

[0126] Another advantage to forming microfluidic structures of the invention (or interior, fluid-contacting surfaces) from oxidized silicone polymers is that these surfaces can be much more hydrophilic than the surfaces of typical elastomeric polymers (where a hydrophilic interior surface is desired). Such hydrophilic channel surfaces can thus be more easily filled and wetted with aqueous solutions than can structures comprised of typical, unoxidized elastomeric polymers or other hydrophobic materials.

[0127] In one embodiment, a bottom wall is formed of a material different from one or more side walls or a top wall, or other components. For example, the interior surface of a bottom wall can comprise the surface of a silicon wafer or microchip, or other substrate. Other components can, as described above, be sealed to such alternative substrates. Where it is desired to seal a component comprising a silicone polymer (e.g. PDMS) to a substrate (bottom wall) of different material, the substrate may be selected from the group of materials to which oxidized silicone polymer is able to irreversibly seal (e.g., glass, silicon, silicon oxide, quartz, silicon nitride, polyethylene, polystyrene, epoxy polymers, and glassy carbon surfaces which have been oxidized). Alternatively, other sealing techniques can be used, as would be apparent to those of ordinary skill in the art, including, but not limited to, the use of separate adhesives, thermal bonding, solvent bonding, ultrasonic welding, etc.

[0128] Certain embodiments of the present invention involve the use of systems and methods for the arrangement of droplets in pre-determined locations. In some embodiments, the invention can interface not only with microfluidic/microscale equipment, but with macroscopic equipment to allow for the easy injection of liquids and extraction of sample droplets, etc. In one set of embodiments, a device can be used that comprises one or more "pots" (as shown, for example, in FIG. 6*i*) into which individual droplets can be transported and stored. In one embodiment, a droplet is urged through a constriction in a storage channel into a pot. Once in the pot, the droplet may remain stably positioned, or it may be urged from the pot through a second constriction and/or through further constrictions into and/or through various pots which can be identical or similar to, or different from, the original pot. Systems and methods for the arrangement of droplets are described in U.S. Provisional Patent Application Ser. No. 61/048,304, filed Apr. 28, 2008, entitled "Microfluidic Storage and Arrangement of Drops," which is incorporated herein by reference.

[0129] In yet another aspect, articles and methods are described herein that can be used for direct screening of cells taken from a subject, such as a human. A "subject," as used herein, means a human or non-human animal. Examples of subjects include, but are not limited to, a mammal such as a dog, a cat, a horse, a donkey, a mule, a deer, an elk, a caribou, a llama, an alpaca, an antelope, a rabbit, a cow, a pig, a sheep, a goat, a rat (e.g., *Rattus Norvegicus*), a mouse (e.g., *Mus musculus*), a guinea pig, a hamster, a primate (e.g., a monkey, a chimpanzee, a baboon, an ape, a gorilla, etc.), or the like; a bird such as a chicken, a turkey, a quail, etc.; a reptile (e.g., a snake); an amphibian such as a toad, a frog (e.g., *Xenopus laevis*), etc.; a fish such as a zebrafish (e.g., *Danio rerio*); or the like. For example, in one embodiment, cells are taken from a subject, e.g., from the blood of the subject. The blood cells (or other cells) are then screened, for example, as described herein, to determine one or more antibody-producing cells or other cells able to secrete a species.

[0130] The screening process can allow identification and selection of the cells that produce these antibodies, and these cells and antibodies may then serve as building blocks for therapeutics, as discussed below. In another example, useful antibody-producing cells from human subjects can be screened. For instance, the subject may be one that was exposed to and/or who can make useful antibodies against an agent of interest such as HIV or other infectious agents (e.g., viruses, bacteria, parasites, prions, etc). Similarly, some humans may produce antibodies against toxic molecules such as drugs of abuse or other toxins, and these antibodies can be isolated using methods and articles described herein. It should be noted that the subject is not necessarily one that appears sick. The subject may be healthy, but produce antibodies of interest (e.g., against an infectious agent, such as HIV). As another example, cancer patients may produce antibodies specific to cancer-cell surface markers. By identifying or determining the antibody-producing cells that produce antibodies against an agent of interest, such antibodies may be produced, as discussed in detail below, and administered to the subject and/or to other subjects, depending on the application.

[0131] It should be noted that, in the descriptions herein, cells are screened on the basis of their production of antibodies. However, it should be understood that this is by way of example only, and in other embodiments, other cells able to secrete other species (e.g., insulin, neurotransmitters, proteins, hormones, etc.) may be studied instead of antibodies and antibody-producing cells. Similarly, although the cells are described in the examples below as arising from the blood of a subject or from culture, in other embodiments, the cells may arise from other sources as well, for example, bodily fluids, biopsies, or the like. Further non-limiting examples include tissue biopsies, serum or other blood fractions, urine, ocular fluid, saliva, cerebro-spinal fluid, fluid or other samples from tonsils, lymph nodes, needle biopsies, etc.

[0132] In some embodiments, the cells may be used as part of a treatment (e.g., of an autoimmune disease). As an example, cells (e.g., human blood cells) that produce desired antibodies may be identified and/or sorted. The cells may then be cultured, in some cases, to produce antibodies which may, for example, be harvested and introduced into a subject. In some cases, the antibody-producing cells may be cultured and given to the subject directly.

[0133] A method of screening according to one embodiment may involve, for example, providing a plurality of B cells from a human (e.g., from a blood sample or by apheresis or other conventional means). (It should be noted that B cells are described in this example; however, in other embodiments, other antibody-producing cells may also be used, for example, plasma cells). From the plurality of B cells, at least one B cell that produces a first antibody which associates with all or a portion of an agent of interest may be determined (e.g., identified). In some embodiments, this determining step is performed, at least in part, using a microfluidic system. For example, as described herein, a microfluidic system may be used containing a plurality of droplets, at least some of which droplets contain one (or more) B cell. In some cases, the B cells are isolated from a subject by removing blood from the subject and screening the blood to find B cells. For instance, cells from the blood may be contained within a plurality of droplets (e.g., such that each droplet has, on the average, one cell). As another example, a plurality of B cells in droplets can be cultured (e.g., within the droplets) to allow production or