

distribution (Fit). The dashed line is the theoretical number of cells per drop according to the cell density only (homogeneously distributed); according to one set of embodiments;

[0028] FIG. 11 includes, according to one set of embodiments, micrographs of drops comprising cells for multiple surfactants, according to one embodiment of the invention. For each surfactant, the chemical structure and the results of the biocompatibility assay (microscopical bright-field images) are shown. For the assay, HEK293T cells were incubated for 48 hr on a layer of perfluorinated FC40 oil in the presence or absence (control) of the indicated surfactant (0.5% w/w);

[0029] FIGS. 12A-12E include, according to one set of embodiments, (a and b) plots of the percentage of viable (a) Jurkat and (b) HEK293T cells recovered from emulsions at the indicated time points; (c) a plot of the total number of recovered Jurkat and HEK293T cells (live and dead) relative to the number of initially encapsulated cells; (d) a plot of the percentage of viable Jurkat cells encapsulated at different densities after 3 d; and (e) a micrograph of HEK293T cells recovered after 48 hr of encapsulation;

[0030] FIGS. 13A-13F include, according to one set of embodiments, (a and b) plots of the percentage of viable (a) Jurkat and (b) HEK293T cells recovered from plugs at the indicated time points; (c) a plot of the total number of recovered Jurkat and HEK293T cells (live and dead) relative to the number of initially encapsulated cells; (d) a plot of the percentage of viable Jurkat cells encapsulated at different densities after 3 d; (e) a micrograph of HEK293T cells recovered after 48 hr of encapsulation; and (f) a plot of the mean size of plugs harboring HEK293T cells plotted against the incubation time.

[0031] FIG. 14 includes micrographs of the growth of the Nematode *C. elegans* within droplets, according to one embodiment of the invention;

[0032] FIGS. 15A-15F include, according to one set of embodiments, (a) a bright-field image of the inlet during reinjection of an emulsion (drops containing HEK293T cells) after 2 days of incubation; (b) bright-field images of individual drops during encapsulation and after reinjection (off-chip incubation for 2 and 14 d); (c) a fluorescence-microscopic image of drops hosting lacZ-expressing HEK293T cells (converting the fluorogenic substrate FDG) after 16 hr of incubation; (d) a schematic illustration of the optical setup for fluorescence measurements; (e) a plot of the influence of the fluorescence intensity (y axis) on the peak width (w). The peak width is defined as the time (t, x axis) for which a fluorescent signal above a certain threshold (dotted, horizontal line) can be measured (due to a drop passing the laser beam). Different fluorescence intensities of the drops (continuous and dashed peaks) result in different apparent peak widths (w1 and w2); and (f) images and plots of fluorescence signals of drops after reinjection. Upper panels: fluorescence intensity (x axis) plotted against the peak width (y axis) for pure (left) and 1:9 diluted (right) transduced cells. The relative frequency of all events is color coded according to the bar on the right (numbers corresponding to the exponent of the frequency). White gates correspond to noncoalesced drops: left gate, drops considered as negatives; right gate, drops considered as positives. Lower panel: fluorescence intensity (x axis) plotted against the drop counts (y axis) of all events within the gates. Positive events are depicted in red, and negative events are depicted in black;

[0033] FIGS. 16A-16C illustrate fluidic mixing in droplets having two or more fluid regions, according to one embodiment of the invention;

[0034] FIGS. 17A-17D illustrate uncharged and charged droplets in channels, according to certain embodiments of the invention; and

[0035] FIG. 18 is a schematic illustration of screening for antibody-binding to low molecular-weight antigens using fluorescence polarization, according to certain embodiments of the invention. Fluorescent antigens with their absorption transition vectors (arrows) aligned parallel to the electric vector of linearly polarized light (along the vertical page axis) are selectively excited. For small, rapidly rotating antigens, the initially photoselected orientational distribution becomes randomized prior to emission, resulting in low fluorescence polarization. Conversely, binding of the low molecular weight antigen to a large, slowly rotating antibody molecule results in high fluorescence polarization.

DETAILED DESCRIPTION

[0036] The present invention generally relates to fluidic droplets, and techniques for screening or sorting such fluidic droplets. In some embodiments, the fluidic droplets may contain cells (e.g., hybridoma cells) that can secrete various species such as antibodies, for example. In one aspect, a plurality of fluidic droplets containing cells is screened to determine proteins, antibodies, polypeptides, peptides, nucleic acids, or the like. For example, cells able to secrete species such as antibodies may be identified, selected, and/or isolated according to certain embodiments of the invention. Examples of such cells include, for instance, immortal cells such as hybridomas, or non-immortal cells such as B-cells. For instance, blood cells may be encapsulated within a plurality of fluidic droplets, and the cells able to produce antibodies may be determined. In some cases, expression or secretion levels may be determined using signaling entities, for example, determinable microparticles present within the fluidic droplet. Other aspects of the invention relate to kits involving such fluidic droplets, methods of promoting the making or use of such fluidic droplets, and the like.

[0037] The following are each incorporated herein by reference: U.S. patent application Ser. No. 11/246,911, filed Oct. 7, 2005, entitled "Formation and Control of Fluidic Species," published as U.S. Patent Application Publication No. 2006/0163385 on Jul. 27, 2006; U.S. patent application Ser. No. 11/024,228, filed Dec. 28, 2004, entitled "Method and Apparatus for Fluid Dispersion," published as U.S. Patent Application Publication No. 2005/0172476 on Aug. 11, 2005; U.S. patent application Ser. No. 11/360,845, filed Feb. 23, 2006, entitled "Electronic Control of Fluidic Species," published as U.S. Patent Application Publication No. 2007/000342 on Jan. 4, 2007; International Patent Application No. PCT/US2006/007772, filed Mar. 3, 2006, entitled "Method and Apparatus for Forming Multiple Emulsions," published as WO 2006/096571 on Sep. 14, 2006; U.S. patent application Ser. No. 11/368,263, filed Mar. 3, 2006, entitled "Systems and Methods of Forming Particles," published as U.S. Patent Application Publication No. 2007/0054119 on Mar. 8, 2007; U.S. Provisional Patent Application Ser. No. 60/920,574, filed Mar. 28, 2007, entitled "Multiple Emulsions and Techniques for Formation"; and International Patent Application No. PCT/US2006/001938, filed Jan. 20, 2006, entitled "Systems and Methods for Forming Fluidic Droplets Encapsulated in Particles Such as Colloidal Particles," published as WO 2006/