increase in the field strength generated by the opposing magnets using the Hall effect sensor; stopping the motion of the probe toward the sample plate; and obtaining a sample from the one or more samples in the sample plate using a probe including a fitting, an elongated portion extending from the fitting, and a restorative spring including a plurality of magnets inserted onto the elongated portion.

[00016] According to an exemplary embodiment of the present teachings, there is provided a method for obtaining a sample, including: sampling a sample plate including one or more samples in a plate sampler; moving toward the sample plate a probe including a fitting, an elongated portion extending from the fitting, a restoration restorative spring, and a magnet; sensing a field strength generated by the proximity of the magnet in the extended position using a Hall effect sensor; detecting an increase in the field strength generated by the magnet proximity using the Hall effect sensor; stopping the motion of the probe toward the sample plate; and obtaining a sample from the one or more samples in the sample plate using probe assembly.

[00017] According to an exemplary embodiment of the present teachings, there is provided a method for making a sampling probe, including: providing a fitting; assembling onto the fitting an elongated portion extending from the fitting; and inserting onto the elongated portion a restorative spring including a plurality of rare earth magnets.

[00018] According to an exemplary embodiment of the present teachings, there is provided a plate sampler apparatus, including: a loading compartment including a sample probe and a tray, the tray being configured to receive a sample plate configured to include a plurality of samples; a fluidic compartment configured to receive one or more fluid containers; a first access door configured to allow access to the loading compartment; and a second access door configured to allow access to the fluidic compartment. The sampling probe is configured to sense an obstacle and to stop motion toward the obstacle, the sampling probe comprising a restorative spring configured to stop the motion of the sampling probe toward the obstacle

[00019]

[00020] According to an exemplary embodiment of the present teachings, there is provided a hi-throughput cytometry system, including: a flow cytometer configured to acoustically focus a sample in a flowing fluid; and a plate loader in fluidic communication with the flow cytometer, the plate loader including: a loading compartment including a sampling probe and a tray, the tray being configured to receive a sample plate configured to include a plurality of samples; a fluidic compartment configured to receive one or more fluid containers; a first

access door configured to allow access to the loading compartment; and a second access door configured to allow access to the fluidic compartment. The sampling probe is configured to sense an obstacle and to stop motion toward the obstacle, the sampling probe comprising a restorative spring configured to stop the motion of the sampling probe toward the obstacle.

[00021] According to an exemplary embodiment of the present teachings, there is provided a hi-throughput cytometry system, including: a flow cytometer; and a plate loader in fluidic communication with the flow cytometer, the plate loader including an actuation mechanism configured to move a tray toward a top surface of the plate loader such that a sample plate may be loaded onto the tray from above the plate loader.

[00022] The foregoing general description and the following detailed description are exemplary only and are not limiting in any way of the scope of the present teachings. Other embodiments or variations upon embodiments specifically discussed herein, including various combinations of features of embodiments discussed herein, may be realized from the following detailed description or may be learned by practice of the present teachings.

BRIEF DESCRIPTION OF THE DRAWINGS

[00023] The accompanying drawings illustrate various exemplary embodiments of the invention. The drawings are exemplary only and are not in any way limiting of the scope of the invention.

[00024] FIG. 1 is a perspective view of an exemplary plate sampler.

[00025] FIG. 2 is another perspective view of the exemplary plate sampler set forth in FIG. 1.

[00026] FIG. 3 is a front view of the exemplary plate sampler set forth in FIG. 1.

[00027] FIG. 4 is a back view of the exemplary plate sampler set forth in FIG. 1.

[00028] FIG. 5 is a side view of the exemplary plate sampler set forth in FIG. 1.

[00029] FIG. 6 is another side view of the exemplary plate sampler set forth in FIG. 1.

[00030] FIG. 7 is a top view of the exemplary plate sampler set forth in FIG. 1.

[00031] FIG. 8 is a bottom view of the exemplary plate sampler set forth in FIG. 1.

[00032] FIG. 9 is a perspective view of another exemplary plate sampler.

[00033] FIG. 10 is another perspective view of the exemplary plate sampler set forth in FIG. 9.

[00034] FIG. 11 is a front view of the exemplary plate sampler set forth in FIG. 9.

[00035] FIG. 12 is a back view of the exemplary plate sampler set forth in FIG. 9.

[00036] FIG. 13 is a side view of the exemplary plate sampler set forth in FIG. 9.

[00037] FIG. 14 is another side view of the exemplary plate sampler set forth in FIG. 9.

[00038] FIG. 15 is a top view of the exemplary plate sampler set forth in FIG. 9.

[00039] FIG. 16 is a bottom view of the exemplary plate sampler set forth in FIG. 9.

CLAIMS

1. A plate sampler apparatus, comprising:

a loading compartment including a sampling probe and a tray, the tray being configured to receive a sample plate configured to include a plurality of samples;

a fluidic compartment configured to receive one or more fluid containers;

a first access door configured to allow access to the loading compartment; and

a second access door configured to allow access to the fluidic compartment,

wherein the sampling probe is configured to sense an obstacle and to stop motion toward the obstacle, the sampling probe comprising a restorative spring configured to stop the motion of the sampling probe toward the obstacle.

2. The apparatus of claim 1, wherein the loading compartment further includes an actuation mechanism configured to move the tray.

3. The apparatus of claim 2, wherein the actuation mechanism is configured to move the tray, when the first access door is opened, along a direction substantially perpendicular to a direction of gravity between a first position located within the loading compartment and a second position located at least partly outside the loading compartment such that the sample plate may be loaded onto the tray from a side of the apparatus by a user of the apparatus or by robotic machinery.

4. The apparatus of claim 2, wherein the actuation mechanism is configured to move the tray, when the first access door is opened, along a direction substantially parallel to a direction of gravity between a first position located within the loading compartment and a second position located at least partly outside the loading compartment such that the sample plate may be loaded onto the tray from above the apparatus by a user of the apparatus or by robotic machinery.

5. The apparatus of claim 4, wherein one or more side portions of the first access door includes one or more indentations configured to hold the tray in place in the second position.

6. The apparatus of claim 4, wherein a top surface of the apparatus surrounding the first access door includes a recessed area configured to contain spilled fluid.

7. The apparatus of claim 1, wherein the tray includes a plurality of protruding corners configured to hold the sample plate in place within the tray.

8. The apparatus of claim 1, wherein the first access door is arranged within a top surface of the apparatus.

9. The apparatus of claim 1, wherein the second access door includes one or more windows allowing a user to monitor a fluid level in one or more fluid containers received in the fluidic compartment.

10. The apparatus of claim 1, further comprising a plurality of LED indicators.

11. The apparatus of claim 1, further comprising a data transfer port configured to be connected directly to an acoustic flow cytometer, or to a computer in communication with an acoustic flow cytometer, or to robotic machinery at least partly controlling the apparatus.

12. A hi-throughput cytometry system, comprising:

a flow cytometer configured to acoustically focus a sample in a flowing fluid; and

a plate loader in fluidic communication with the flow cytometer, wherein the plate loader includes:

a loading compartment including a sampling probe and a tray, the tray being configured to receive a sample plate configured to include a plurality of samples;

a fluidic compartment configured to receive one or more fluid containers;

a first access door configured to allow access to the loading compartment; and

a second access door configured to allow access to the fluidic compartment,

wherein the sampling probe is configured to sense an obstacle and to stop motion toward the obstacle, the sampling probe comprising a restorative spring configured to stop the motion of the sampling probe toward the obstacle.

13. The system of claim 12, wherein the loading compartment further includes an actuation mechanism configured to move the tray.

14. The system of claim 13, wherein the actuation mechanism is configured to move the tray, when the first access door is opened, along a direction substantially perpendicular to a direction of gravity between a first position located within the loading compartment and a second position located at least partly outside the loading compartment such that the sample plate may be loaded onto the tray from a side of the apparatus.

15. The system of claim 13, wherein the actuation mechanism is configured to move the tray, when the first access door is opened, along a direction substantially parallel to a direction of gravity between a first position located within the loading compartment and a second position located at least partly outside the loading compartment such that the sample

plate may be loaded onto the tray from above the apparatus.

16. The system of claim 15, wherein one or more side portions of the first access door includes one or more indentations configured to hold the tray in place in the second position.

17. The system of claim 15, wherein a top surface of the apparatus surrounding the first access door includes a recessed area configured to contain spilled fluid.

18. The system of claim 12, wherein the tray includes a plurality of protruding corners configured to hold the sample plate in place within the tray.

19. The system of claim 12, further comprising:

robotic machinery configured to transfer one or more fluids and samples to and from one or more sample plates and further configured to spatially manipulate the one or more sample plates so as to insert the one or more sample plates in the tray of the plate loader; and

a controller configured to control the flow cytometer, the plate loader, and the robotic machinery according to one or more experimental protocols.