CLAIMS

1. A construct for perfusion bioreactor cell culture comprising:

   at least one flexible polymer sheet for rolling or folding in use;

   wherein the at least one flexible polymer sheet comprises a plurality of channels for transport of cell culture medium to cells and/or hosting cells in use.

2. The construct of claim 1:

   (a) wherein the at least one flexible polymer sheet is non-porous or comprises an average pore diameter from 0 to 49µm and the channels are open channels, optionally;

   wherein the construct comprises a laminate structure, wherein the at least one flexible polymer sheet comprises a first flexible polymer sheet and a second flexible polymer sheet adhered to each other, and wherein the first or second flexible polymer sheet comprises the plurality of open channels; or

   (b) wherein the at least one flexible polymer sheet comprises a porous polymer comprising pores of an average diameter of 100µm to 600µm and wherein the channels are closed channels.

3. The construct of any preceding claim, wherein each of the plurality of channels are spaced apart by an average distance from 100 µm to 1500 µm.

4. A method of forming a construct for perfusion bioreactor cell culture, the method comprising the steps of:

   a) dissolving a polymer in a solvent to form a mixture;
   b) mixing a porogen having a diameter of at most 125 µm into the mixture;
   c) applying the mixture onto a planar structure;
   d) immersing the planar structure comprising the applied mixture in an anti-solvent; and drying the planar structure comprising the

applied mixture to form a porous flexible polymer sheet for rolling or folding in use;

wherein the planar structure comprises a plurality of channel forming members and wherein the mixture is applied so that the mixture encases the channel forming members; and

e) removing the construct comprising the channel forming members therein from the planar structure.

5. The construct of claims 1, 2(b) or 3 or the method of claim 4, further comprising a step of removing the channel forming members from the construct to provide closed channels, wherein the porous flexible polymer sheet comprises pores of an average pore diameter of 100µm to 600µm; optionally

wherein each of the plurality of closed channels have an average width from 5 µm to 1000 µm; optionally

wherein the porous flexible polymer sheet has an average thickness from 100 µm to 1000 µm; further optionally

wherein the porous flexible polymer sheet has an average thickness of between 300 µm and 1000 µm.

6. A method of forming a construct for perfusion bioreactor cell culture, the method comprising the steps of:

a) providing at least one flexible polymer sheet for rolling or folding in use;

b) etching a plurality of channels onto at least one surface of the at least one flexible polymer sheet, wherein each channel extends from one surface of the at least one flexible polymer sheet to an opposing surface of the flexible polymer sheet and wherein each of the channels are open channels.

7. The method of claim 6, wherein the channels extend through the at least one surface of the at least one flexible polymer sheet and the method further comprises:

c) adhering the at least one flexible polymer sheet comprising the plurality of channels extending therethrough to a second flexible polymer sheet to form a laminate structure; optionally

wherein the plurality of channels are etched onto the at least one surface and extend between two opposing surfaces of the at least one flexible polymer sheet and the method further comprises cutting the at least one flexible polymer sheet or the laminate structure so each channel extends from one surface of the at least one flexible polymer sheet to an opposing surface of the flexible polymer sheet;

optionally wherein the at least one flexible polymer sheet and second flexible polymer sheet are adhered by a flexible polymer.

8. The construct of claim 2(a) or 3 or the method of any claim 6 or 7, wherein the at least one flexible polymer sheet comprises is non-porous or comprises an average pore diameter from 0 to 49µm and the channels are open channels;

optionally wherein each of the plurality of channels comprise an average width from 20µm to 1000µm;

further optionally wherein each of the plurality channels comprise an average depth from 50µm to 500µm;

further optionally wherein the at least one flexible polymer sheet and/or the second flexible polymer sheet comprises an average thickness from 30µm to 1000µm; optionally

wherein the at least one flexible polymer sheet comprises bean curd sheet (BCS); further optionally wherein the plurality of channels are moulded on the BCS flexible polymer sheet.

9. The construct of any of claims 1, 2, 3, 5 or 8 or the method of any one of claims 4 to 8, wherein the porous flexible polymer sheet or the at least one flexible polymer sheet and/or second flexible polymer sheet comprise a biodegradable polymer;

optionally wherein the porous flexible polymer sheet or the at least one flexible polymer sheet and/or second flexible polymer sheet comprise an edible polymer;

further optionally wherein the porous flexible polymer sheet or the at least one flexible polymer sheet and/or second flexible polymer sheet comprise a digestible polymer.

10. The construct of claim 2, 3, 5, 8 or 9 or the method of any of claims 4 to 9 wherein the porous flexible polymer sheet or the at least one flexible polymer sheet and/or second flexible polymer sheet comprise a polymer selected from at least one of polycaprolactone, polypropylene and/or polystyrene.

11. A system for perfusion bioreactor cell culture comprising:

a) a chamber having an internal space comprising an internal width;

b) a construct according to any one of claims 1, 2, 3, 5, 8 or 9 comprising cells seeded thereon,

wherein the construct is disposed within the internal space of the chamber, and wherein the construct is configured as a filled 3-dimensional structure; and

c) a system for perfusing culture media through the chamber and/or the construct.

12. A method of culturing cells comprising the steps of:

a) applying a cell support agent to a construct according to any one of claims 1, 2, 3, 5, 8, 9 or 10;

b) seeding cells on the construct;

c) subjecting the construct to conditions suitable to crosslink the cell support agent;

when the construct comprises channel forming members, removing the channel forming members;

d) manipulating the construct to form a filled 3-dimensional structure;

e) disposing the manipulated construct into a chamber of a system for perfusion bioreactor cell culture; and

f) perfusing culture media through the system and maintaining the manipulated construct under conditions suitable for culturing the cells and culturing the cells thereon or therein.

13. The method of claim 12, further comprising after step f):

g) removing the construct from the chamber and applying a cell support agent-specific enzyme to the construct for releasing the cells from the construct; and

h) recovering the cells; optionally

wherein the cell support agent is fibrin, and optionally wherein the cell support agent-specific enzyme comprises nattokinase; optionally

wherein the recovered cells are formed into a comestible product; optionally wherein the comestible product is a meat analogue; or

wherein the construct comprises at least one flexible polymer sheet comprising an edible polymer and wherein the construct is removed from the chamber and the construct and the cells cultured thereon are formed into a comestible product.

14. The system of claim 11 or the method of any one of claims 12 to 13, wherein the 3-dimensional structure is a cylindrical structure; optionally wherein manipulating the construct comprises rolling the construct; further optionally wherein the cells comprise muscle cells.

15. The system of claim 11 or the method according to any one of claims 12 to 14, wherein the construct is according to any one of claims 2(a), 3, 8, 9 and 10 and wherein the cells are seeded within the plurality of channels; or

wherein the construct is according to any one of claims 2(b), 3, 5, 9 or 10 and wherein the cells are seeded within the pores of the porous polymer.