

What is claimed is:

1. A method of manufacturing a planar waveguide for a flowcell, the method comprising:

5 forming a core layer, the core layer disposed between a substrate and a nanowell layer, the nanowell layer having nanowells to receive a sample, the core layer having a higher refractive index than the substrate and the nanowell layer; and

forming a grating using nanoimprinting to couple light to the core layer; and wherein the core layer is formed in a separate process from forming the grating.

10 ~~2. The method of claim 1, wherein the core layer is formed in a common process with forming the grating.~~

~~3. The method of claim 1, wherein the core layer is formed in a separate process from forming the grating.~~

15 ~~4.2. The method of claim 13, wherein the grating is formed by nanoimprinting onto the substrate, the core layer is formed onto the grating, and the nanowell layer is formed onto the core layer.~~

~~5.3. The method of claim 13, wherein the grating is formed onto the substrate, the core layer is formed onto the grating, an additional layer is formed onto the core layer, and the nanowell layer is formed onto the additional layer formed onto the core layer.~~

20 ~~6.4. The method of claim 35, wherein the additional layer and the nanowell layer are initially free of the nanowells before formation of the nanowells, the method further comprising patterning the nanowell layer to form the nanowells while the additional layer remains intact, and subsequently transferring the pattern of the nanowell layer to the additional layer so as to expose the core layer in the nanowells.~~

25 ~~7.5. The method of claim 46, wherein the pattern is transferred by etching.~~

~~8. The method of claim 1, wherein the core layer is formed onto the substrate, and wherein the grating and the nanowells layer are formed onto the core layer.~~

~~9.6. The method of claim 13, wherein the core layer is formed onto the substrate, the~~

grating is formed onto the core layer, and the nanowell layer is formed onto the grating.

~~10.7.~~ The method of claim ~~13~~, wherein the core layer is formed onto the substrate, a first layer is formed onto the core layer, a second layer is formed onto the first layer, and wherein the grating and the nanowells are formed into the first and second layers, respectively.

5 ~~11.8.~~ The method of claim ~~13~~, wherein the core layer is formed onto the substrate, a resin layer is formed onto the core layer, and the grating and the nanowells are formed in the resin layer.

~~12.9.~~ The method of any of claims ~~1-3, 8~~ or ~~7-10~~, wherein the grating and the nanowell layer are formed in a common process.

10 ~~13.10.~~ The method of claim ~~9-12~~, wherein the grating and the nanowell layer are formed in a same layer of the flowcell.

~~14.11.~~ The method of claim ~~9-12~~, wherein the grating and the nanowell layer are formed in separate layers of the flowcell.

15 ~~15.12.~~ A planar waveguide for a flowcell manufactured using the method of any of the previous claims, wherein the planar waveguide for the flowcell comprises~~ing~~:

a substrate;

a nanowell layer having nanowells to receive a sample;

a core layer disposed between the substrate and the nanowell layer, the core layer having a higher refractive index than the substrate and the nanowell layer; and

20 a grating to couple light to the core layer.

~~16.13.~~ The flowcell of claim ~~12-15~~, wherein the grating is disposed over the substrate, the core layer is disposed over the grating, and the nanowell layer is disposed over the core layer.

~~17.14.~~ The flowcell of claim ~~13-16~~, wherein a grating layer covers the substrate, the grating layer includes~~ing~~ the grating.

25 ~~18.15.~~ The flowcell of claim ~~12-15~~, wherein a first resin layer including the grating is disposed over the substrate, and a second resin layer including the nanowells is disposed over the first resin layer.

19.16. The flowcell of claim 1245, wherein the grating is disposed over the substrate, a first polymer layer is disposed over the grating, and a second polymer layer is disposed over the first polymer layer, wherein the nanowells are disposed in the first and second polymer layers.

20.17. The flowcell of claim 1245, wherein the core layer is disposed over the substrate, a resin layer is disposed over the core layer, and the grating and nanowells are disposed in the resin layer.

21.18. The flowcell of claim 1245, wherein the core layer is disposed over the substrate, the grating is disposed over the core layer, and the nanowell layer is disposed over the grating.

22.19. The flowcell of claim 1824, wherein a grating layer covers the core layer, the grating layer includes ~~the~~ the grating.

23.20. The flowcell of claim 1245, wherein the core layer is disposed over the substrate, a polymer layer is disposed over the core layer, and a resin layer is disposed over the polymer layer, wherein the grating is disposed in the polymer layer, and wherein the nanowells are disposed in the resin layer.

24.21. The flowcell of claim 1245, wherein a polymer layer is disposed over the substrate, and a resin layer is disposed over the polymer layer, wherein the grating is disposed in the polymer layer, and wherein the nanowells are disposed in the resin layer.