

puter for instrument control and image analysis or, alternatively, provided with software and/or an external computer loaded with software for controlling the reader instrument and image analysis. An adjustable pipette may also be provided as a part of the kit, or may be supplied by the end user.

[0223] A variety of embodiments of the present system are contemplated including, but not limited to, the following:

[0224] 1. A device for analyzing a sample potentially containing an analyte, the device including: a) a planar waveguide; b) a refractive volume for optically coupling light provided by a light source to the planar waveguide; and c) a plurality of capture molecules, wherein the planar waveguide and the refractive volume are integrally formed as a single piece, and wherein the planar waveguide includes a first surface and a second surface that is opposite from the first surface, wherein the plurality of capture molecules is immobilized to the first surface.

[0225] 2. The device of item 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.

[0226] 3. The device of item 1 or 2, wherein at least one of the plurality of capture molecules is capable of specifically binding the at least one analyte in the sample.

[0227] 4. The device of item 1, 2 or 3, wherein the planar waveguide is made of an optically transparent plastic material.

[0228] 5. The device of item 4, wherein the optically transparent plastic material is a material selected from the group consisting of cyclic olefin polymer, cyclic olefin copolymer, polyolefin, polystyrene, acrylic, polymethylmethacrylate, and polycarbonate.

[0229] 6. The device of item 1, 2, 3 or 4, wherein at least a portion of the first surface of the planar waveguide is modified to provide improved attachment of the capture molecules to the first surface compared to had the first surface not been modified.

[0230] 7. The device of item 1, 2, 3, 4 or 5, wherein at least a portion of the first surface of the planar waveguide is modified to provide a static water contact angle of between 60 and 75 degrees.

[0231] 8. The device of item 7, wherein the first surface of the planar waveguide 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.

[0232] 9. The device of item 8, wherein the planar waveguide modification is performed using a chemical selected from the group consisting of organosilane, alkoxy silane, chlorosilane, alkylsilane, epoxy silane, glycidoxysilane, aldehyde silane, aminosilane and combinations thereof.

[0233] 10. The device of item 1, 2, 3, 4, 5, 6 or 7, wherein at least a portion of the first surface of the planar waveguide is covered with a coating, the coating including at least one molecule selected from the group consisting of a polymethacryloyl polymer, a polyethylene glycol polymer, a polycationic polymer, an avidin, a biotin and combinations thereof.

[0234] 11. The device of item 1, 2, 3, 4, 5, 6, 7 or 10, wherein at least a portion of the first surface of the planar

waveguide is covered with a coating for inhibiting nonspecific binding between the first surface of the planar waveguide and the at least one analyte.

[0235] 12. The device of item 1, 2, 3, 4, 5, 6, 7, 10, or 11, wherein the first surface of the planar waveguide includes an array including at least two reaction sites, each of the at least two reaction sites being formed by printing a composition onto the first surface, the composition including at least one capture molecule.

[0236] 13. The device of item 12, wherein the array further includes at least one negative control site, the at least one negative control site being formed by printing onto the first surface a composition containing no molecule that detectably binds to the at least one analyte in the sample.

[0237] 14. The device of item 13, wherein the at least one negative control site is located at a proximal end of the array closest to an inlet port, at which the sample is introduced onto the first surface.

[0238] 15. The device of item 13, wherein the array further includes at least one positive control site, the at least one positive control site being formed by printing onto the first surface a composition containing a molecule that consistently binds to the at least one analyte in the sample.

[0239] 16. The device of item 13, wherein at least one of the positive control sites is located at a distal end of the array farthest from an inlet port, at which the sample is introduced onto the first surface.

[0240] 17. The device of item 13, wherein the first surface of the planar waveguide further includes a reference site for calibrating one of item intensity and uniformity of the light source.

[0241] 18. The device of item 17, wherein the reference site includes an excitable molecule immobilized on a portion of the first surface of the planar waveguide.

[0242] 19. The device of item 18, wherein the excitable molecule is a fluorophore selected from the group consisting of organic dye, lanthanide chelate, semiconductor nanoparticles, and phosphorescent material.

[0243] 20. The device of item 13, further including a fluidic channel to allow the sample be in contact with the array.

[0244] 21. The device of item 1, 2, 3, 4, 5, 6, 7, 10, 11 or 12, wherein the plurality of capture molecules is selected from a group consisting of polypeptides, antigens and antibodies.

[0245] 22. The device of item 21, wherein the array includes a first reaction site and a second reaction site, the first and second reaction sites containing a different capture molecule selected from the group.

[0246] 23. The device of item 21, wherein the array includes a first reaction site and a second reaction site, the first reaction site including at least a fragment of gp41 antigen of HIV-1, and the second reaction site including at least a fragment of p24 antigen of HIV-1.

[0247] 24. The device of item 23, wherein the array further includes a third reaction site and a fourth reaction site, the third reaction site including at least a fragment of p47 of *Treponema pallidum*, and the fourth reaction site including at least a fragment of p17 of *Treponema pallidum*.

[0248] 25. The device of item 24, wherein the array further includes a fifth reaction site and a sixth reaction site, the fifth reaction site including at least a fragment of hepatitis C virus (HCV) core antigen, and the sixth reaction site including an HCV antigen selected from the group consisting of HCV NS3, HCV NS4, HCV NS5, fragments thereof, and combinations thereof.