

pling a light beam provided by a light source to the planar waveguide, the refractive volume being integrally formed from the planar waveguide, and a sample chamber for receiving and containing the sample such that the sample comes into contact with the plurality of capture molecules; B) a reader instrument including a receiving mechanism for positioning the cartridge therein, the light source for providing the light beam, a detector for detecting a light signal from a portion of the planar surface on which the plurality of capture molecules is bound, and an analysis module for receiving and analyzing the light signal from the detector; and C) one or more processing solutions; wherein the cartridge and the reader instrument cooperate such that the light beam is incident on the refractive volume in a plane parallel to and offset from the planar waveguide, and the light beam is focused at the planar surface at a non-zero, internal propagation angle relative to the planar surface for all light within the light beam, while illuminating a portion of the planar waveguide including the plurality of capture molecules thereby, if the sample includes a target analyte, the target analyte interacts with the plurality of capture molecules so as to produce the light signal capturable by the detector.

[0287] 64. The kit of item 63, wherein the one or more processing solutions is selected from a group consisting of sample diluents solution, fluorescent conjugate solution, and wash solution.

[0288] 65. The system of item 63 or 64, wherein the plurality of capture molecules include at least one molecule selected from the group consisting of a peptide, a polypeptide, a protein, an antibody, an antigen, a polysaccharide, sugar, an oligonucleotide, a polynucleotide, a synthetic molecule, an inorganic molecule, an organic molecule, and combinations thereof.

[0289] 66. The system of item 63, 64 or 65, wherein the planar waveguide is formed of an optically transparent material selected from the group consisting of cyclic olefin polymer, cyclic olefin copolymer, polyolefin, polystyrene, acrylic, polymethylmethacrylate, and polycarbonate.

[0290] 67. The kit of item 63, 64, 65 or 66, the sample containing antibodies and viral antigen, and wherein the cartridge and the reader instrument are configured to cooperate so as to detect both antibodies and viral antigen in the sample.

[0291] Changes may be made in the above methods and systems without departing from the scope hereof. It should thus be noted that the matter contained in the above description or shown in the accompanying drawings should be interpreted as illustrative and not in a limiting sense. The following claims are intended to cover generic and specific features described herein, as well as statements of the scope of the present method and system, which, as a matter of language, might be said to fall therebetween. For example, different capture molecules, printed protein site configurations, and other surface chemistries, from those described herein, may be contemplated. Additional suitable designs and materials for the integrated lens, other than those shown in the figures herein, may be incorporated into the planar waveguide without deviating from the spirit of the present disclosure. Additionally, other suitable types of illumination and detection may be used for further improved illumination uniformity and detection sensitivity.

[0292] Although each of the aforescribed embodiments and examples have been illustrated with various components having particular respective orientations, it should be understood that the system as described in the present disclosure

may take on a variety of specific configurations with the various components being located in a variety of positions and mutual orientations and still remain within the spirit and scope of the present disclosure. Furthermore, suitable equivalents may be used in place of or in addition to the various components, the function and use of such substitute or additional components being held to be familiar to those skilled in the art and are therefore regarded as falling within the scope of the present disclosure. Therefore, the present examples are to be considered as illustrative and not restrictive, and the present disclosure is not to be limited to the details given herein but may be modified within the scope of the appended claims.

What is claimed is:

1. A system for performing an assay on a sample, the system comprising:

a cartridge including

a planar waveguide having a plurality of capture molecules bound to a planar surface thereof,

a refractive volume for optically coupling a light beam provided by a light source to the planar waveguide, the refractive volume being integrally formed from the planar waveguide, and

a sample chamber for receiving and containing the sample such that the sample comes into contact with the plurality of capture molecules; and

a reader instrument including

a receiving mechanism for positioning the cartridge therein,

the light source for providing the light beam,

a detector for detecting a light signal from a portion of the planar surface on which the plurality of capture molecules is bound, and

an analysis module for receiving and analyzing the light signal from the detector,

wherein the light beam is incident on the refractive volume in a plane parallel to and offset from the planar waveguide, and

wherein the refractive volume is configured for refracting the light beam such that the light beam is focused at the planar surface at a non-zero, internal propagation angle relative to the planar surface for all light within the light beam.

2. The system of claim 1, wherein the plurality of capture molecules include at least one molecule selected from the group consisting of a peptide, a polypeptide, a protein, an antibody, an antigen, a polysaccharide, sugar, an oligonucleotide, a polynucleotide, a synthetic molecule, an inorganic molecule, an organic molecule, and combinations thereof.

3. The system of claim 1, wherein the planar waveguide is formed of an optically transparent material selected from the group consisting of cyclic olefin polymer, cyclic olefin copolymer, polyolefin, polystyrene, acrylic, polymethylmethacrylate, and polycarbonate.

4. The system of claim 1, wherein the planar surface is modified using a process selected from the group consisting of plasma activation, chemical vapor deposition, liquid phase deposition, and surface polymerization of an activation chemistry, and combinations thereof.

5. The system of claim 1, wherein the sample contains an antibody and an antigen, wherein the cartridge and the reader instrument are configured to cooperate so as to detect both the antibody and the antigen in the sample.