CLAIMS

WHAT IS CLAIMED IS:

1. A method, comprising:
    (a) providing a system comprising:
        (i) a flow cell comprising a sample,
        (ii) a light source,
        (iii) a detector comprising a plurality of pixels, and
        (iv) a pixel shifter disposed in an optical path from the flow cell to the detector;
    (b) illuminating the sample using the light source, wherein the illuminating generates a signal light corresponding to an identity of a portion of the sample;
    (c) shifting the signal light across the plurality of pixels using the pixel shifter; and
    (d) detecting, using the plurality of pixels, the signal light from the sample to generate data related to the identity of the portion of the sample.
2. The method of claim 1, wherein the sample is a nucleic acid sample.
3. The method of claim 2, wherein the portion of the nucleic acid sample comprises a nucleotide or a nucleic acid sequence, and further comprising using the data to identify the nucleotide or the nucleic acid sequence of the nucleic acid sample.
4. The method of claim 3, wherein the nucleic acid sequence or the nucleotide of the nucleic acid sample is identified, at least in part, by:
    (i) contacting a labeled molecule to the nucleic acid sample, wherein the labeled molecule binds to the nucleic acid sample;
    (ii) illuminating the labeled molecule bound to the nucleic acid sample using the light source, thereby generating light from the labeled molecule;
    (iii) detecting, using the plurality of pixels, the light from the labeled molecule to generate the data, wherein the data corresponds to the light from the labeled molecule; and
    (iv) processing the data to determine the identity of the portion of the nucleic acid sample bound to the labeled molecule.
5. The method of claim 4, further comprising (v) removing the labeled molecule from the nucleic acid sample.

6. The method of claim 5, further comprising (vi) repeating (i) - (v) for an additional labeled molecule that binds to another portion of the nucleic acid sample.
7. The method of any one of claims 2-6, further comprising binding one or more labels to the nucleic acid sample, wherein the one or more labels are configured to absorb the light from the light source and emit the signal light.
8. The method of any one of claims 1-7, wherein the flow cell comprises a plurality of interior surfaces.
9. The method of claim 8, wherein the illuminating in (b) comprises illuminating at least two interior surfaces of the plurality of interior surfaces, and the detecting in (d) comprises detecting the signal light from the at least two interior surfaces of the plurality of interior surfaces.
10. The method of claim 8 or 9, wherein the sample is coupled to at least one interior surface of the plurality of interior surfaces.
11. The method of claim 10, wherein at least a portion of the sample is coupled to each interior surface of the plurality of interior surfaces.
12. The method of any one of claims 1-11, further comprising using a plurality of detectors comprising the detector to each detect a portion of the signal light from a plurality of portions of the signal light, wherein each portion of the plurality of portions of the signal light comprises a different wavelength from another portion of the plurality of portions of the signal light.
13. The method of claim 12, further comprising using a plurality of pixel shifters comprising the pixel shifter to shift the plurality of portions of the signal light over each detector of the plurality of detectors.
14. The method of claim 12 or 13, further comprising using a plurality of focusing elements disposed in an optical path of the signal light to focus the signal light onto the plurality of detectors.
15. The method of any one of claims 1-14, further comprising a plurality of light sources comprising the light source, wherein each light source of the plurality of light sources is used to illuminate the sample using a different wavelength of light from another light source of a plurality of light sources.
16. The method of any one of claims 1-15, wherein the signal light is a fluorescent signal light.

17. The method of any one of claims 1-16, wherein the flow cell comprises a curved surface with the sample coupled thereto.
18. The method of any one of claims 1-17, wherein the system has a numerical aperture (NA) of less than about 0.6.
19. The method of any one of claims 1-18, wherein the system has a field of view (FOV) of at least about 1 square millimeter (mm^2).
20. The method of any one of claims 1-19, wherein the detector comprises a charge coupled device (CCD) detector.