CLAIMS

1. An integrated device comprising:

a grating disposed on a substrate and arranged to couple radiation incident on the grating into a plurality of optical waveguides disposed on the substrate;

a first receiving region of a first waveguide of the plurality of optical waveguides;

a first inlet via which the incident radiation is coupled into the first receiving region; and

a second receiving region of a second waveguide of the plurality of optical waveguides;

a second inlet via which the incident radiation is coupled into the second receiving region,

wherein the second inlet is offset a first amount with respect to the first inlet in a first direction approximately perpendicular to lines of the grating such that signals from the first and second waveguides can disambiguate motion of an optical beam on the grating in a direction toward or away from the inlets.

2. The integrated device of claim 1, further comprising:

a third receiving region of a third waveguide of the plurality of optical waveguides; and

a third inlet via which the incident radiation is coupled into the second receiving region,

wherein the third inlet is offset a second amount with respect to the first inlet in a second direction approximately perpendicular to lines of the grating, the second direction opposite the first direction.

3. The integrated device of claim 1 or 2, wherein a first portion of the grating located adjacent to the first inlet has a first periodicity that is different than a second periodicity of a second portion of the grating located adjacent to a fourth inlet to a fourth receiving region of the plurality of optical waveguides.

4. The integrated device of any one of claims 1 through 3, further comprising:

a first optical sensor arranged to receive radiation coupled into the first waveguide; and

a second optical sensor arranged to receive radiation coupled into the second waveguide.

5. The integrated device of any one of claims 1 through 4, wherein the first inlet has a different width than the second inlet.

6. The integrated device of any one of claims 1 through 5, wherein lines of the grating comprise a first dielectric material embedded within a second dielectric material having a lower index of refraction than the first dielectric material.

7. The integrated device of any one of claims 1 through 6, wherein each waveguide of the plurality of optical waveguides comprises a first dielectric material embedded within a second dielectric material having a lower index of refraction than the first dielectric material.

8. The integrated device of claim 7, wherein the first dielectric material is silicon nitride.

9. The integrated device of any one of claims 1 through 8, wherein the second receiving region has a tapered width.

10. The integrated device of claim 9, wherein a width of the first inlet is different from a width of the second inlet.

11. The integrated device of any one of claims 1 through 10, further comprising a plurality of pixels formed on the substrate, each including a reaction chamber and an optical sensor, wherein at least one waveguide is configured to provide excitation radiation to a plurality of the reaction chambers, optionally wherein each reaction chamber is configured to receive a sample for genetic sequencing, protein sequencing or another biological assay.

12. A method of making an integrated device comprising:

forming a plurality of waveguides on a substrate;

forming a grating on the substrate that spans inlets to the plurality of waveguides;

locating a first inlet to a first waveguide of the plurality of waveguides along a reference line for the grating; and

offsetting a second inlet to a second waveguide of the plurality of waveguides by a first distance from the reference line, wherein the first distance is in a first direction approximately perpendicular to lines of the grating, and wherein the first distance is provided such that signals from the first and second waveguides can disambiguate motion of an optical beam on the grating in a direction toward or away from the inlets;

forming a first receiving region adjacent to the first inlet of the first waveguide of the plurality of waveguides; and

forming a second receiving region adjacent to the second inlet of the second waveguide of the plurality of waveguides.

13. The method of claim 12, wherein an inlet is at a position angle to a waveguide, different from another position angle of another inlet to another waveguide.

14. The method of claim 12 or 13, wherein

the first receiving region and the second receiving region are tapered.

15. The method of any one of claims 12 through 14, further comprising forming a first portion of the grating located adjacent to the first inlet to have a different periodicity than a second portion of the grating located adjacent to a third inlet to a third waveguide of the plurality of waveguides.