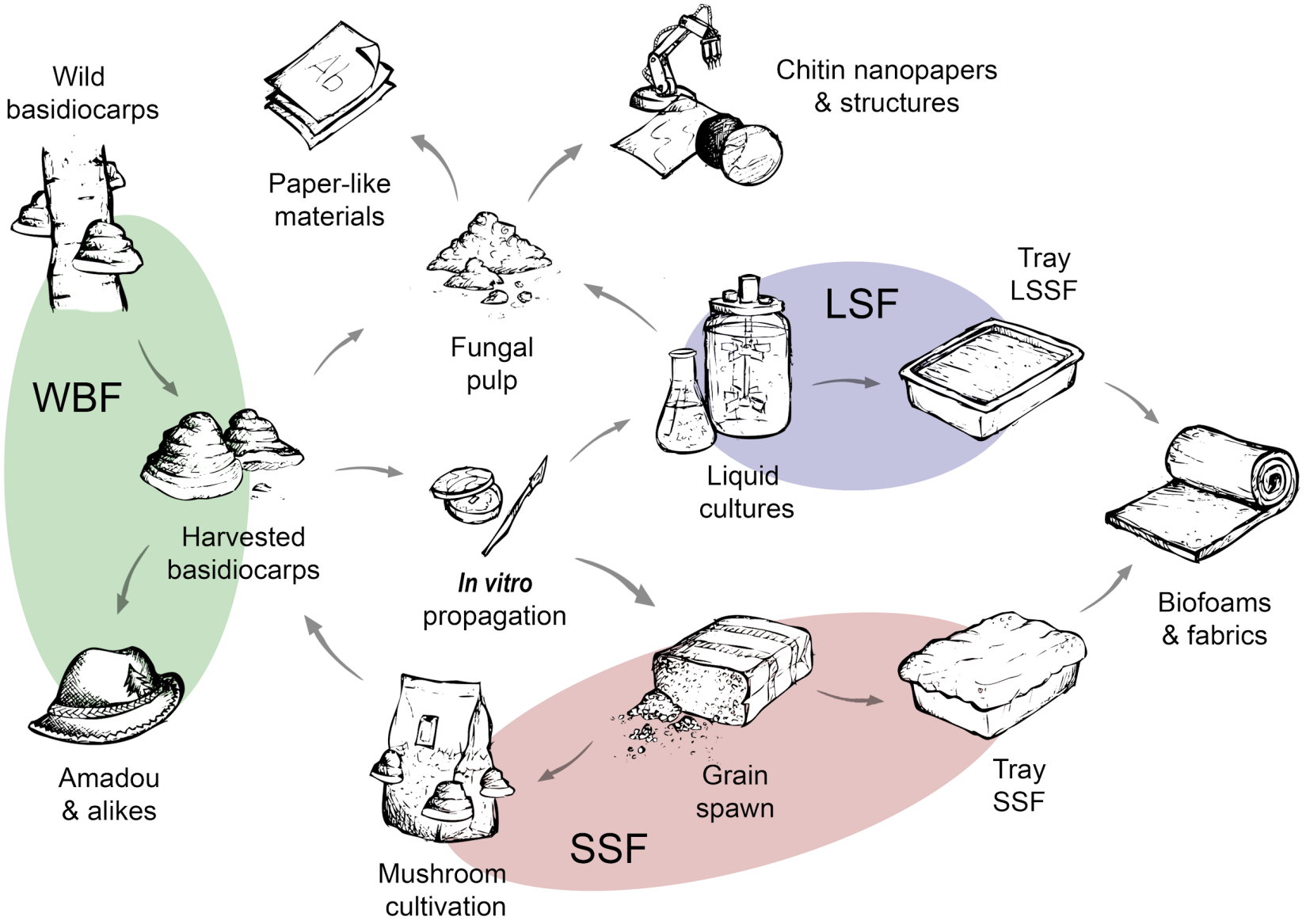
(2) Fungal Nanomaterials: Hydrophobicity





(2) Fungal Nanomaterials: Applications

Conclusion: Flexible Manufacturing Platform



Conclusion: Flexible Manufacturing Platform

- Wide range of possible **waste input substrates**
- Carbon neutral **bio-based manufacturing** (when optimised)
- Many possible **manufacturing routes** and **products**
- Considerable **consumer**, **commercial** and **academic interest**
- Mycelium **foams** viable for non- and semi-structural applications; best suited to **packaging** and **insulation**
- Fungal **nanomaterials** viable for **paper**, **leather alternatives**, **yarns**, **coatings**, **membranes**, **wound dressings**
- **High-margin products** (leather alternatives) **help scaling**

Thank You for Your Attention