

[0216] Various embodiments of the present invention can reduce the hybridization set-up time. Since the substrate slide with the array of probes can be shipped with the cover affixed onto the slide, a user can simply add the prepared target liquid directly into the chamber and hybridize the target to the probes in an oven with a shaker. After the hybridization process, the cover can be removed from the substrate slide. The substrate slide can then be washed and read. This can significantly reduce the delay in proceeding to the next step after the hybridization.

[0217] D. Antibacterial Screening Having Improved Fluid Interaction

[0218] In accordance with embodiments of the present invention, antibacterial screening systems and methods having improved fluid interaction and mixing are provided. In one example, an array of suspected antimicrobial compounds are deposited onto a substrate slide as described in the various embodiments above. The targeted bacterial microbes in solution are deposited onto the array of suspected antimicrobial compounds on the substrate slide either before or after the substrate slide is mated with a corresponding cover slip. Next, any of the above-described systems and methods can be used to cause the microbe solution to flow, thereby facilitating the effective mixing of the targeted bacteria microbe solution with the array of suspected antimicrobial compounds.

[0219] Finally, after the microbe solution has thoroughly mixed with the suspected antimicrobial compounds, the cover slip can be removed to permit examination to determine whether any zones of inhibition have formed on each of the compounds in the microarray. Optical inspection can be used to determine the existence and extent of antibacterial activity.

[0220] In alternative embodiments, the systems and methods described above with respect to antibacterial assays can also be applied to antifungal assays.

[0221] The various apparatus and methods described above can be applicable for the detection of any specific interactions between biological or chemical molecules, including associations, hybridizations, and reactions between molecules. Examples of such associations that can be investigated by embodiments of this invention include, but are not restricted to, complementary DNA-DNA association, complementary DNA-RNA association, protein-protein association, peptide-protein association, antigen-antibody association, ligand-receptor association, agonist- or antagonist-receptor association, substrate- or cofactor-enzyme association and reaction.

[0222] All publications and patent applications cited in this specification are incorporated by reference herein in their entirety as if each individual publication or patent application were specifically and individually indicated to be incorporated by reference.

[0223] Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it will be readily apparent to those of ordinary skill in the art in light of the teachings of this invention that certain changes and modifications may be made thereto without departing from the spirit or scope of the appended claims.

What is claimed is:

1. A microarray apparatus, comprising:
 - a substrate having an array of probes deposited on a surface of the substrate for interaction with a target molecule in a target liquid; and
 - a cover coupled to the substrate to form a reaction chamber therebetween, wherein the array of probes is contained within the reaction chamber and the substrate and the cover are movable relative to each other.
2. The microarray apparatus of claim 1, wherein the substrate is fixed and the cover is movable.
3. The microarray apparatus of claim 1, wherein the cover is fixed and the substrate is movable.
4. The microarray apparatus of claim 1, wherein both the substrate and cover are movable.
5. The microarray apparatus of claim 1, further comprising:
 - a first liquid confinement coating on the substrate for retaining the target liquid in a first predetermined region encompassing the array of probes.
6. The microarray apparatus of claim 5, wherein the cover has a hydrophobic coating.
7. The microarray apparatus of claim 5, wherein:
 - said first liquid confinement coating comprises a first hydrophilic region containing the array of probes and a first hydrophobic region surrounding the first hydrophilic region.
8. The microarray apparatus of claim 7, further comprising:
 - a second liquid confinement coating on the cover, said second liquid confinement coating comprising a second hydrophilic region aligned with the first hydrophilic region on the substrate and a second hydrophobic region aligned with the first hydrophobic region on the substrate.
9. The microarray apparatus of claim 1, further comprising:
 - a substrate holder for retaining the substrate;
 - a cover holder for retaining the cover; and
 - an agitator for agitating the substrate holder and the cover holder to induce relative movement between the substrate and the cover.
10. The microarray apparatus of claim 9, wherein:
 - said substrate holder comprises one or more barriers for preventing movement of the substrate relative to the substrate holder when the agitator is agitating the substrate holder and the cover holder; and
 - said cover holder comprises one or more barriers for allowing limited movement of the cover relative to the cover holder when the agitator is agitating the substrate holder and the cover holder.
11. The microarray apparatus of claim 9, further comprising:
 - said substrate holder comprises one or more barriers for allowing limited movement of the substrate relative to the substrate holder when the agitator is agitating the substrate holder and the cover holder; and