CLAIMS

What is claimed is:

1. A device comprising:

a rotational axis;

a plurality of reaction structures arranged circumferentially over at least a portion of the device, wherein each reaction structure in the plurality of reaction structures comprises an aliquot chamber having an outlet and a reaction chamber having an inlet connected to the outlet of the aliquot chamber, wherein the reaction chamber is positioned radially outwards of the aliquot chamber; and

one or more connecting siphons radially leveled with each other and radially inwards of the outlets of the aliquot chambers of the plurality of reaction structures, wherein each respective connecting siphon in the one or more connecting siphons connects the aliquot chambers of corresponding adjacent reaction structures in the plurality of reaction structures.

2. The device of claim 1, wherein for each reaction structure in the plurality of reaction structures, the reaction chamber comprises a first well, and wherein one or more of the following (i)-(iii) applies:

(i) a first reagent is disposed in the first well;

(ii) for a respective reaction structure in the plurality of reaction structures, the first well serves as both reagent and readout wells; and

(iii) the first wells of the plurality of reaction structures are radially leveled with each other.

3. The device of claim 2, wherein for each reaction structure in at least a subset of the plurality of reaction structures, the reaction chamber comprises a second well and an intermediate chamber between the first and second wells, and a second reagent is disposed in the second well.

4. The device of claim 3, wherein the second wells of at least the subset of the plurality of reaction structures are radially leveled with each other, and/or wherein the inlet of the reaction chamber is located at the first well, and the second well is positioned radially inwards of the first well.

5. The device of claim 1, wherein each respective reaction structure in the plurality of reaction structures comprises an air chamber, wherein the reaction chamber of the respective reaction structure has an outlet connected to the air chamber.

6. The device of claim 1, further comprising:

an overflow chamber; and

an overflow channel connecting the aliquot chamber of a last reaction structure in the plurality of reaction structures to the overflow chamber.

7. The device of claim 6, wherein the overflow channel comprises one or more of the following (i)-(ii):

(i) a U-channel having an outlet connected to the overflow chamber; and

(ii) a siphon portion and the siphon portion comprises:

an inlet radially leveled with an inlet and an outlet of each connecting siphon in the one or more connecting siphons; and

a crest leveled with or radially outwards of a crest of each connecting siphon in the one or more connecting siphons.

8. A method comprising:

(A) obtaining a device comprising:

a rotational axis; and

a plurality of reaction structures arranged circumferentially over at least a portion of the device, wherein each reaction structure in the plurality of reaction structures comprises an aliquot chamber having an outlet and a reaction chamber having an inlet connected to the outlet of the aliquot chamber, wherein the reaction chamber is positioned radially outwards of the aliquot chamber; and

one or more connecting siphons radially leveled with each other and radially inwards of the outlets of the aliquot chambers of the plurality of reaction structures, wherein each respective connecting siphon in the one or more connecting siphons connects the aliquot chambers of corresponding adjacent reaction structures in the plurality of reaction structures;

(B) rotating the device at a speed to fill a first portion of the reaction chamber of each reaction structure in the plurality of reaction structures with a fluid;

(C) increasing the speed to empty the fluid from each corresponding connecting siphon in the one or more connecting siphons; and

(D) decreasing the speed to create a gas volume trapped inside of each corresponding connecting siphon in the one or more connecting siphons, thereby interrupting fluidic connection between the plurality of reaction structures.

9. The method of claim 8, wherein the increasing (C) moves at least a portion of the fluid out of the aliquot chamber of each respective reaction structure in the plurality of reaction structures such that the fluid contained in the aliquot chamber of each respective reaction structure in the plurality of reaction structures is positioned outwards of either the inlet or outlet of each corresponding connecting siphon in the one or more connecting siphons, thereby emptying the fluid from each corresponding connecting siphon in the one or more connecting siphons.

10. The method of claim 8, wherein the decreasing (D) moves at least a portion of the fluid contained in the reaction chamber of each respective reaction structure in the plurality of reaction

structures to the aliquot chamber of each respective reaction structure in the plurality of reaction structures such that the fluid contained in the aliquot chamber of each respective reaction structure in the plurality of reaction structures is positioned inwards of the inlet and outlet of each corresponding connecting siphon in the one or more connecting siphons, thereby wetting the inlet and outlet of each corresponding connecting siphon in the one or more connecting siphons with the gas volume trapped inside of each corresponding connecting siphon.

11. The method of claim 8, wherein the first portion of the reaction chamber of each reaction structure in the plurality of reaction structures comprises a first well with a first reagent, the method further comprising:

(E) repeating the increasing (C) and decreasing (D) one or more times to promote mixing of the fluid with the first reagent.

12. The method of claim 11, further comprising:

(F) detecting, for each reaction structure in the plurality of reaction structure, light transmitted through the first well or a wall of the first well of the reaction chamber.

13. The method of claim 8, further comprising:

(G) increasing the speed to fill a second portion of the reaction chamber of each reaction structure in at least a subset of the plurality of reaction structures; and

(H) performing the decreasing (D).

14. The method of claim 13, wherein the second portion of the reaction chamber of each reaction structure in at least the subset of the plurality of reaction structures comprises a second well with a second reagent, the method further comprising:

(I) repeating the increasing (G) and performing (H) one or more times to promote mixing of the fluid with the second reagent.

15. The method of claim 14, further comprising:

(J) detecting, for each reaction structure in at least the subset of the plurality of reaction structure, light transmitted through the first well or a wall of the first well of the reaction chamber.