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 and an outlet;

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

a cell refinement chamber including an inlet in fluid communication with the sample dissociation chamber and an outlet.

2. The apparatus of claim 1, wherein the sample dissociation chamber further comprises a mesh filter.

3. The apparatus of claim 1, further comprising a mesh filter included in the cell refinement chamber.

4. The apparatus of claim 3, wherein the mesh filter comprises pores having a pore size of between 20 micrometers and 50 micrometers.

5. The apparatus of claim 1, wherein the sample dissociation chamber further comprises a first mesh filter comprising pores having a first pore size, and wherein the cell refinement chamber further comprises a second mesh filter comprising pores having a second pore size.

6. The apparatus of claim 5, wherein the second pore size is smaller than the first pore size.

7. The apparatus of claim 1, further comprising a means to control fluid connection between the sample dissociation chamber, the waste collection chamber and the cell refinement chamber.

8. The apparatus of claim 7, wherein the means to control fluid connection comprises a stopcock.

9. 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.

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

11. 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.

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

a tissue processing chamber including an inlet, an outlet, and at least one mesh filter 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; and

one of a debris removal chamber including a debris removal mechanism, and a sample collection chamber included in the same enclosure as the tissue processing chamber and in fluid communication with the tissue processing chamber.

13. 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; and

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.

14. The method of claim 13, wherein treating the sample comprises dissociating the sample.

15. The method of claim 13, wherein treating the sample comprises removing excess fluids from the sample.

16. The method of claim 13, wherein treating the sample comprises washing the sample using a rinsing solution.

17. The method of claim 13, 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.

18. The method of claim 13, further comprising removal of debris using a mesh filter included in the sample storage chamber.

19. The method of claim 18, wherein the mesh filter has a pore size of between 15 micrometers and 50 micrometers.

20. The method of claim 13, further comprising 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.

21. The method of claim 13, further comprising enriching the cells for a target cell population using a microfluidic device.

22. The method of claim 13, further comprising extracting the cells from the tissue processing system.

23. The method of claim 17, 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.

24. The method of claim 13, wherein treating the tissue sample in the tissue processing chamber comprises introducing a tissue cleaning solution into the tissue processing chamber.

25. The method of claim 13, wherein treating the tissue sample in the tissue processing chamber further comprises introducing a tissue dissociating solution into the tissue processing chamber.

26. The method of claim 22, wherein the cells extracted are adipose derived stem cells.

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

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

29. The method of claim 22, wherein the cells extracted are pancreatic islet cells.

30. The method of claim 22, wherein the cells extracted are bacteria.

31. The method of claim 22, wherein the cells extracted are stromal vascular fraction cells.

32. The method of claim 22, wherein the cells extracted are stem cells derived from an umbilical cord.

33. The method of claim 22, wherein the cells extracted are yeasts.

34. The method of claim 22, wherein the cells extracted are parasites.

35. The method of claim 22, wherein the cells extracted are a foodborne pathogen.

CLAIMS

1. An apparatus for processing biological samples, the apparatus comprising:

a first sheet of material;

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

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

a first chamber including an inlet configured to receive a fluid solution, a sample inlet configured to receive a biological sample, and an outlet,

a second chamber configured to receive waste fluid, the second chamber including an inlet in fluid communication with the outlet of the first chamber, and

a third chamber including an inlet in fluid communication with the first chamber and an outlet;

a first filtration mesh disposed between the inlet and the outlet of at least one of the first chamber and the third chamber; and

a first flow control device configured to control a flow of fluid between the first chamber and at least one of the second chamber and the third chamber.

2. The apparatus of claim 1, wherein the first filtration mesh comprises pores having pore sizes of between about 20 micrometers and about 50 micrometers.

3. The apparatus of claim 1, wherein the first filtration mesh is included in the third chamber, and wherein the first chamber includes a second filtration mesh having a pore size of between about 30 micrometers and about 1 millimeter, the first filtration mesh having a pore size smaller than the pore size of the second filtration mesh.

4. The apparatus of claim 1, wherein the first flow control device comprises a stopcock.

5. The apparatus of claim 1, being sterile and providing a substantially isolated environment to the biological sample.

6. The apparatus of claim 1, further comprising a second flow control device configured to control introduction of at least one of a rinsing solution and a dissociation solution into the first chamber.

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

8. The apparatus of claim 1, wherein the sample inlet comprises a connector configured to receive a syringe.

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

providing a tissue processing device including:

a first sheet of material,

a second sheet of a flexible material bonded to the first sheet of material,

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

a first chamber including an inlet and an outlet;

a second chamber including an inlet in fluid communication with the outlet of the first chamber, and

a third chamber including an inlet in fluid communication with the first chamber and an outlet,

a first filtration mesh disposed between the inlet and the outlet of at least one of the first chamber and the third chamber, and

a flow control device in fluid communication with the first chamber, the second chamber and the third chamber;

introducing a sample to be processed into the first chamber through the inlet of the first chamber;

introducing a fluid solution to the first chamber of the tissue processing device;

washing the sample by mixing the fluid solution with the sample; and

draining a waste fluid from the first chamber to the second chamber.

10. The method of claim 9, further comprising retrieving the washed sample from the tissue processing device.

11. The method of claim 9, further comprising

introducing a dissociation solution to the first chamber;

mixing the dissociation solution with the sample in the first chamber;

incubating the sample for a period of time at a first temperature in the first chamber, incubating the sample releasing a population of cells of interest;

transferring the population of cells of interest to the third chamber;

passing the population of cells of interest through the first filtration mesh; and

harvesting the population of cells of interest from the outlet of the third chamber.

12. The method of claim 11, wherein the period of time is between about 5 minutes and about 30 hours.

13. The method of claim 11, wherein the period of time is between about 10 minutes and about 120 minutes.

14. The method of claim 11, wherein the first temperature is about 37 degrees Celsius.

15. The method of claim 11, wherein the dissociation solution comprises an enzyme.

16. The method of claim 15, wherein the dissociation solution comprises collagenase.

17. The method of claim 9, wherein the sample comprises an adipose tissue.

18. The method of claim 11, wherein the cells of interest comprise stem cells.

19. The method of claim 11, further comprising washing, concentrating, and reducing red blood cells from the population of cells of interest by passing the population of cells of interest through a microfluidic device.

20. The population of cells of interest of the method of claim 19.