

What is claimed is:

1. An apparatus comprising:

a plurality of locations configured to have probes attached thereto, wherein interaction between the probes and an analyte generates a signal;

an optical system comprising a plurality of collimators;

a sensor comprising a plurality of pixels configured to detect the signal;

wherein the collimators are configured to essentially prevent light from passing if a deviation of a propagation direction of the light from an optical axis of the collimators is greater than a threshold.
2. The apparatus of claim 1, wherein the sensor comprises a control circuit configured to control, acquire data from, or process data from the pixels.
3. The apparatus of claim 1, wherein the pixels are arranged such that each of the pixels is optically coupled to one or more of the locations.
4. The apparatus of claim 1, wherein the pixels are optically coupled to the locations by the collimators.
5. The apparatus of claim 1, wherein the signal is luminescence.
6. The apparatus of claim 1, wherein the signal is generated under excitation of an excitation radiation.
7. The apparatus of claim 6, wherein the optical system further comprises a filter, wherein the filter is configured to block at least a portion of the excitation radiation.
8. The apparatus of claim 7, wherein the filter is a dichroic filter.
9. The apparatus of claim 1, wherein the optical system further comprises a transmissive layer.

- 10.** The apparatus of claim 1, wherein the optical system further comprises a plurality of microlens.
- 11.** The apparatus of claim 1, wherein the collimators comprises a meta-material or a photonic crystal.
- 12.** The apparatus of claim 1, wherein the collimators are configured to eliminate optical cross-talk between neighboring pixels among the plurality of pixels.
- 13.** The apparatus of claim 1, wherein at least one of the collimators comprises a core and a sidewall surrounding the core.
- 14.** The apparatus of claim 13, wherein the signal is generated under excitation of an excitation radiation; wherein the core is a material that essentially prevents the excitation radiation from passing through irrespective of propagation direction of the excitation radiation.
- 15.** The apparatus of claim 13, wherein the signal is generated under excitation of an excitation radiation; wherein the core comprises a dichroic filter.
- 16.** The apparatus of claim 13, wherein the core allows the signal to pass through essentially unabsorbed.
- 17.** The apparatus of claim 13, wherein the core is a void space.
- 18.** The apparatus of claim 13, wherein the sidewall attenuates a portion of the signal reaching the sidewall.
- 19.** The apparatus of claim 13, wherein the sidewall is textured.
- 20.** The apparatus of claim 7, wherein the filter comprises a meta-material or a photonic crystal.
- 21.** The apparatus of claim 1, wherein the pixels are arranged in an array and are configured to be read out column by column.

- 22.** The apparatus of claim 1, wherein the pixels are arranged in an array and are configured to be read out pixel by pixel.
- 23.** The apparatus of claim 1, wherein each of the pixels has one of the collimators dedicated thereto.
- 24.** The apparatus of claim 1, wherein the optical system further comprises a redistribution layer with transmission lines and bonding pads, wherein the transmission lines and bonding pads are configured to receive electrical signals from the sensor.