CLAIMS

1. An apparatus for the processing of biological sample, the apparatus comprising:

a first sheet of material;

a second sheet of material bonded to the first sheet of material; and

a plurality of chambers defined between the first sheet of material and the second sheet of material, the plurality of chambers including:

a sample dissociation chamber including an inlet, an outlet, and a first mesh filter comprising pores having a first pore size;

a waste collection chamber including an inlet in fluid communication with the outlet of the sample dissociation chamber;

a cell refinement chamber including an inlet in fluid communication with the sample dissociation chamber, an outlet, and a second mesh filter comprising pores having a second pore size; and

a means to control fluid connection between the sample dissociation chamber, the waste collection chamber, and the cell refinement chamber.

2. The apparatus of claim 1, wherein the mesh filter included in the cell refinement chamber comprises pores having a pore size of between 20 micrometers and 50 micrometers.

3. The apparatus of claim 1, wherein the second pore size is smaller than the first pore size.

4. The apparatus of claim 1, wherein the means to control fluid connection comprises a stopcock.

5. The apparatus of claim 1, further comprising a flow control device configured to introduce at least one of a rinsing solution and a dissociation solution into the sample dissociation chamber and having an outlet in fluid communication with the sample dissociation chamber.

6. The apparatus of claim 1, further comprising means for applying pressure to one of the sample disassociation chamber and the cell refinement chamber.

7. The apparatus of claim 1, further comprising a downstream processing apparatus in fluid communication with the outlet of the cell refinement chamber and including at least one microfluidic device configured to separate a fluid output from the cell refinement chamber into a first solution having a first concentration of one or more cells of interest and a second solution having a concentration of the one or more cells of interest which is less than that of the first solution.

8. A sterile and substantially isolated tissue processing system comprising:

a tissue processing chamber including an inlet, an outlet, and at least one mesh filter comprising pores having a first pore size disposed between the inlet of the tissue processing chamber and the outlet of the tissue processing chamber;

a waste collection chamber included in a same enclosure as the tissue processing chamber, the waste collection chamber including an inlet in fluid communication with the outlet of the tissue processing chamber;

one of a debris removal chamber including a debris removal mechanism, and a sample collection chamber including a second mesh filter comprising pores having a second pore size included in the same enclosure as the tissue processing chamber and in fluid communication with the tissue processing chamber; and

a means to control fluid connection between the tissue processing chamber, the waste collection chamber, and the one of the debris removal chamber and the sample collection chamber.

9. A method of processing a sample in a tissue processing system, the method comprising:

introducing a sample to be processed into a tissue processing chamber through an inlet port of the tissue processing chamber;

treating the sample in the tissue processing chamber;

retaining the sample within the tissue processing chamber and transferring a waste fluid through a mesh filter included in the tissue processing chamber and a first outlet of the tissue processing chamber into a waste collection chamber included in the same enclosure as the tissue processing chamber through an inlet of the waste collection chamber;

transferring cells from the tissue processing chamber through an outlet of the tissue processing chamber into a sample storage chamber included in a same enclosure as the tissue processing chamber through an inlet of the sample storage chamber; and

removing debris from the sample storage chamber using a mesh filter included in the sample storage chamber.

10. The method of claim 9, wherein treating the sample comprises dissociating the sample.

11. The method of claim 9, wherein treating the sample comprises removing excess fluids from the sample.

12. The method of claim 9, wherein treating the sample comprises washing the sample using a rinsing solution.

13. The method of claim 9, wherein treating the sample comprises washing the sample using a rinsing solution and dissociating the sample using a dissociation solution comprising at least one enzyme.

14. The method of claim 13, wherein the mesh filter included in the sample storage chamber has a pore size of between 15 micrometers and 50 micrometers.

15. The method of claim 9, further comprising enriching the cells for a target cell population using a microfluidic device.

16. The method of claim 9, further comprising extracting the cells from the tissue processing system.

17. The method of claim 13, further comprising processing cells in a downstream processing apparatus in fluid communication with an outlet of the sample storage chamber and including at least one microfluidic device configured to separate the cells into a first solution having a first concentration of one or more cells of interest and a second solution having a concentration of the one or more cells of interest which is less than that of the first solution.

18. The method of claim 9, wherein treating the tissue sample in the tissue processing chamber comprises introducing a tissue cleaning solution into the tissue processing chamber.

19. The method of claim 9, wherein treating the tissue sample in the tissue processing chamber further comprises introducing a tissue dissociating solution into the tissue processing chamber.

20. The method of claim 16, wherein the cells extracted are adipose derived stem cells.

21. The method of claim 16, wherein the cells extracted are mesenchymal stem cells.

22. The method of claim 16, wherein the cells extracted are stem cells.

23. The method of claim 16, wherein the cells extracted are pancreatic islet cells.

24. The method of claim 16, wherein the cells extracted are bacteria.

25. The method of claim 16, wherein the cells extracted are stromal vascular fraction cells.

26. The method of claim 16, wherein the cells extracted are stem cells derived from an umbilical cord.

27. The method of claim 16, wherein the cells extracted are yeasts.

28. The method of claim 16, wherein the cells extracted are parasites.

29. The method of claim 16, wherein the cells extracted are a foodborne pathogen.

CLAIMS

1. An apparatus for the processing of biological sample, the apparatus comprising:

a first sheet of material;

a second sheet of material bonded to the first sheet of material; and

a plurality of chambers defined between the first sheet of material and the second sheet of material, the plurality of chambers including:

a tissue processing chamber including an inlet, an outlet, and a first mesh filter comprising pores having a first pore size;

a waste collection chamber including an inlet in fluid communication with the outlet of the tissue processing chamber;

a sample collection chamber including an inlet in fluid communication with the tissue processing chamber, an outlet, and a second mesh filter comprising pores having a second pore size; and

a means to control fluid connection between the tissue processing chamber, the waste collection chamber, and the sample collection chamber.

2. The apparatus of claim 1, wherein the mesh filter included in the sample collection chamber comprises pores having a pore size of between 20 micrometers and 50 micrometers.

3. The apparatus of claim 1, wherein the second pore size is smaller than the first pore size.

4. The apparatus of claim 1, wherein the means to control fluid connection comprises a stopcock.

5. The apparatus of claim 1, further comprising a flow control device configured to introduce at least one of a rinsing solution and a dissociation solution into the tissue processing chamber and having an outlet in fluid communication with the tissue processing chamber.

6. The apparatus of claim 1, further comprising means for applying pressure to one of the tissue processing chamber and the sample collection chamber.

7. The apparatus of claim 1, further comprising a downstream processing apparatus in fluid communication with the outlet of the sample collection chamber and including at least one microfluidic device configured to separate a fluid output from the sample collection chamber into a first solution having a first concentration of one or more cells of interest and a second solution having a concentration of the one or more cells of interest which is less than that of the first solution.

8. A sterile and substantially isolated tissue processing system comprising:

a tissue processing chamber including an inlet, an outlet, and at least one mesh filter comprising pores having a first pore size disposed between the inlet of the tissue processing chamber and the outlet of the tissue processing chamber;

a waste collection chamber included in a same enclosure as the tissue processing chamber, the waste collection chamber including an inlet in fluid communication with the outlet of the tissue processing chamber;

one of a debris removal chamber including a debris removal mechanism, and a sample collection chamber including a second mesh filter comprising pores having a second pore size included in the same enclosure as the tissue processing chamber and in fluid communication with the tissue processing chamber; and

a means to control fluid connection between the tissue processing chamber, the waste collection chamber, and the one of the debris removal chamber and the sample collection chamber.

9. A method of processing a sample in a tissue processing system, the method comprising:

introducing a sample to be processed into a tissue processing chamber through an inlet port of the tissue processing chamber;

treating the sample in the tissue processing chamber;

retaining the sample within the tissue processing chamber and transferring a waste fluid through a mesh filter included in the tissue processing chamber and a first outlet of the tissue processing chamber into a waste collection chamber included in the same enclosure as the tissue processing chamber through an inlet of the waste collection chamber;

transferring cells from the tissue processing chamber through an outlet of the tissue processing chamber into a sample collection chamber included in a same enclosure as the tissue processing chamber through an inlet of the sample storage chamber; and

removing debris from the sample collection chamber using a mesh filter included in the sample collection chamber.

10. The method of claim 9, wherein treating the sample comprises dissociating the sample.

11. The method of claim 9, wherein treating the sample comprises removing excess fluids from the sample.

12. The method of claim 9, wherein treating the sample comprises washing the sample using a rinsing solution.

13. The method of claim 9, wherein treating the sample comprises washing the sample using a rinsing solution and dissociating the sample using a dissociation solution comprising at least one enzyme.

14. The method of claim 13, wherein the mesh filter included in the sample collection chamber has a pore size of between 15 micrometers and 50 micrometers.

15. The method of claim 9, further comprising enriching the cells for a target cell population using a microfluidic device.

16. The method of claim 9, further comprising extracting the cells from the tissue processing system.

17. The method of claim 13, further comprising processing cells in a downstream processing apparatus in fluid communication with an outlet of the sample collection chamber and including at least one microfluidic device configured to separate the cells into a first solution having a first

concentration of one or more cells of interest and a second solution having a concentration of the one or more cells of interest which is less than that of the first solution.

18. The method of claim 9, wherein treating the tissue sample in the tissue processing chamber comprises introducing a tissue cleaning solution into the tissue processing chamber.

19. The method of claim 9, wherein treating the tissue sample in the tissue processing chamber further comprises introducing a tissue dissociating solution into the tissue processing chamber.

20. The method of claim 16, wherein the cells extracted are adipose derived stem cells.

21. The method of claim 16, wherein the cells extracted are mesenchymal stem cells.

22. The method of claim 16, wherein the cells extracted are stem cells.

23. The method of claim 16, wherein the cells extracted are pancreatic islet cells.

24. The method of claim 16, wherein the cells extracted are bacteria.

25. The method of claim 16, wherein the cells extracted are stromal vascular fraction cells.

26. The method of claim 16, wherein the cells extracted are stem cells derived from an umbilical cord.

27. The method of claim 16, wherein the cells extracted are yeasts.

28. The method of claim 16, wherein the cells extracted are parasites.

29. The method of claim 16, wherein the cells extracted are a foodborne pathogen.