

According to various embodiments, the chip includes at least 20000 reaction sites. In other embodiments, the chip includes at least 30000 reaction sites.

[009a] In one aspect, there is provided a system for performing biological reactions, the system comprising: a chip including a plurality of reaction sites, wherein the plurality of reaction sites are each configured to include a liquid sample of at most one nanoliter; a control system configured to initiate biological reactions in the liquid samples; and a detection system configured to detect biological reactions on the chip.

[009b] In another aspect, there is a method for performing biological reactions, the method comprising: loading a chip including a substrate and a plurality of reaction sites with a liquid sample, wherein the plurality of reaction sites are each configured to include a volume of the liquid sample of at most one nanoliter; initiating biological reactions in the plurality of reaction sites; and detecting, with an optical system, a plurality of biological reactions on the chip.

DESCRIPTION OF THE FIGURES

[0010] FIG. 1 illustrates a chip including a plurality of reaction sites according to various embodiments described herein;

[0011] FIG. 2 illustrates a side view of the exemplary chip of FIG. 1 according to various embodiments described herein;

[0012] FIG. 3 illustrates an exemplary method of performing biological reactions according to various embodiments described herein;

[0013] FIG. 4 illustrates an exemplary method of performing biological reactions according to various embodiments described herein;

[0014] FIG. 5 is a block diagram that illustrates a polymerase chain reaction (PCR) instrument, upon which embodiments of the present teachings may be implemented;

[0015] FIG. 6 illustrates an exemplary optics system that can be used to image the chip according to embodiments of the present teachings;

[0016] FIG. 7 illustrates a cut away view of an array in a substrate according to various embodiments described herein;

[0017] FIG. 8 illustrates a cross-sectional view of a chip according to various embodiments described herein;

[0018] FIG. 9 illustrates a hydrophobic surface and through-holes according to various embodiments described herein;

[0019] FIG. 10 illustrates various pitch distances according to various embodiments described herein;