

nism for generating a temperature gradient across the interior cavity of the reaction chamber.

[0014] In accordance with further embodiments of the present invention, a microarray apparatus is provided. The apparatus comprises a substrate; an array of probes deposited on a surface of the substrate; and a cover having a channel with a width smaller than a width of the array of probes, said cover being coupled to the substrate such that said channel and said substrate define a channel cavity such that a target fluid flowing through the channel cavity contacts each probe in the array of probes.

[0015] In accordance with further embodiments of the present invention, a microarray apparatus is provided. The apparatus comprises a reaction chamber having an interior cavity; an array of probes deposited on an inner surface of the interior cavity of the reaction chamber for reaction with a target molecule in a target liquid; and a shape modulator for varying the shape of the interior cavity.

[0016] In accordance with further embodiments of the present invention, a microarray apparatus is provided. The apparatus comprises a chamber filled with a combination of a volume exclusion liquid and a target liquid.

[0017] In accordance with further embodiments of the present invention, a microarray apparatus is provided. The apparatus comprises a substrate having a plurality of arrays of probes deposited on a surface of the substrate; and a cover coupled with the substrate such that the cover and the substrate form a chamber over each array of probes, said cover having an inlet for introducing a target liquid into the chamber.

[0018] In accordance with further embodiments of the present invention, a method for promoting interaction between a target molecule in a target liquid and an array of probes deposited on a surface of a substrate is provided. The method comprises loading the target liquid on top of the array of probes; positioning a cover on top of the target liquid; and creating a relative motion between the substrate and the cover for generating movement of the target molecule.

[0019] In accordance with further embodiments of the present invention, a method for promoting interaction between a target molecule in a target liquid and an array of probes deposited on an interior surface of a reaction chamber for confining the target liquid is provided. The method comprises loading the target liquid in the reaction chamber; and applying a magnetic force to move a magnetically reactive mixing member contained within the reaction chamber to generate motion of the target molecule.

[0020] In accordance with further embodiments of the present invention, a method for promoting interaction between a target molecule in a target liquid and an array of probes deposited on an interior surface of a reaction chamber for confining the target liquid is provided. The method comprises loading the target liquid into the reaction chamber; loading a volume exclusion liquid into the reaction chamber; and agitating the reaction chamber to cause relative movement between the volume exclusion liquid and the target liquid.

[0021] In accordance with further embodiments of the present invention, a method for promoting interaction

between a target molecule in a target liquid and an array of probes deposited on an interior surface of a reaction chamber is provided. The method comprises loading the target liquid into the reaction chamber; and directing acoustic waves through the target liquid to generate motion of the target molecule.

[0022] In accordance with further embodiments of the present invention, a method for promoting interaction between a charged target molecule in a target liquid and an array of probes deposited on a surface of a substrate is provided. The method comprises loading the target liquid into the reaction chamber; and generating a voltage across the reaction chamber to generate motion of the charged target molecule contained within the target liquid.

[0023] In accordance with further embodiments of the present invention, a method for promoting interaction between a charged target molecule in a target liquid and an array of probes deposited on a surface of a substrate is provided. The method comprises loading the target liquid into the reaction chamber; and generating an electric field across the reaction chamber to generate motion of the charged target molecule contained within the target liquid.

[0024] In accordance with further embodiments of the present invention, a method for promoting interaction between a target molecule in a target liquid and an array of probes deposited on an interior surface of a reaction chamber for confining the target liquid is provided. The method comprises loading the target liquid in the reaction chamber; and generating a temperature gradient in the target fluid across the reaction chamber.

[0025] In accordance with further embodiments of the present invention, a method for promoting interaction between a target molecule in a target liquid and an array of probes deposited on a surface of a substrate is provided. The method comprises loading a target liquid into a channel, said channel having a width smaller than a width of the array of probes; and passing the target liquid through the channel across all of the probes in the probe array.

[0026] In accordance with further embodiments of the present invention, a method for promoting interaction between a target molecule in a target liquid and an array of probes deposited on an interior surface of a reaction chamber for confining the target liquid is provided. The method comprises loading the target liquid into an interior cavity of the reaction chamber; and changing the shape of the interior cavity of the reaction chamber to generate a pressure wave in the target liquid.

[0027] In accordance with further embodiments of the present invention, a microarray apparatus is provided. The apparatus comprises a reaction chamber comprising a substrate having an array of probes deposited thereon, and a cover coupled to the substrate to form an interior cavity of the reaction chamber between the substrate and the cover; an array of probes deposited on an inner surface of the interior cavity for reaction with a charged target molecule in a target liquid; and a flow inducing mechanism for inducing flow of the target liquid without physically translating either the substrate or the cover.

[0028] In accordance with further embodiments of the present invention, a method for promoting interaction between an array of probes deposited on a surface of a