

## CLAIMS

What is claimed is:

1. An electroporation apparatus, comprising:
  - a plurality of chambers configured to store a plurality of cells during an electroporation process;
  - a plurality of electrodes configured to generate a plurality of electric fields within the plurality of chambers during the electroporation process, each electric field of the plurality of electric fields corresponding to one chamber of the plurality of chambers;
  - a flow channel configured to transport the plurality cells during a cell collection process after the electroporation process; and
  - a plurality of valves connecting the plurality of chambers to the flow channel.
2. The electroporation apparatus of claim 1, further comprising:
  - an inlet port;
  - an outlet port; and
  - a plurality of flanking flow channels connecting the inlet port and the outlet port to the flow channel.
3. The electroporation apparatus of claim 2, further comprising:
  - a pump for pumping a liquid medium from the flow channel into at least one of the plurality of chambers during a collection process,
  - wherein the liquid medium is obtained at the inlet port.
4. The electroporation apparatus of claim 1, further comprising:
  - a surface comprising a plurality of openings leading to the plurality of chambers;
  - and
  - an airflow channel below the plurality of openings and connecting airflow between the plurality of chambers.
5. The electroporation apparatus of claim 4, further comprising:

a vent or air filter connecting the airflow channel to an exterior of the electroporation apparatus.

6. The electroporation apparatus of claim 4, further comprising:  
a seal configured to cover the plurality of openings.
7. The electroporation apparatus of claim 1, wherein each of the plurality of chambers comprises a shape which narrows toward the plurality of valves.
8. The electroporation apparatus of claim 1, wherein:  
the plurality of chambers comprises a given chamber; and  
the plurality of electrodes comprises a pair of electrodes on opposite sides of the given chamber.
9. The electroporation apparatus of claim 8, wherein each electrode of the pair of electrodes comprises:  
an interior portion inside the given chamber; and  
an exterior portion external to the given chamber, wherein each pair of electrodes is configured to connect to an electric circuit.
10. The electroporation apparatus of claim 9, wherein the interior portion inside the given chamber has an elliptical face and comprises a gold coating.
11. The electroporation apparatus of claim 1, wherein each of the plurality of chambers is configured to store a volume of at least about 250 uL.
12. The electroporation apparatus of claim 1, wherein each of the plurality of chambers is configured to store a volume of at least about 500 uL.
13. The electroporation apparatus of claim 3, wherein said pump further comprises a valve or valves, wherein said valve or valves permit only one-directional flow of fluid.
14. The electroporation apparatus of claim 1, wherein each valve in the plurality of valves corresponds to one chamber in the plurality of chambers.

15. The electroporation apparatus of claim 14, wherein each valve corresponding to the chamber valves is a pinch-valve or pinch-type valve.
16. The electroporation apparatus of claim 1, wherein the plurality of chambers, in combination, are configured to store at least 2 mL, at least 2.4 mL, at least 3.2 mL, at least 4 mL, at least 4.8 mL, at least 5.6 mL, or at least 6.4 mL of cells in liquid suspension for electroporation.
17. The electroporation apparatus of claim 1, where the plurality of cells involved in the electroporation process comprises at least one selected from a group consisting of: at least  $1 \times 10^8$  cells, at least  $2 \times 10^8$  cells, at least  $3 \times 10^8$  cells, at least  $4 \times 10^8$  cells, at least  $5 \times 10^8$  cells, at least  $6 \times 10^8$  cells, at least  $7 \times 10^8$  cells, at least  $8 \times 10^8$  cells, at least  $9 \times 10^8$  cells, at least  $1 \times 10^9$  cells, at least  $2 \times 10^9$  cells, at least  $3 \times 10^9$  cells, at least  $4 \times 10^9$  cells, at least  $5 \times 10^9$  cells, at least  $6 \times 10^9$  cells, at least  $7 \times 10^9$  cells, at least  $8 \times 10^9$  cells, at least  $9 \times 10^9$  cells, at least  $1 \times 10^{10}$  cells, at least  $2 \times 10^{10}$  cells, at least  $3 \times 10^{10}$  cells, at least  $4 \times 10^{10}$  cells, at least  $5 \times 10^{10}$  cells, at least  $6 \times 10^{10}$  cells, at least  $7 \times 10^{10}$  cells, at least  $8 \times 10^{10}$  cells, at least  $9 \times 10^{10}$  cells, at least  $1 \times 10^{11}$  cells, at least  $2 \times 10^{11}$  cells, at least  $3 \times 10^{11}$  cells, at least  $4 \times 10^{11}$  cells, at least  $5 \times 10^{11}$  cells, at least  $6 \times 10^{11}$  cells, at least  $7 \times 10^{11}$  cells, at least  $8 \times 10^{11}$  cells, at least  $9 \times 10^{11}$  cells, at least  $1 \times 10^{12}$  cells, at least  $2 \times 10^{12}$  cells, at least  $3 \times 10^{12}$  cells, at least  $4 \times 10^{12}$  cells, at least  $5 \times 10^{12}$  cells, at least  $6 \times 10^{12}$  cells, at least  $7 \times 10^{12}$  cells, at least  $8 \times 10^{12}$  cells, and at least  $9 \times 10^{12}$ .
18. A method, comprising:
  - executing an electroporation process by generating a plurality of electric fields within a plurality of chambers using a plurality of electrodes,
  - wherein the plurality of chambers are configured to store a plurality cells during the electroporation process; and
  - executing a cell collection process by:
    - opening a plurality of valves connected to the plurality of chambers; and
    - transporting the plurality of cells to an outlet port using a flow channel connected to the plurality of valves,

wherein the plurality of chambers, the plurality of electrodes, the plurality of valves, the outlet port, and the flow channel are located within an electroporation apparatus.

19. The method of claim 18, wherein the plurality of valves are opened one at a time.

20. The method of claim 18, wherein executing the cell collection process further comprises:

pumping, by at least one pump, a liquid medium from the flow channel into at least one of the plurality of chambers,

wherein the liquid medium is obtained at an inlet port, and

wherein the inlet port and the outlet port are connected to the flow channel by a plurality of flanking flow channels within the electroporation apparatus.

21. The method of claim 18, wherein executing the cell collection process further comprises:

draining the plurality of chambers into the flow channel, wherein pressure within the plurality of chambers is maintained via a vent or air filter connected to an air flow channel running between the plurality of chambers.

22. The method of claim 18, further comprising:

depositing the plurality of cells into a plurality of openings of the electroporation apparatus leading to the plurality of chambers;

applying a seal to the plurality of openings; and

connecting the plurality of electrodes to a least one circuit by inserting the electroporation apparatus into a docking station.

23. The method of claim 18, wherein:

the plurality of chambers comprises a given chamber;

the plurality of electrodes comprises a pair of electrodes on opposite sides of the given chamber; and

each electrode of the pair of electrodes comprises:

an interior portion inside the given chamber; and  
an exterior portion external to the given chamber.

24. The method of claim 18, wherein each of the plurality of valves operates using at least one selected from a group consisting of a spring motion, a lever motion, and a piston motion.

25. An electroporation docking station, comprising:

a receptacle configured to secure an electroporation apparatus in an upright position;  
a plurality of electrical contacts arranged to align with a corresponding plurality of electrodes on the electroporation apparatus when secured in the receptacle;  
and  
a plurality of valve actuators arranged to engage with a corresponding plurality of chamber valves on the electroporation apparatus when secured in the receptacle.

26. The electroporation docking station of claim 25, further comprising:

a pump actuator arranged to engage with a pump of the electroporation apparatus when secured in the receptacle.

27. The electroporation docking station of claim 26, further comprising:

a circuit configured to:  
generate an electric field using the plurality of electrodes during an electroporation process via the plurality of electrical contacts;  
open one or more of the plurality of chamber valves during a cell collection process via the plurality of valve actuators; and  
operate the pump during the cell collection process via the pump actuator.

28. The electroporation docking station of claim 25, further comprising:

a container comprising a liquid medium and configured to connect to an inlet port of the electroporation apparatus when secured in the receptacle; and

a collection bag configured to connect to an outlet port of the electroporation apparatus when secured in the receptacle.

29. The electroporation docking station of claim 25, wherein the receptacle comprises an opening, and the wherein electrical contacts are aligned linearly along a length of the receptacle.

30. The electroporation docking station of claim 25, wherein the plurality of electrical contacts are located on opposing sides of the receptacle.

31. The electroporation docking station of claim 25, wherein the plurality of chamber valves are spring-type valves, and wherein the plurality of valve actuators are configured to open the plurality of chamber valves by applying forces to the plurality of chamber valves.

32. The electroporation docking station of claim 31, wherein the plurality of valve actuators are configured to open the plurality of chamber valves simultaneously.

33. The electroporation docking station of claim 31, wherein the plurality of valve actuators are configured to open the plurality of chamber valves one at a time.

34. A method, comprising:

securing, in a receptacle of an electroporation docking station (EDS), an electroporation apparatus in an upright position;

generate an electric field, during an electroporation process, using a plurality of electrical contacts of the EDS, wherein the plurality of electrical contacts are aligned with a corresponding plurality of electrodes of the electroporation apparatus when secured in the receptacle;

operating, during a cell collection process, one or more of a plurality of valve actuators of the EDS engaged with a corresponding plurality of chamber valves of the electroporation apparatus when secured in the receptacle.

35. The method of claim 34, further comprising:

pumping, during the cell collection process, a liquid medium into the plurality of chamber valves by operating a pump actuator of the EDS engaged with a pump of the electroporation apparatus when secured in the receptacle.