According to various embodiments, a single closing deformer can be used alone, or in combination with one or more additional closing deformers, to form a barrier wall or dam of displaceable adhesive and/or to close-off one or more fluid communications formed between sample-containment features.

According to various embodiments, a valve can be provided that can control fluid flow into a sample-containment feature and can be designed to close automatically, or semi-automatically, after the loading of a sample-containment feature. For example, a closing element of the valve can be arranged to re-seat and close a fluid communication upon termination of a spinning operation.

According to various embodiments, after the liquid is processed in the loaded sample-containment feature, for example, after conducting a polymerase chain reaction of a biological sample in the sample-containment feature, the processed sample can be forced into a subsequently arranged, downstream sample-containment feature. According to various embodiments, the fluid sample can be forced into the subsequent sample-containment feature with or without first closing a valve that controls the supply of liquid into the loaded sample-containment feature. According to various embodiments, a valve **21***b*, as shown in FIGS. **7**-**10**, can be opened to form a downstream fluid communication, for example, by forcibly deforming the valve **21***b* with one or more opening deformers, as described above and as described by the various applications incorporated herein by reference. The device **100** can then be spun again, forcing the processed sample to move into the subsequent sample-containment feature through the newly-opened valve **21***b*.

According to various embodiments, the displaced gas stored in the gas trap **60** during the filling operation can allow the processed sample to be expelled from the loaded sample-containment feature as centripetal force can be used to force out the processed sample. As the processed sample exits through the open valve **21***b* and into the subsequent sample-containment feature, the gas collected in the gas trap **60** can expand and move disrupting the gas-liquid interface between the gas and the processed sample. This description can assist in moving the processed sample out of the previously loaded sample-containment feature.

According to various embodiments, a length dimension, L, and a width dimension, W, of an elongated air trap reservoir **60**, can be exemplified with reference to FIG. **10**. According to various embodiments, the length, L, as measured along the longitudinal axis **72** of the gas trap **60**, from the sample-containment feature to the distal end of the gas trap **60**, can be as long as desired. The width, W, of the gas trap **60** can be as wide as desired. While a volume defined by the gas trap **60** can be infinitely larger than a volume defined by the sample-containment feature in fluid communication with the gas trap, the maximum dimensions of the length, L, and the width, W, of the gas trap **60** can each be made to be just less than the amount of space between respective sample-processing pathways when a plurality of pathways are included in or in the device. For example, in a device including sample-containment features having widths or diameters of from about 0.5 mm to about 2.0 mm, and a separation of about 1.0 mm between respective sample-processing pathways, the length, L, of the gas trap **60** can be from about 0.5 mm to about 2.5 mm, for example, from about 0.75 mm to about 1.5 mm. According to various embodiments, in a device including the noted exemplary dimensions, the width, W, of the gas trap **60** can be from about 0.1 mm to about 1.0 mm, for example, from about 0.3 mm to about 0.5 mm.

According to various embodiments, an exemplary gas trap formed as a recess in a surface of the substrate, can have a length, L, of about 1.50 mm, a width, W, of about 0.30 mm, and a depth, D, of about 0.5 mm. According to various embodiments, an exemplary gas trap formed by a bore through a thickness of a substrate, can have a length, L, of about 1.50 mm, and a diameter of about 0.30 mm. According to various embodiments, the walls defining the gas trap **60** can be curved, tapered, or smoothed at the corresponding intersections of the walls.

According to various embodiments, the gas trap can be sized such that it defines a volume that can be smaller than, equal to, or larger than, the volume of the sample-containment feature, with which the gas trap is in fluid communication. While the gas trap can define a volume that can be larger than the volume defined by the sample-containment feature, the maximum volume of the gas trap can be limited by the amount of space between respective sample-processing pathways. According to various embodiments, in a device including a sample-containment feature having a diameter of about 1.20 mm and a depth of about 0.9 mm, the volume of the gas trap can be from about two percent to about 50% volume of the sample-containment feature, for example, from about 5% to about 25% of the volume of the sample-containment feature. According to various embodiments, the volume of the gas trap can be from about 10% to about 20% of the volume of the sample-containment feature.

According to various embodiments, the recess of the air trap reservoir can extend outwardly from a sample-containment feature in various directions and can include various shapes and features. For example, as shown in FIG. **11**, the air trap reservoir **160** can include a curved channel or bore **162** that can extend from a sample-containment feature **26** and can curve in a direction toward an axis of rotation. At the end of the curved channel **162**, a reservoir tip **164** can be arranged that can act as an air receiving well.

Those skilled in the art can appreciate from the foregoing description that the present teachings can be implemented in a variety of forms. Therefore, while these teachings have been described in connection with particular embodiments and examples thereof, the true scope of the present teachings should not be so limited. Various changes and modifications may be made without departing from the scope of the teachings herein.

What is claimed is:

1. A device comprising:

a substrate including a top surface and a bottom surface; and

one or more sample processing pathways, each comprising

a first sample-containment feature at least partially defined by the substrate and including an inlet portion and an outlet portion, and

a reservoir in fluid communication with the sample-containment feature and comprising a distal end portion including a closed end, wherein the reservoir extends away from the outlet portion, and the distal end portion is arranged closer to the inlet portion than to the outlet portion.

2. The device of claim **1**, wherein each of the one or more sample processing pathways further comprises an upstream sample-containment feature and a first valve arranged between the upstream sample-containment feature and the inlet portion of the first sample-containment feature, the first valve being capable of forming at least one fluid communication between the upstream sample-containment feature and the first sample-containment feature.