Claims

1. An optical device comprising:

a first waveguide configured to guide a light wave along a longitudinal axis of the first waveguide;

a first grating at least partially etched in the first waveguide, the first grating arranged away from the longitudinal axis in a first direction; a second grating at least partially etched in the first waveguide, the second grating arranged away from the longitudinal axis in a second direction; wherein the second direction is different from the first direction; and

a second waveguide arranged over the first waveguide to at least partially overlap each of the first grating and the second grating,

wherein the longitudinal axis is free from the first grating and second grating,

wherein the first grating comprises a first plurality of grating elements, the second grating comprises a second plurality of grating elements, and each grating element of the first plurality of grating element and the second plurality of grating elements is defined by side-walls in the first waveguide that form a closed perimeter, and

wherein the second waveguide comprising a section configured to guide the light wave along a central axis of the second waveguide, the central axis being aligned with the longitudinal axis of the first waveguide.

2. The optical device of claim 1, wherein the second direction opposes the first direction.

3. The optical device of claim 1, wherein the first grating is arranged at a first distance away from the longitudinal axis; and wherein the second grating is arranged at the first distance away from the longitudinal axis.

4. The optical device of claim 1, wherein the first plurality of grating elements is arranged in a first row and wherein the second plurality of grating elements is arranged in a second row.

5. The optical device of claim 4, wherein each of the first row and the second row is arranged at least substantially parallel to the longitudinal axis.

6. The optical device of claim 4, wherein each grating element of the second plurality of grating elements mirrors a respective grating element of the first plurality of grating elements about the longitudinal axis.

7. The optical device of claim 1, wherein the central axis of the second waveguide is in between the first grating and the second grating.

8. The optical device of claim 1, wherein the second waveguide further comprises at least one coupling end configured to couple the light wave between the first waveguide and the second waveguide.

9. The optical device of claim 8, wherein the at least one coupling end is tapered.

10. The optical device of claim 8, wherein the at least one coupling end comprises charge carriers.

11. The optical device of claim 1, further comprising:

a third grating at least partially formed in the first waveguide, the third grating arranged away from the longitudinal axis in the first direction; and

a fourth grating at least partially formed in the first waveguide, the fourth grating arranged away from the longitudinal axis in the second direction.

12. The optical device of claim 11, wherein a minimum distance between the third grating and the longitudinal axis is at least substantially equal to a minimum distance between the fourth grating and the longitudinal axis.

13. The optical device of claim 11, wherein each of the first grating and the second grating is arranged at a front end of the first waveguide; wherein each of the third grating and the fourth grating is arranged at a rear end of the first waveguide; wherein the rear end opposes the front end.

14. The optical device of claim 11, wherein the second waveguide is arranged over the first waveguide to at least partially overlap each of the first grating, the second grating, the third grating and the fourth grating.

15. The optical device of claim 14, wherein a portion of the second waveguide at least partially overlapping each of the third grating and the fourth grating is larger than a further portion of the second waveguide at least partially overlapping each of the first grating and the second grating.

16. The optical device of claim 12, wherein a minimum distance between the first grating and the longitudinal axis is larger than the minimum distance between the third grating and the longitudinal axis.

17. The optical device of claim 11, wherein each of the third grating and the fourth grating comprise more grating elements than each of the first grating and the second grating.

18. The optical device of claim 1, wherein a grating coupling coefficient between an input to the first waveguide and the first waveguide is dependent on a minimum distance between the first grating and the second grating.

19. The optical device of claim 1, wherein the first waveguide comprises silicon-on-insulator, the silicon-on-insulator having a thickness at least substantially in a range of 260nm to 300nm.

20. A method for fabricating an optical device, the method comprising:

providing a first waveguide configured to guide a light wave along a longitudinal axis of the first waveguide;

etching a first grating at least partially in the first waveguide, wherein the first grating is arranged away from the longitudinal axis in a first direction; and

etching a second grating at least partially in the first waveguide, wherein the second grating is arranged away from the longitudinal axis in a second direction;

wherein the second direction is different from the first direction;

arranging a second waveguide arranged over the first waveguide to at least partially overlap each of the first grating and the second grating,

wherein the longitudinal axis is free from the first grating and second grating,

wherein the first grating comprises a first plurality of grating elements, the second grating comprises a second plurality of grating elements, and each grating element of the first plurality of grating element and the second plurality of grating elements is defined by side-walls in the first waveguide that form a closed perimeter, and

wherein the second waveguide comprising a section configured to guide the light wave along a central axis of the second waveguide, the central axis being aligned with the longitudinal axis of the first waveguide.