directions, while a crossing angle of 0° indicates that the fluid paths overlap completely and are flowing in the same direction. "Contact region," as used herein, refers to the area at which two fluid paths overlap. In most cases, a contact region is formed where a first fluid path is tangential to a second fluid path, though it is possible that there is some degree of overlap between the fluid paths, or that the fluid paths are separated by some distance, so long as some degree of fluid communication between the fluid paths is possible. "Convection controller," as used herein, refers to any device or system that inhibits convection, but allows at least some diffusion.

[**0058**] In one embodiment, the fluidic system of the present invention, which is illustrated in the following description of particular embodiments as a microfluidic system by way of example, includes a first fluid path and a second fluid path segregated from the first fluid path by a convection controller at a contact region. Referring now to **FIG. 1**, an embodiment of a microfluidic system will be described. This embodiment of a microfluidic system **10** may include a first fluid path **20** and a second fluid path **30** segregated from first fluid path **20** by a convection controller **50** at a first contact region **40**.

[**0059**] In typical operation of the embodiment of microfluidic system **10** illustrated in **FIG. 1**, a first fluid is introduced, for example by pumping or gravity feed, into first fluid path **20** through a first inlet **22** and a second fluid is similarly introduced into second fluid path **30** through a second inlet **32**. Following introduction, the first and second fluids flow through their respective fluid paths **20, 30** as illustrated by flow indicators **100**, passing one another at contact region **40**. Convection controller **50** inhibits convection between first fluid path **20** and second fluid path **30**, while allowing at least some diffusion between them. The first fluid and second fluid may be, or contain, material to be interacted, such as reactants. For example, the first fluid may be a test material, such as a solution suspected of containing a particular enzyme, and the second fluid may be an indicator, such as a material that creates an observable response when exposed to the enzyme. When the fluids are introduced into flow paths **20, 30**, mixing of the fluids by convection may be inhibited by convection controller **50**, but diffusion of the fluids, or materials therein, such as the enzyme, indicator, or indicator and enzyme may be allowed. Accordingly, the materials may interact at contact region **40** and the response of the indicator may be observed there. In such an embodiment, contact region **40** is effectively a test site, performing a function similar to a test tube or well in a tray containing a test material and an indicator. In some embodiments, the indicator may pass through convection inhibitor **50**, making flow path **20, 30** into a test site.

[**0060**] The present invention is not limited to a single pair of fluid paths **20, 30**. For example, the embodiments illustrated in **FIGS. 3 and 4** each include two pairs of fluid paths **20, 30**, while the embodiment illustrated in **FIG. 5** includes two sets of five fluid paths **20, 30**. In these embodiments, fluid paths **20, 30** are arranged in two sets of parallel fluid paths having a crossing angle of about 90 degrees. As illustrated by the figures, such an arrangement increases the number of contacts regions **40** geometrically. For example, crossing two fluid paths creates one contact region, crossing two pairs of fluid paths creates four contact regions, crossing two sets of five fluid paths creates 25 contact regions, crossing two sets of 10 fluid paths creates 100 contact regions and so on. Because each contact region **40** may function as an interaction site, the number of interaction sites also grows geometrically as the number of fluid paths **20, 30** is increased. Accordingly, by introducing fluid into, for example, 20 fluid paths arranged as two sets of 10 fluid paths crossing one another, 100 interactions are able to be performed in parallel, representing a significant time savings over filling 100 wells with materials to be interacted, such as a test fluid and an indicator. Some of the many other possible arrangements of fluid paths and the materials that may introduced into the fluid paths are discussed below.

[**0061**] Fluid paths **20, 30** may be constructed in any manner and of any material(s) that allow a fluid to be introduced into fluid paths **20, 30** without adversely affecting or being affected by the fluid. For example, fluid paths **20, 30** may have any configuration or cross-sectional dimension that allows introduction of a fluid or fluids to be used with microfluidic system **10**. In some embodiments, fluid paths **20, 30** may be constructed in a manner and of material(s) that allow a fluid to flow through fluid paths **20, 30** without adversely affecting or being affected by the fluid. For example, fluid paths **20, 30** may have any configuration or cross-sectional dimension that allows a fluid or fluids to be used with microfluidic system **10** to flow through fluid paths **20, 30** at an acceptable pressure drop.

[**0062**] In one embodiment, the cross-sectional dimension of fluid paths **20, 30** is as small as possible without inhibiting the introduction or flow of the fluid or fluids to be used with microfluidic system **10**. For example, fluid paths **20, 30** may have a cross-sectional dimension of less than 1 millimeter (mm), preferably less than 500 micrometers (μm), more preferably less than 300 μm, still more preferably less than 100 μm and, most preferably, less than 50 μm. In certain embodiments, the fluid paths may have nanometer dimensions. For example, one ore more fluid paths may have cross-sectional dimensions of less than 1000 nanometers, less than 500 nanometers, less than 300 nanometers, less than 100 nanometers, or even as little as 50 or less nanometers, depending on the embodiment. However, it should be recognized that the preferred cross-sectional dimension of fluid paths **20, 30** will vary with the fluid(s) and application. For example, fluids including cells therein, such as blood, may suffer damage to the cells if the cross-sectional dimension is small. As a further example, fluids having a high viscosity may require excessive pumping pressure if the cross-sectional dimension is small.

[**0063**] The preferred configuration of fluid paths **20, 30** may vary with microfluidic system **10** and the fluid(s) to be used therein. Generally, fluid paths **20, 30** may be as straight and direct as possible from inlet to outlet to minimize pressure drop and reduce damage to time sensitive or shear sensitive liquids. However, in some instances, fluid paths **20, 30** may be preferred to be longer or more convoluted than otherwise necessary, such as where fluid paths **20, 30** serve as reactors or mixers wherein a residence time is desired. In some embodiments, a pair of crossing fluid paths **20, 30** may have configurations, such as matching lengths from inlet to contact region **40**, to facilitate matching pressures within them. As discussed in more detail below, matching pressures across contact region **40** may further inhibit convection