CLAIMS

1. An apparatus, comprising:

(a) a body defining an upper flow channel and a plurality of wells, the upper flow channel configured to receive a flow of fluid containing nucleotides, each well of the plurality of wells being fluidically coupled with the corresponding flow channel, each well of the plurality of wells having a floor with an aperture;

(b) a lower channel positioned under the floor of each well of the plurality of wells, the lower channel to receive fluid containing a deblocking agent;

(c) a plurality of valves, each valve of the plurality of valves to transition between an open and closed state, each valve of the plurality of valves to permit fluid communication between the lower channel and the corresponding well of the plurality of wells in the open state, each valve of the plurality of valves to reduce fluid communication between the lower channel and the corresponding well of the plurality of wells in the closed state; and

(d) a plurality of electrodes, each electrode of the plurality of electrodes being positioned in a corresponding well of the plurality of wells, the plurality of electrodes to effect writing of polynucleotides in the corresponding wells of the plurality of wells.

2. The apparatus of claim 1, further comprising an imaging assembly to capture images indicative of one or more nucleotides in a polynucleotide.

3. The apparatus of claim 1, each valve of the plurality of valves comprising a hydrogel material.

4. The apparatus of claim 1, each valve of the plurality of valves comprising an electroactive polymer.

5. The apparatus of claim 1, each valve of the plurality of valves comprising a heat swellable polymer.

6. The apparatus of claim 1, each valve of the plurality of valves being biased toward a closed state, each valve of the plurality of valves to open in response to fluid pressure against the valve exceeding a threshold.

7. An apparatus, comprising:

(a) a flow cell body defining one or more flow channels and a plurality of wells, each flow channel of the one or more flow channels to receive a flow of fluid, each well of the plurality of wells being fluidically coupled with the corresponding flow channel of the one or more flow channels, each well of the plurality of wells defining a corresponding depth;

(b) a plurality of electrodes, each electrode of the plurality of electrodes being positioned in a corresponding well of the plurality of wells, the plurality of electrodes to effect writing of polynucleotides in the corresponding wells of the plurality of wells; and

(c) a temperature gradient generator, the temperature gradient generator to provide a temperature profile that varies between the plurality of wells.

8. The apparatus of claim 7, further comprising an imaging assembly to capture images indicative of one or more nucleotides in a polynucleotide.

9. The apparatus of claim 7, the temperature gradient generator to provide a relatively higher temperature within each well of the plurality of wells and a relatively lower temperature in spaces between the plurality of wells.

10. A method comprising:

flowing fluid through an apparatus of claims 1 to 6 wherein the fluid contains nucleotides,

wherein the apparatus further comprises a plurality of barrier features above the wells of the plurality of wells or in the wells of the plurality of wells;

activating the plurality of electrodes at bottom regions of each well of the plurality of wells to generate machine-written polynucleotides within each well of the plurality of wells, the machine-written polynucleotides representing stored data; and

activating the plurality of barrier features to reduce optical cross-talk between adjacent wells of the plurality of wells.

11. The method of claim 10, activating the electrode assemblies at the bottom region of each well of the plurality of wells comprising generating a positive current, activating the plurality of barrier features comprising generating a negative current.

12. The method of claim 10, activating the plurality of barrier features comprising adding a charge tag to at least some of the nucleotides.

13. The method of claim 12, each charge tag being positively charged.

14. The method of claim 13, each charge tag imparting a net positive charge to the corresponding nucleotide of the nucleotides.

15. The method of claim 12, each charge tag being negatively charged.

16. The method of claim 12, each charge tag being attached to one or more regions of the corresponding nucleotide of the nucleotides selected from a ribose, a phosphate group, or a base.

17. The method of claim 12, each charge tag being cleaved before a ligation event.

18. The method of claim 12, each charge tag being cleaved after a ligation event.