

## CLAIMS

1. A method for culturing a filamentous fungus in a fermentation medium, comprising:
  - (a) aerating the fermentation medium to provide an air-medium colloid (AMC); and
  - (b) culturing the filamentous fungus in or on the AMC to form a biomass of the filamentous fungus.
2. The method of claim 1, wherein the AMC comprises an inoculum of the filamentous fungus.
3. The method of claim 1, further comprising inoculating the AMC with an inoculum of the filamentous fungus.
4. The method of claim 1, wherein the AMC comprises a stabilizer.
5. The method of claim 4, wherein the stabilizer is selected from the group consisting of a polysaccharide gum, an anionic surfactant, a cationic surfactant, cetareth 20, cellulose, diacetyl tartaric esters of mono- and diglycerides (DATEM), a diglyceride, an emulsifying wax, glycerol monostearate, a lecithin, a monoglyceride, a mustard, a non-ionic surfactant, a soap, a sodium phosphate, sodium stearyl lactylate, a zwitterionic surfactant, a saponin, a starch, a modified starch, a plant protein surfactant, an animal protein surfactant, microparticulates, silica, and combinations and mixtures thereof.
6. The method of claim 5, wherein the stabilizer comprises xanthan gum.
7. The method of claim 4, wherein a mass ratio of the fermentation medium to the stabilizer in the AMC is between about 100:1 and about 1,000:1.
8. The method of claim 1, wherein a volume fraction of air in the AMC is between about 0.05 and about 0.95, between about 0.1 and about 0.9, between about 0.2 and about 0.8, between about 0.3 and about 0.7, between about 0.4 and about 0.6, or about 0.5.
9. The method of claim 1, wherein the AMC is a foam that is stable over at least about 1 day, at least about 2 days, at least about 3 days, at least about 4 days, at least about 5 days, at least about 6 days, at least about 7 days, at least about 8 days, at least about 9 days, at least about 10 days, at least about 11 days, at least about 12 days, at least about 13 days, at least about 14 days, at least about 15 days, at least about 16 days, at least about 17 days, at least about 18 days, at least about 19 days, at least about 20 days, at least about 21 days, at least about 22 days, at least about 23 days, at least about 24 days, at least about 25 days, at least about 26 days, at least about 27 days, at least about 28 days, at least about 29 days, or at least about 30 days.

10. The method of claim 1, wherein the filamentous fungus belongs to an order selected from the group consisting of *Ustilaginales*, *Russulales*, *Polyporales*, *Agaricales*, *Pezizales*, and *Hypocreales*.

11. The method of claim 1, wherein the filamentous fungus belongs to a family selected from the group consisting of *Ustilaginaceae*, *Hericiaceae*, *Polyporaceae*, *Grifolaceae*, *Lyophyllaceae*, *Strophariaceae*, *Lycoperdaceae*, *Agaricaceae*, *Pleurotaceae*, *Physalacriaceae*, *Omphalotaceae*, *Tuberaceae*, *Morchellaceae*, *Sparassidaceae*, *Nectriaceae*, and *Cordycipitaceae*.

12. The method of claim 1, wherein the filamentous fungus belongs to a species selected from the group consisting of *Ustilago esculenta*, *Hericium erinaceus*, *Polyporus squamosus*, *Grifola fondosa*, *Hypsizygus marmoreus*, *Hypsizygus ulmarius*, *Calocybe gambosa*, *Pholiota nameko*, *Calvatia gigantea*, *Agaricus bisporus*, *Stropharia rugosoannulata*, *Hypholoma lateritium*, *Pleurotus eryngii*, *Pleurotus ostreatus*, *Tuber borchii*, *Morchella esculenta*, *Morchella conica*, *Morchella importuna*, *Sparassis crispa*, *Fusarium venenatum*, MK7 ATCC Accession Deposit No. PTA-10698, *Disciotis venosa*, and *Cordyceps militaris*.

13. The method of claim 1, further comprising, prior to or during step (b), adding a food-grade or food-safe additive to the AMC.

14. A filamentous fungal biomat, produced by the method of claim 1.

15. The biomat of claim 14, comprising a stabilizer.

16. The biomat of claim 14, comprising a food-grade or food-safe additive.

17. The biomat of claim 14, having at least one of the following properties:

(a) a thickness of at least about 1.75 mm;

(b) a mass of at least about 295 grams per square meter of a top surface area of the AMC;

(c) a dry density of at least about 0.20 g/cm<sup>3</sup>;

(d) a tensile strength of at least about 255 kPa;

(e) a carbohydrate content of at least about 47 wt% when dry.

18. A foodstuff, comprising at least a portion of the biomat of claim 14.

19. A structural material, comprising at least a portion of the biomat of claim 14.

20. A textile material, comprising at least a portion of the biomat of claim 14.

21. A filamentous fungal biomat, having at least one of the following properties:

(a) a thickness of at least about 1 mm;

- (b) a mass of at least about 295 grams per square meter of a top surface area of a growth medium on which the filamentous fungal biomat is grown;
  - (c) a dry density of at least about 0.20 g/cm<sup>3</sup>;
  - (d) a tensile strength of at least about 255 kPa; and
  - (e) a carbohydrate content of at least about 47 wt% when dry.
- 22. The biomat of claim 21, comprising a stabilizer.
  - 23. The biomat of claim 21, comprising a food-grade or food-safe additive.
  - 24. The biomat of claim 21, produced by the method of claim 1.
  - 25. A foodstuff, comprising at least a portion of the biomat of claim 21.
  - 26. A structural material, comprising at least a portion of the biomat of claim 21.
  - 27. A textile material, comprising at least a portion of the biomat of claim 21.
  - 28. An air-medium colloid (AMC), comprising:
    - a fermentation medium; and
    - air, colloidally dispersed throughout the fermentation medium.
  - 29. The AMC of claim 28, further comprising a stabilizer.