CLAIMS

We Claim:

1. A method of preparing a comestible meat product, comprising:
applying a plurality of non-human cells comprising at least one muscle-derived cell and one or more additional cells, at any state of differentiation, from at least one of myoblasts, mesoangioblasts, myofibroblasts, myotubes, mesenchymal stem cells, hepatocytes, fibroblasts, pericytes, adipocytes, adipose tissue, epithelial, chondrocytes, osteoblasts, osteoclasts, pluripotent cells, somatic stem cells, endothelial cells, epithelial tissue, vascular endothelium, or contractile cells to a patterned texture substrate comprising a first patterned texture region and a second patterned texture region, wherein a texture of the first patterned texture region differs from a texture of the second patterned texture region;
directing a cell culture medium continuously at a first fluid flow rate across or adjacent to the patterned texture substrate;

growing the plurality of non-human cells on the patterned texture substrate to form the comestible meat product; and

separating the comestible meat product from the patterned texture substrate.

2. The method of claim 1, wherein the comestible meat product is held intact by an extracellular matrix secreted by the plurality of non-human cells.

3. The method of claim 1, wherein the comestible meat product is separated contemporaneously as a cell sheet from the patterned texture substrate.

4. The method of claim 1, wherein at least one of the first patterned texture region or the second patterned texture region comprises one or more of channels, recesses, or protrusions.

5. The method of claim 1, wherein at least one of the texture of the first patterned texture region or the texture of the second patterned texture region comprises a plurality of surface characteristics that correspond to a cell type or at least one of growth, retention, or release of the plurality of non-human cells.

6. The method of claim 1, wherein at least one of the first patterned texture region or the second patterned texture region comprises a set of linear channels in parallel to each other.

7. The method of claim 1, wherein at least one of the texture of the first patterned texture region or the texture of the second patterned texture region comprises a channel having a predetermined direction comprising one or more of a radial, circular, non-linear, spot, or cross-hatched pattern.

8. The method of claim 1, wherein the patterned texture substrate is arranged in a three-dimensional lattice with one or more additional substrates.

9. The method of claim 1 wherein the patterned texture substrate comprises a biocompatible coating.

10. The method of claim 1, wherein the patterned texture substrate comprises a non-patterned texture region.

11. A method of preparing a comestible meat product, the method comprising:

applying a plurality of non-human cells comprising at least one muscle-derived cell and

one or more additional cells, at any state of differentiation, from at least one of myoblasts, mesoangioblasts, myofibroblasts, myotubes, mesenchymal stem cells, hepatocytes, fibroblasts, pericytes, adipocytes, adipose tissue, epithelial, chondrocytes, osteoblasts, osteoclasts, pluripotent cells, somatic stem cells, endothelial cells, epithelial tissue, vascular endothelium, or contractile cells to at least one patterned texture substrate;

growing the plurality of non-human cells on the at least one patterned texture substrate to form a comestible meat product, wherein an arrangement of patterned textures of the at least one patterned texture substrate inhibits release of the plurality of non-human cells for a predetermined amount of time or until the plurality of non-human cells achieve a predetermined cell state; and

separating the comestible meat product from the at least one patterned texture substrate as a substantially intact cell sheet using fluidic shear stress.

12. A method of preparing a comestible meat product, the method comprising:

applying a plurality of non-human cells comprising at least one muscle-derived cell and one or more additional cells, at any state of differentiation, from at least one of myoblasts, mesoangioblasts, myofibroblasts, myotubes, mesenchymal stem cells, hepatocytes, fibroblasts, pericytes, adipocytes, adipose tissue, epithelial, chondrocytes, osteoblasts, osteoclasts, pluripotent cells, somatic stem cells, endothelial cells, epithelial tissue, vascular endothelium, or contractile cells to at least one cell-adherent patterned texture of a patterned texture substrate;

growing the plurality of non-human cells applied to the patterned texture substrate to form a comestible meat product such that the plurality of non-human cells have a cell alignment based on the at least one cell-adherent patterned texture; and

separating the comestible meat product from the patterned texture substrate using a fluid flow in a predetermined direction according to an adhesion gradient of adhesion quality between the comestible meat product and the patterned texture substrate.

13. The method of claim 1, wherein directing the cell culture medium comprises directing the cell culture medium according to a predetermined flow pattern.

14. The method of claim 13, wherein the predetermined flow pattern comprises a predetermined flow path over the patterned texture substrate.

15. The method of claim 1, wherein separating the comestible meat product comprises directing a fluid at the patterned texture substrate at a second fluid flow rate higher than the first fluid flow rate.

16. The method of claim 11, wherein the substantially intact cell sheet comprises a plurality of cell types.

17. The method of claim 11, wherein the substantially intact cell sheet comprises a plurality of cell layers.

18. The method of claim 11, wherein the substantially intact cell sheet separated using fluidic shear stress is held intact by an endogenously produced scaffold.

19. The method of claim 12, wherein the at least one cell-adherent patterned texture comprises a plurality of channels, at least one channel of the plurality of channels having a depth of between about 0.01 μm and about 100 μm, and a width of between about 1 μm and about 5 mm, wherein adjacent channels of the plurality of channels are separated from each other by at least about 5 μm.

20. The method of claim 1, further comprising, prior to separating the comestible meat product from the patterned texture substrate, directing the cell culture medium across or adjacent to the patterned texture substrate at a second fluid flow rate different from the first fluid flow rate.