CLAIMS

WHAT IS CLAIMED IS:

1. An apparatus (700) for bioprocessing, comprising:

a housing (710);

a drawer (712) receivable within the housing (710), the drawer (712) including a plurality of sidewalls (718) and a bottom defining a processing chamber (722), and a generally open top, the drawer (712) being movable between a closed position in which the drawer is received within the housing (710), and an open position in which the drawer (712) extends from the housing (710) enabling access to the processing chamber (722) through the open top, wherein said drawer (712) is operable as a stand-alone bioprocessing module for carrying out the processes of cell activation, genetic modification and/or expansion;

at least one bed plate (746) positioned within the processing chamber (722) and configured to receive a bioreactor vessel (410).

2. The apparatus (700) of claim 1, further comprising:

at least one heating element (782) for heating the processing chamber (722);

wherein the at least one heating element (782) is controllable to heat the plurality of sidewalls (18) to maintain contents of the bioreactor vessel (410) at a desired temperature.

3. The apparatus (700) of claim 2,

wherein a heating element (782) of the at least one heating element is operatively connected to the at least one bed plate (746); and

wherein the heating element (782) is controllable to heat the at least one bed plate (746) to maintain the contents of the bioreactor vessel (410) at the desired temperature.

4. The apparatus (700) of any preceding claim, wherein:

the at least one bed plate (746) includes a plurality of locating pins (754) configured to interface with the bioreactor vessel (410) to ensure alignment of the bioreactor vessel (410) on the bed plate (746).

5. The apparatus (700) of any preceding claim, wherein the at least one bed plate (746) includes a sensor (756) for detecting proper alignment of the bioreactor vessel (410) on the bed plate (746) and/or the at least one bed plate (746) includes at least one load cell (760) for sensing a weight of the bioreactor vessel (410) on the bed plate (76).

6. The apparatus (700) of claim 5, wherein the sensor (756) comprises one of an infrared optical beam or a lever switch.

7. The apparatus (700) of any preceding claim, further comprising:

an actuator mechanism (761) integrated with the bed plate (746), the actuator mechanism (761) being operable to selectively tilt the bioreactor vessel (410) with respect to the at least one bed plate (746).

8. The apparatus (700) of claim 7, wherein the actuator mechanism (761) includes a pair of opposed cam arms (762) that extend through the at least one bed plate (746) to engage a bottom surface of the bioreactor vessel (410).

9. The apparatus (700) of any preceding claim, further comprising:

a track system mounted to the housing (710) and operatively connected to the drawer (712); and

a linear actuator (768) operable to move the drawer (712) along the track system between the open position and the closed position.

10. The apparatus (700) of claim 9, wherein the linear actuator (768) is configured to move the drawer along the track system at a predetermined and generally constant speed to minimize disturbance to contents of the bioreactor vessel (410).

11. The apparatus (700) of any preceding claim, wherein:

the drawer (712) includes a compartment (730) having at least one rail (812) for supporting a disposable media bag;

wherein the compartment (730) is accessible without moving the drawer (712) to the open position.

12. The apparatus (700) of any preceding claim, further comprising:

a load cell (750) positioned within the drawer (712), configured to support a waste bag and sense a weight of the waste bag.

13. The apparatus (700) of any preceding claim, wherein:

the at least one bed plate is two bed plates (746, 748), wherein each bed plate is configured to receive a bioreactor vessel (410, 420).

14. The apparatus (700) of any preceding claim, further comprising:

an anvil (744) integrated with the drawer (712); and

an array of pinch valve linear actuators positioned opposite the anvil, the anvil and the pinch valve linear actuators forming a channel therebetween for receiving a plurality of pinch valve tubes;

wherein each of the pinch valve linear actuators is selectively actuatable to engage one of the plurality of pinch valve tubes to control a flow of fluids through the plurality of pinch valve tubes.

15. The apparatus (700) of any preceding claim, further comprising:

at least one pump (454, 456, 492) positioned within the housing behind the drawer (712); and

a pump shoe (742) integrated with the drawer (712), the at least one pump (454, 456, 492) and the pump shoe (742) forming a passage for receiving at least one pump tube (442, 450, 490).

16. The apparatus (700) of any preceding claim, further comprising:

a drawer engagement actuator (740) positioned within the housing (710) and operable to selectively position the plurality of pinch valve tubes and the at least one pump tube (442, 450, 490), or the at least one pump (454, 456, 493) and the array of pinch valve linear actuators, in an engagement position where the at least one pump (454, 456, 493) and the array of pinch valve

linear actuators can engage the at least one pump tube (442, 450, 490) and plurality of pinch valve tubes, respectively, and a clearance position where the at least one pump (454, 456, 493) and the array of pinch valve linear actuators are disengaged from the at least one pump tube (442, 450, 490) and the plurality of pinch valve tubes, respectively.

17. The apparatus (700) of any of claims 9-16, wherein:

the linear actuator (768) and the drawer engagement actuator (740) are operable independently of one another such that the drawer (712) can be moved to the open position in a first mode where the at least one pump (454, 456, 493) and the array of pinch valve linear actuators are in the engagement position, and a second mode where the at least one pump (454, 456, 493) and the array of pinch valve linear actuators are disengaged from the plurality of pinch valve tubes.

18. The apparatus (700) of any preceding claim, wherein:

the drawer (712) includes at least one chevron-shaped alignment feature (532) for facilitating alignment of a tray (610) containing the bioreactor vessel (410) with the drawer (712).

19. A method of bioprocessing using an apparatus (700) as claimed in any of the preceding claims, comprising the steps of:

sliding a drawer (712) having a plurality of sidewalls (718), a bottom and a generally open top from a closed position within a housing to an open position to extend the drawer (712) from the housing (710);

positioning a bioreactor vessel (410) through the generally open top on a static bed plate (746) positioned within the drawer (712);

sliding the drawer (712) to the closed position; and

controlling a drawer engagement actuator (740) to engage at least one pump (454, 456, 493) and a plurality of pinch valve linear actuators with a plurality of fluid flow lines.

20. The method according to claim 19, further comprising a step of:

controlling a temperature within the processing chamber (722) and/or a step of engaging at least one cam arm (762) with a bottom of the bioreactor vessel (410) to selectively tilt or oscillate the bioreactor vessel (410) with respect to the bed plate (746) and/or a step of actuating a drawer

engagement actuator (740) to position at least one of a pump (454, 456, 493) and an array of pinch valve linear actuators in an engagement position where the at least one pump (454, 456, 493) and the array of pinch valve linear actuators can engage at least one pump tube (442, 450, 490) and a plurality of pinch valve tubes, respectively.

21. A kit of parts (600) receivable within the apparatus (700) as claimed in any of the preceding claims 1-18 for bioprocessing in accordance with claim 19 or claim 20, the kit (600) including:

a plurality of sidewalls (612, 614, 616, 618) and a bottom surface (620) defining an interior compartment (622), and a generally open top;

an opening (626, 628) formed in the bottom surface (620) of the kit, the opening (626, 628) having a perimeter;

a bioreactor vessel (410) positioned above the at least one opening (626) within the interior compartment (622) and supported by the bottom surface (620) such that a portion of the bioreactor vessel (410) is accessible through the opening (626) in the bottom surface (620);

wherein the kit (600) is receivable within the processing chamber (722) such that the bed plate (746) extends through the opening (626, 628) in the bottom surface (620) of the tray (610) to support the bioreactor vessel (410) above the bottom surface (620) of the kit.

22. The kit of parts (600) of claim 21, comprising:

a first tubing holder block (652) integrated with the kit and configured to receive at least one pump tube and hold the at least one pump tube in position for selective engagement with a pump;

a second tubing holder block (654) integrated with the kit and configured to receive a plurality of pinch valve tubes and hold each pinch valve tube of the plurality of pinch valve tubes in position for selective engagement with a respective actuator of a pinch valve array.