Claims

1. A device, comprising:

a substrate, the substrate comprising:

an input coupler comprising a first arrangement of waveguide structures, the first arrangement of waveguide structures having a critical dimension defining one or more gaps between each waveguide structure of the first arrangement of waveguide structures;

an output coupler comprising a second arrangement of waveguide structures, the second arrangement of waveguide structures having a critical dimension defining one or more gaps between each waveguide structure of the second arrangement of waveguide structures;

a mirror disposed only on the input coupler, the mirror disposed between the one or more gaps between each waveguide structure of the first arrangement of waveguide structures,

an encapsulation layer disposed on the mirror, the encapsulation layer having a refractive index of about 1.0 to about 1.5; and

a medium disposed on the output coupler, the medium disposed between the one or more gaps between each waveguide structure of the second arrangement of waveguide structures.

2. The device of claim 1, wherein the encapsulation layer is disposed on a top side of the mirror.

3. The device of claim 2, wherein the encapsulation layer is further disposed on one or more side walls of the mirror.

4. The device of claim 1, wherein the mirror comprises a reflectivity of greater than 90%.

5. A method, comprising:

depositing a mirror on a waveguide, the waveguide having an input coupler and an output coupler;

depositing an encapsulation layer on the mirror;

forming a resist over the input coupler, wherein a residual encapsulation portion of the encapsulation layer on a non-input coupler area is exposed;

removing the residual encapsulation portion of the encapsulation layer, wherein a residual mirror portion of the mirror on the non-input coupler area is exposed;

removing the residual mirror portion of the mirror of the input coupler, wherein the non-input coupler area of the waveguide is exposed; and

removing the resist on the input coupler, the waveguide having the mirror only on the input coupler and the encapsulation layer only on the mirror.

6. The method of claim 5, wherein the forming the resist over the input coupler comprises:

depositing a resist layer over the encapsulation layer; and

patterning the resist layer such that the residual encapsulation portion is exposed.

7. The method of claim 5, wherein depositing the encapsulation layer comprises performing one or more vapor deposition processes.

8. The method of claim 7, wherein performing one or more vapor deposition processes comprises generating an oxygen plasma.

9. The method of claim 5, wherein the encapsulation layer is chromium or silicon nitride.

10. The method of claim 5, wherein the mirror is silver or aluminum.

11. The method of claim 5, wherein removing the residual encapsulation portion of the encapsulation layer comprises using an etching process to etch the residual portion of the encapsulation layer.

12. The method of claim 11, wherein the etching process is a wet etching process or a dry etching process.

13. A method, comprising:

depositing a mirror on a waveguide, the waveguide having an input coupler and an output coupler;

forming a first resist over the input coupler, wherein a residual mirror portion of the mirror on a non-input coupler area is exposed;

removing the residual mirror portion of the mirror on the non-input coupler area;

removing the first resist;

depositing an encapsulation layer on the mirror and the non-input coupler area;

forming a second resist over the mirror, wherein a residual encapsulation portion of the encapsulation layer on the non-input coupler area is exposed by the second resist;

removing the residual encapsulation portion, wherein the non-input coupler area of the waveguide is exposed; and

removing the second resist, the waveguide having the mirror only on the input coupler, and the encapsulation layer:

only on the mirror; or

on the mirror and exterior portions of the input coupler surrounding a grating of the input coupler.

14. The method of claim 13, wherein the forming the resist over the input coupler comprises:

depositing a resist layer over the encapsulation layer; and

patterning the resist layer such that the residual encapsulation portion is exposed.

15. The method of claim 14, wherein depositing the encapsulation layer comprises performing one or more vapor deposition processes.

16. The method of claim 15, wherein performing one or more vapor deposition processes comprises generating an oxygen plasma.

17. The method of claim 13, wherein the encapsulation layer is chromium or silicon nitride.

18. The method of claim 13, wherein the mirror is silver or aluminum.

19. The method of claim 13, wherein removing the residual encapsulation portion of the encapsulation layer comprises using an etching process to etch the encapsulation layer.

20. The method of claim 19, wherein the etching process is a wet etching process or a dry etching process.