CLAIMS

1. An attachment configured to detachably couple to a fluid extruding device, the attachment comprising:

a membrane having a plurality of pores configured to allow a cell to pass through while inducing a mechanical stress to the cell such that the introduction of one or more substances into the cell is facilitated; and

one or more unidirectional valves to allow unidirectional flow of the cell and one or more substances across the membrane in a single direction for a plurality of times; and

an engaging member for coupling to the outlet of the fluid extruding device such that the membrane is in fluid communication with the outlet of the fluid extruding device,

wherein the fluid extruding device is configured to extrude fluid via mechanical actuation.

2. The attachment of claim 1, wherein the engaging member for coupling to the outlet of the fluid extruding device forms a substantially air tight seal when coupled to the outlet of the fluid extruding device.

3. The attachment of claim 1 or 2, wherein the engaging member comprises a pliant material for engaging a circumference of the outlet of the fluid extruding device.

4. The attachment of claim 1 or 2, wherein the engaging member is configured to couple to the outlet of the fluid extruding device via a luer lock fitting.

5. The attachment of any one of claims 1 to 4, wherein the fluid extruding device is selected from the group consisting of a pipette, manually-operated micropipette, electronically-operated micropipette, burette, syringe, automated/semi-automated liquid handling system and liquid handling robotics.

6. The attachment of any one of claims 1 to 5, wherein the plurality of pores define substantially linear paths through the membrane.

7. The attachment of any one of claims 1 to 6, wherein the plurality of pores have pore dimensions that are substantially uniform across said plurality of pores.

8. The attachment of claim 7, wherein the pore dimensions are at least one of: average diameter, average cross sectional area and average path length through the membrane.

9. The attachment of any one of claims 1 to 8, wherein the plurality of pores has an average pore diameter which is from 40% to 70% of the average diameter of the cell.

10. The attachment of any one of claims 1 to 9, further comprising:

a filter having pores with an average diameter larger than those of the membrane for reducing the incidence of cell clumps or cell aggregates reaching the membrane.

11. The attachment of any one of claims 1 to 10, further comprising a retaining ring to hold the membrane in a substantially fixed position.

12. A method for introducing one or more substances into a cell, the method comprising:

detachably coupling the outlet of a fluid extruding device to an engaging member of an attachment comprising a membrane having a plurality of pores, such that the fluid extruding device is in fluid communication with the membrane;

providing one or more unidirectional valves to allow unidirectional flow of the cell and one or more substances across the membrane; and

passing the one or more substances and the cell through the plurality of pores in a single direction for a plurality of times to facilitate introduction of the one or more substances into the cell by inducing a mechanical stress to the cell,

wherein the fluid extruding device is configured to extrude fluid via mechanical actuation.

13. The method of claim 12, further comprising forming a substantially air tight seal when the engaging member is coupled to the outlet of the fluid extruding device.

14. The method of claim 12 or 13, wherein the engaging member comprises a pliant material for engaging a circumference of the outlet of the fluid extruding device.

15. The method of claim 12 or 13, wherein the step of detachably coupling the outlet of a fluid extruding device to an engaging member of an attachment comprises coupling via a luer lock fitting.

16. The method of any one of claims 12 to 15, wherein the fluid extruding device is selected from the group consisting of a pipette, manually-operated micropipette, electronically-operated micropipette, burette, syringe, automated/semi-automated liquid handling system and liquid handling robotics.

17. The method of any one of claims 12 to 16, wherein the plurality of pores define substantially linear paths through the membrane.

18. The method of any one of claims 12 to 17, wherein the plurality of pores have pore dimensions that are substantially uniform across said plurality of pores.

19. The method of claim 18, wherein the pore dimensions are at least one of: average diameter, average cross sectional area and average path length through the membrane.

20. The method of any one of claims 12 to 19, wherein the plurality of pores has an average pore diameter which is from 40% to 70% of the average diameter of the cell.

21. The method of any one of claims 12 to 20, further comprising a step of reducing the volume on one side of the membrane to create a pressure

differential across the membrane to facilitate flow of the cell and the one or more substance through the plurality of pores.

22. The method of claim 21, wherein the step of reducing the volume is a manual step.

23. The method of any one of claims 12 to 22, further comprising passing the one or more substances and the cell through a filter having pores with an average diameter larger than those of the membrane for reducing the incidence of cell clumps or cell aggregates reaching the membrane.

24. A fluid extruding system for introducing one or more substances into a cell, the system comprising:

an attachment as claimed in any one of claims 1 to 11; and

a fluid extruding device detachably coupled to the attachment, wherein the fluid extruding device is configured to extrude fluid via mechanical actuation.

25. A fluid extruding device for introducing one or more substances into a cell, the device comprising:

a fluid flow chamber;

a membrane disposed within the fluid flow chamber, the membrane having a plurality of pores configured to allow a cell to pass through while inducing a mechanical stress to the cell such that the introduction of one or more substances into the cell is facilitated;

one or more unidirectional valves to allow unidirectional flow of the cell and one or more substances across the membrane in a single direction for a plurality of times;

and an actuator for applying a reducing volume in the fluid flow chamber to create a pressure differential across the membrane to facilitate flow of fluid across the membrane.