CLAIMS

1. An instrument for sequencing polynucleotides comprising:

a gas flow rate sensor to measure a rate of flow of a pressurized gas to a plurality of reservoirs storing a respective liquid; and

a controller coupled to the gas flow rate sensor to calculate a volume of the liquid that the flow of pressurized gas displaces from the plurality of reservoirs wherein the reservoirs are located within a cartridge that is removably coupled to the instrument.

2. The instrument of claim 1, wherein the flow of pressurized gas displaces a plurality of fluids from the plurality of reservoirs storing respective liquids, and wherein the controller calculates volumes of the respective liquids that the flow of pressurized gas displaces from the respective reservoirs.

3. The instrument of claim 2, wherein the respective liquids comprise reagents.

4. The instrument of any one of claims 2 or 3, wherein the controller actuates a plurality of actuators to selectively control the displacement of the liquids.

5. The instrument of claim 4, wherein the actuators comprise valves.

6. The instrument of claim 4 or claim 5, wherein the actuators are located on the cartridge.

7. The instrument of any one of claims 1 to 6, wherein the liquid is displaced into a channel.

8. The instrument of claim 7, wherein the channel comprises a flow cell.

9. The instrument of any one of claims 1 to 8, wherein the gas comprises nitrogen.

10. The instrument of any one of claims 1 to 9, further comprising a pressure regulator coupled upstream of the gas flow rate sensor.

11. The instrument of any one of claims 7 to 10, wherein the cartridge, comprises:

a gas manifold to receive a flow of the pressurized gas;

the plurality of reservoirs storing respective liquids;

the channel to receive liquids dispensed from the plurality of reservoirs responsive to flow of the pressurized gas from the gas manifold into respective reservoirs;

the plurality of actuators, each coupled to the channel and to the respective reservoir; and

an electrical connector to electrically couple the actuators to a controller.

12. The instrument of claim 11, wherein the cartridge further comprises a waste reservoir to receive liquids from the channel.

13. The instrument of claim 11 or claim 12, wherein the cartridge further comprises the respective liquids.

14. The instrument of claim 13, wherein the respective liquids comprise reagents.

15. The instrument of any one of claims 11 to 14, wherein the cartridge is removably couplable to an instrument.

16. The instrument of any one of claims 11 to 15, wherein the actuators comprise valves.

17. The instrument of any one of claims 11 to 16, wherein the channel comprises a flow cell.

18. The instrument of any one of claims 11 to 17, wherein the cartridge lacks a sensor for measuring flow of the respective liquids.

19. The instrument of any one of claims 11 to 18, wherein the cartridge lacks a syringe pump for pulling the respective liquids.

20. A system comprising the instrument and the cartridge of any one of preceding claims.

21. A method for sequencing polynucleotides comprising:

measuring a rate of flow of a pressurized gas;

delivering the flow of the pressurized gas to at least one reservoir storing at least one liquid so as to displace a volume of the at least one liquid in the at least one reservoir using the flow of pressurized gas; and

using the measurement of the rate of flow of the pressurized gas to calculate the volume of the liquid that is displaced;

wherein the flow of pressurized gas displaces a plurality of fluids from a plurality of reservoirs storing respective liquids, the method comprising calculating volumes of the respective liquids that the flow of pressurized gas displaces from the respective reservoirs wherein the plurality of reservoirs is located within a cartridge; and wherein the method comprising removably coupling the cartridge to an instrument.

22. The method of claim 21, wherein the respective liquids comprise reagents.

23. The method of claim 21 or claim 22, wherein the plurality of reservoirs is located within a cartridge.

24. The method of claim 23, the method comprising removably coupling the cartridge to an instrument.

25. The method of any one of claims 21 to 24, further comprising actuating a plurality of actuators to selectively control the displacement of the liquids.

26. The method of claim 25, wherein the actuators comprise valves.

27. The method of claim 25 or claim 26, wherein the actuators are located on a cartridge.

28. The method of any one of claims 21 to 27, wherein the liquid is displaced into a channel.

29. The method of claim 28, wherein the channel comprises a flow cell.

30. The method of any one of claims 21 to 29, wherein the gas comprises nitrogen.

31. The method of any one of claims 21 to 30, further comprising regulating the pressure of the gas upstream of the gas flow rate sensor.

32. The method of any one of claims 21 to 31, further comprising:

fluidically coupling a gas manifold to the flow of the pressurized gas;

electrically coupling an actuator to a controller;

actuating the actuator to fluidically couple the reservoir to a channel; and

receiving, by the channel, the liquid dispensed from the reservoir.

33. The method of claim 32, further comprising receiving, by a waste reservoir, the liquid from the channel.

34. The method of claim 32 or claim 33, wherein the gas manifold and the actuator are located in a cartridge, and wherein the controller is located in an instrument.

35. The method of claim 34, further comprising removably coupling the cartridge to an instrument.

36. The method of any one of claims 32 to 35, wherein the actuator comprises a valve.

37. The method of any one of claims 32 to 36, wherein the channel comprises a flow cell.

38. The method of claim 21 comprising:

measuring a rate of flow of a pressurized gas using an air mass flow sensor of an instrument.

39. The method of claim 21, wherein the at least one reservoir comprises at least two reservoirs.

40. The method of claim 39, further comprising using the flow of the pressurized gas to sequentially dispense the at least one liquid from each of the at least two reservoirs,

wherein the at least one liquid is dispensed from each of the at least two reservoirs for a fixed time period and wherein the fixed time period for each reservoir can be variable relative to other reservoirs.

41. The method of claim 40, wherein the at least one liquid comprises at least two liquids, and wherein each of the at least two reservoirs comprises a different liquid.