CLAIMS

1. An apparatus, comprising: (a) a common fluid source; (b) a plurality of independent, continuous fluidic pathways, each independent, continuous fluidic pathway comprising: (i) a sample chamber connected to the common fluid source, said sample chamber having a fluid volume and comprising an assay chamber and an entry conduit, wherein the assay chamber has an assay chamber volume, and wherein the entry conduit connects the common fluid source to the assay chamber; and (ii) a pneumatic compartment connected to the sample chamber, said pneumatic compartment having a pneumatic volume; and (c) a first film adhered to a surface of at least a portion of the apparatus, wherein the first film forms one wall of the entry conduit of each fluidic pathway; and (d) a second film adhered to the first film, wherein the second film has a higher melting temperature than the first film, wherein, excluding the connection between the sample chamber and the common fluid source, each fluidic pathway is a closed system, and wherein a ratio of the fluid volume to the pneumatic volume is substantially equivalent for each fluidic pathway of the plurality of fluidic pathways.

2. The apparatus of claim 1, wherein the fluid volume of a first fluidic pathway of the plurality of fluidic pathways is greater than the fluid volume of a second fluidic pathway of the plurality of fluidic pathways.

3. The apparatus of claim 1, wherein the pneumatic compartment comprises an air chamber and a pneumatic conduit, wherein the pneumatic conduit connects the sample chamber to the air chamber.

4. The apparatus of claim 1, wherein the assay chamber comprises: a double tapered chamber, the double tapered chamber comprising: a tapered inlet in fluidic communication with a terminus of the entry conduit of the fluidic pathway; a tapered outlet in fluidic communication with a terminus of the pneumatic compartment, wherein the tapered inlet and the tapered outlet are separated by a largest dimension of the assay chamber volume; and two curved boundaries, each curved boundary extending from the tapered inlet to the tapered outlet, the two curved boundaries together enclosing the assay chamber volume, wherein each curved boundary comprises a midpoint, and wherein a distance between the two curved boundaries decreases as the boundaries curve from the midpoint toward the tapered inlet and from the midpoint toward the tapered outlet.

5. The apparatus of claim 4, wherein the two curved boundaries of the double tapered chamber are concave with regard to a center point of the assay chamber volume.

6. The apparatus of claim 4, wherein the double tapered chamber is monolithic.

7. The apparatus of claim 1, wherein the assay chamber comprises a first bounding surface formed in a monolithic substrate and a second bounding surface formed by a plug, the plug comprising a body and a cap, the body protruding into the monolithic substrate at a depth, wherein the cap of the plug forms the second bounding surface of the assay chamber.

8. The apparatus of claim 7, wherein the assay chamber comprises a third bounding surface

formed by a film, wherein the first bounding surface, second bounding surface, and third bounding surface together enclose the assay chamber volume.

9. The apparatus of claim 7, wherein an internal cavity formed in the cap of the plug contains one or more dried reagents.

10. The apparatus of claims 7, wherein the assay chamber volume depends at least in part on the depth at which the body of the plug protrudes into the monolithic substrate of the assay chamber.

11. The apparatus of claim 7, wherein the plug is transparent.

12. The apparatus of claim 1, wherein the assay chamber volume is between 1 μL and 35 μL.

13. The apparatus of claim 1, further comprising a magnetic mixing element located within the assay chamber of each fluidic pathway, wherein the magnetic mixing element is capable of gyration.

14. The apparatus of claim 13, wherein gyration of the magnetic mixing element is induced by rotation of a magnet exterior to the assay chamber.

15. An apparatus for rehydrating a dried reagent, the apparatus comprising: an assay chamber comprising a first bounding surface formed in a monolithic substrate and a second bounding surface formed by a plug, the plug comprising a body and a cap, the body protruding into the monolithic substrate at a depth, wherein the cap of the plug forms the second bounding surface of the assay chamber, thereby enclosing a volume of the assay chamber; one or more dried reagents contained in an internal cavity formed in the cap of the plug; and a magnetic mixing element configured to induce gyration within the assay chamber volume.

16. The apparatus of claim 15, wherein the assay chamber comprises a third bounding surface comprised of a film, wherein the first bounding surface, second bounding surface and third bounding surface together enclose the assay chamber volume.