Claims

1. A method, comprising:

under control of control circuitry implementing a mixing protocol, aspirating reagents from multiple different reagent reservoirs into a cache channel one at a time in an ordered sequence, wherein designated amounts of the reagents are automatically aspirated from the corresponding reagent reservoirs by corresponding sippers based on the mixing protocol implemented by the control circuitry;

holding the reagents in the cache channel for a duration to initiate pre-mixing and form a reagent mixture;

discharging the reagent mixture from the cache channel into a mixing reservoir; and

mixing the reagent mixture with a sample template within the mixing reservoir to form a clustering mixture.

2. The method of claim 1, further comprising delivering the clustering mixture to a flow cell to produce clonal populations of deoxyribonucleic acid (DNA) molecules on the flow cell.

3. The method of claim 1, wherein the mixing reservoir contains the sample template therein prior to discharging the reagent mixture from the cache channel into the mixing reservoir.

4. The method of claim 1, wherein the clustering mixture in the mixing reservoir is mixed by aspirating a volume of the clustering mixture into a nozzle sipper extending into the mixing reservoir and subsequently discharging the volume of the clustering mixture from the nozzle sipper back into the mixing reservoir.

5. The method of claim 4, wherein the nozzle sipper contains a buffer fluid therein, the method further comprising introducing air into the nozzle sipper prior to aspirating the volume of the clustering mixture into the nozzle sipper to define an air gap between the buffer fluid and the clustering mixture that is aspirated into the nozzle sipper to avoid mixing between the buffer fluid and the clustering mixture.

6. The method of claim 1, wherein the cache channel includes an alternating pattern of the designated amounts of the different reagents along a length of the cache channel in response to aspirating the reagents into the cache channel.

7. The method of claim 1, wherein the ordered sequence that is repeated at least once before the reagent mixture in the cache channel is discharged into the mixing reservoir.

8. The method of claim 1, wherein a first volume of the reagents is aspirated into the cache channel to create an upstream buffer zone that separates a buffer fluid in the cache channel from a second, smaller volume of the reagent mixture that is to be discharged into the mixing reservoir.

9. The method of claim 1, wherein the reagents are aspirated from the corresponding reagent reservoirs using sippers that extend into the corresponding reagent reservoirs, the sippers fluidly being connected to the cache channel through corresponding ports and fluid channels on a fluid manifold.

10. The method of claim 1, further comprising introducing a surfactant into the reagents to reduce a difference in miscibility between the reagents.

11. The method of claim 1, wherein at least some of the reagents have different specific gravities relative to each other.

12. The method of claim 1, further comprising introducing a crowding agent having a molecular weight less than 10,000 Daltons into the reagents to reduce viscosity of the reagents.

13. The method of claim 1, wherein the reagents include three different reagents, and wherein the ordered sequence includes a third of the three different reagents, following a repeated sequence of a first and a second of the three different reagents.