CLAIMS

1. A biosensor comprising:

a flow cell; and

a detection device having the flow cell coupled thereto, the flow cell and the detection device forming a flow channel that is configured to have biological or chemical substances therein that generate light emissions in response to an excitation light, the detection device including:

a device base having a sensor array of light sensors and a guide array of light guides, the light guides having input regions that are configured to receive the excitation light and the light emissions from the flow channel, the light guides extending into the device base from the input regions toward corresponding light sensors and having a filter material that is configured to filter the excitation light and permit the light emissions to propagate toward the corresponding light sensors, the device base including device circuitry electrically coupled to the light sensors and configured to transmit data signals based on photons detected by the light sensors; and

a shield layer extending between the flow channel and the device base, the shield layer having apertures that are positioned relative to the input regions of corresponding light guides such that the light emissions propagate through the apertures into the corresponding input regions, the shield layer extending between adjacent apertures and configured to block the excitation light and the light emissions incident on the shield layer between the adjacent apertures.

2. The biosensor of claim 1, wherein the input regions of the light guides are located within the corresponding apertures of the shield layer or are located a depth into the device base.

3. The biosensor of claim 1, further comprising a passivation layer that extends along the shield layer such that the shield layer is between the passivation layer and the device base, the passivation layer extending across the apertures.

4. The biosensor of claim 3, wherein the filter material of the light guides is an organic

filter material, the passivation layer extending directly along the input regions of the light guides and isolating the organic filter material from the shield layer.

5. The biosensor of claim 3, wherein the passivation layer extends directly along the input regions of the light guides at corresponding material interfaces, the material interfaces being located within the corresponding apertures of the shield layer or located a depth into the device base.

6. The biosensor of claim 3, wherein the passivation layer extends into the apertures and forms an array of reaction recesses, the reaction recesses extending toward or being located within corresponding apertures.

7. The biosensor of claim 6, wherein the reaction recesses have corresponding base surfaces, the base surfaces being located within the aperture or located a depth into the device base.

8. The biosensor of claim 1, wherein the device base includes peripheral crosstalk shields, each of the crosstalk shields surrounding a respective one of the corresponding light guides, the crosstalk shields configured to reduce optical crosstalk between adjacent light sensors.

9. A method of manufacturing a biosensor, the method comprising:

providing a device base having a sensor array of light sensors and device circuitry that is electrically coupled to the light sensors and configured to transmit data signals based on photons detected by the light sensors, the device base having an outer surface;

applying a shield layer to the outer surface of the device base;

forming apertures through the shield layer;

forming guide cavities that extend from corresponding apertures toward a corresponding light sensor of the sensor array;

depositing filter material within the guide cavities, wherein a portion of the filter material extends along the shield layer;

curing the filter material;

removing the filter material from the shield layer, the filter material within the guide cavities forming light guides; and

applying a passivation layer to the shield layer such that the passivation layer extends directly along the shield layer and across the apertures.

10. The biosensor of claim 3, wherein the passivation layer includes tantalum pentoxide (Ta_2O_5).

11. The biosensor of claim 10, wherein the passivation layer includes stacked multiple sub-layers in which at least one of the sub-layers includes the tantalum pentoxide (Ta_2O_5).

12. The biosensor of claim 11, wherein the sub-layers include two tantalum pentoxide (Ta_2O_5) layers with a low-temperature film therebetween.

13. The biosensor of claim 11, wherein the sub-layers include two plasma vapor deposition (PVD) tantalum pentoxide layers with a plasma enhanced chemical vapor deposition (PECVD) silicon nitride film therebetween.