CLAIMS

What is claimed is:

1. A method, comprising:

moving, using an actuator disposed within a manifold assembly, a membrane portion of a membrane of opposing membranes of the manifold assembly away from a valve seat to enable fluidic flow from a reagent fluidic line to a common fluidic line, the membrane portion and the valve seat forming a membrane valve, the reagent fluidic line being fluidically coupled to a reagent reservoir, the common fluidic line being fluidically coupled to a flow cell, the common fluidic line has a common central axis and the reagent fluidic line has a reagent central axis that is non-collinear with the common central axis, wherein the actuator comprises a pivot positioned between the opposing membranes and having a distal end that is adapted to move the membrane portion away from the valve seat; and

urging the membrane portion against the valve seat to prevent fluidic flow from the reagent fluidic line to the common fluidic line.

2. The method of claim 1, further comprising:

allowing a second membrane portion of the membrane to move away from a second valve seat to enable fluidic flow from a second reagent fluidic line to the common fluidic line, the second membrane portion and the second valve seat forming a second membrane valve, the second reagent fluidic line being coupled to a second reagent reservoir, the second reagent fluidic line having a reagent central axis that is non-collinear with the common central axis; and

urging the second membrane portion against the second valve seat to prevent fluidic flow from the second reagent fluidic line to the common fluidic line.

3. The method of claim 1 or 2 further comprising pressurizing the reagent reservoir.

4. A system, comprising:

a valve drive assembly;

a reagent cartridge comprising:

a common fluidic line; and

a plurality of reagent fluidic lines, each of the plurality of reagent fluidic lines being adapted to be coupled to a corresponding reagent reservoir; and

a manifold assembly comprising

a plurality of membrane valves; and

a plurality of actuators disposed within the manifold assembly,

the manifold assembly selectively fluidically coupling the common fluidic line and a corresponding one of the plurality of reagent fluidic lines responsive to the valve drive assembly actuating a corresponding one of the plurality of actuators, each of the plurality of membrane valves is formed between the common fluidic line and a corresponding reagent fluidic line, wherein each of the actuators comprises a pivot having a distal end that is adapted to move a membrane portion of a membrane of opposing membranes of the manifold assembly away from a valve seat of the manifold assembly,

wherein the valve drive assembly is adapted to interface with the plurality of actuators and the plurality of membrane valves to selectively control a flow of reagent between each of the plurality of reagent fluidic lines and the common fluidic line, wherein at least one of the plurality of actuators is positioned between the opposing membranes.

5. The apparatus of claim 4, wherein the manifold assembly comprises a manifold body defining a portion of the common fluidic line and a portion of the reagent fluidic lines and the membrane coupled to portions of the manifold body, the membrane valves being formed by the membrane and the manifold body.

6. The apparatus of claim 5, wherein the manifold body comprises the valve seat disposed between the portions of the manifold body.

7. The apparatus of claim 6, wherein the valve seat is formed by a protrusion against which the membrane is adapted to engage.

8. The apparatus of claim 7, wherein the protrusion separates the common fluidic line and the corresponding one of the plurality of reagent fluidic lines.

9. The apparatus of claim 6 – 8, wherein the membrane is moveable relative to the valve seat.

10. The apparatus of any one of claims 6 – 9, wherein the valve drive assembly is adapted to interface with the membrane and to drive the membrane against the valve seat to close a corresponding one of the plurality of membrane valves.

11. The apparatus of any one of claims 6 – 10, further comprising a shut-off valve to control the flow between at least one of the plurality of reagent fluidic lines and the common fluidic line.

12. The apparatus of any one of claims 6 – 11, wherein the reagent cartridge comprises the manifold assembly.

13. The apparatus of any one of claims 4 – 12, wherein the reagent cartridge comprises a plurality of reagent reservoirs each fluidically coupled to the plurality of reagent fluidic lines.

14. The apparatus of claim 13, wherein the system comprises a pressure source selectively fluidically coupled to at least one of the plurality of reagent reservoirs.

15. The apparatus of any one of claims 4 – 14, wherein the common fluidic line has a common central axis and each of the reagent fluidic lines have a reagent central axis that is non-collinear with the common central axis.

16. The apparatus of any one of claims 4 – 15, wherein the valve drive assembly comprises a plurality of plungers.

17. The apparatus of any one of claims 4 – 16, wherein the valve drive assembly comprises a pressure source adapted to actuate a corresponding one of the plurality of membrane valves.

18. The apparatus of any one of claims 4 – 17, wherein the valve drive assembly comprises one or more plungers coupled to the membrane via a snap fit connection or a magnetic connection.

19. The apparatus of any one of claims 4 – 18, wherein the plurality of membrane valves are arranged arcuately about the common fluidic line.

20. An apparatus, comprising:

a common fluidic line;

a plurality of reagent fluidic lines, each of the plurality of reagent fluidic lines being adapted to be coupled to a corresponding reagent reservoir; and

a manifold assembly comprising a plurality of membrane valves and a plurality of actuators disposed within the manifold assembly, the manifold assembly selectively fluidically coupling the common fluidic line, a corresponding one of the plurality of reagent fluidic lines responsive to actuation of a corresponding one of the plurality of actuators, each of the plurality of membranes valve is formed between the common fluidic line and a corresponding one of the plurality of reagent fluidic lines, wherein at least one of the plurality of actuators is a cantilever having a distal end that is adapted to move one of opposing membranes of the manifold assembly away from a corresponding valve seat of one of the plurality of membrane valves; and

wherein the at least one of the plurality of actuators is positioned between the opposing membranes.

21. The apparatus of claim 20, wherein the manifold assembly comprises a manifold body and the opposing membranes coupled to the manifold body, the manifold body defining a portion of the common fluidic line, a portion of the plurality of reagent fluidic lines, and a plurality of valve seats that each separate the common fluidic line and a corresponding one of the plurality of reagent fluidic lines.

22. The apparatus of claim 21, further comprising a valve drive assembly adapted to interface with each of the plurality of actuators to move a corresponding membrane of a corresponding one of the plurality of membranes away from a corresponding valve seat.

23. The apparatus of claim 22, wherein the valve drive assembly is adapted to interface with a corresponding one of the plurality of membrane valves on a first side of the manifold assembly and to interface with the corresponding one of the plurality of actuators on a second side of the manifold assembly.

24. The apparatus of claim 22 or 23, wherein the manifold assembly comprises a manifold body that defines a receptacle adjacent to the each of the plurality of actuators, the receptacles adapted to guide the valve drive assembly into engagement with the corresponding one of the plurality of actuators.

25. The apparatus of any one of claims 22 – 24, further comprising an indexer adapted to move the valve drive assembly to interface with different ones of the plurality of actuators.

26. The apparatus of any one of claims 20 – 25, wherein one of the plurality of actuators comprises a pivot having a distal end that is adapted to move a corresponding membrane away from a corresponding valve seat.

27. The apparatus of any one of claims 20 – 25, wherein the manifold assembly is part of a flow cell assembly.

28. The apparatus of claim 27, wherein the flow cell assembly comprises a plurality of layers and wherein the manifold assembly is defined by or between one or more of the plurality of layers.

29. The apparatus of any one of claims 26 – 28, wherein the flow cell assembly comprises a plurality of laminate layers and wherein the manifold assembly is defined by or between one or more of the plurality of layers.

30. An apparatus, comprising:

a flow cell assembly comprising a plurality of laminate layers that form a flow cell inlet, a flow cell outlet, a flow cell, and a manifold assembly, the manifold assembly, comprising:

a common fluidic line;

a plurality of reagent fluidic lines, each of the plurality of reagent fluidic lines being adapted to be fluidically coupled to a corresponding reagent reservoir; and

a plurality of membrane valves selectively fluidically coupling the common fluidic line and a corresponding one of the plurality of reagent fluidic lines; and

a plurality of actuators;

wherein at least one of the plurality of actuators is a cantilever having a distal end that is adapted to move one of opposing membranes of the manifold assembly away from a corresponding valve seat of one of the plurality of membrane valves; and

wherein the at least one of the plurality of actuators is positioned between the opposing membranes.

31. The apparatus of claim 30, wherein the common fluidic line and the plurality of reagent fluidic lines are defined by or between one or more of the plurality of laminate layers.

32. The apparatus of claim 30 or 31, wherein one or more of the plurality of laminate layers comprise micro-structures or nano-structures.

33. The apparatus of any one of claims 30 – 32, wherein the flow cell comprises a pattern defined by one or more of the plurality of laminate layers.