Claims

1. A method, comprising:

depositing a first precursor over a waveguide, the first precursor deposited over a first grating, a second grating, and an intermediate region between the first grating and the second grating of the waveguide, the first precursor deposited to have a first thickness;

performing a first cure process, the first cure process curing the first precursor;

depositing a second precursor over the waveguide, the second precursor deposited over the first grating, the second grating, and the intermediate region, the second precursor deposited to have a second thickness;

depositing a coating over the intermediate region and the second grating;

performing a second cure process, the second cure process curing the second precursor over the first grating; and

removing the coating and the second precursor over the second grating and the intermediate region.

2. The method of claim 1, wherein the first grating has a first depth, the second grating has a second depth, and the first depth is greater than the second depth.

3. The method of claim 1, wherein the first thickness and the second thickness are different.

4. The method of claim 2, wherein the second depth is equal to the first thickness, and the first depth is equal to the first thickness and the second thickness.

5. The method of claim 1, wherein the first precursor and the second precursor are the same material.

6. The method of claim 1, wherein the coating is deposited via inkjet deposition.

7. A method, comprising:

depositing a first precursor over a waveguide, the first precursor deposited over a first grating, a second grating, and an intermediate region between the first grating and the second grating of the waveguide, the first precursor deposited to have a first thickness, an upper surface of the first grating, the second grating, and the intermediate region having a hardmask material disposed thereon;

performing a first cure process, the first cure process curing the first precursor;

removing the first precursor over the upper surface;

removing the hardmask material;

depositing a second precursor over the waveguide, the second precursor deposited over the first grating, the second grating, and the intermediate region, the second precursor deposited to have a second thickness;

depositing a coating over the intermediate region and the second grating;

performing a second cure process, the second cure process curing the second precursor over the first grating; and

removing the coating and the second precursor over the second grating and the intermediate region.

8. The method of claim 7, wherein the first grating has a first depth, the second grating has a second depth, and the first depth is greater than the second depth.

9. The method of claim 8, wherein the removing the first precursor comprises etching the first precursor such that the first thickness and the second depth are equal.

10. The method of claim 7, wherein the first precursor and the second precursor are the same material.

11. The method of claim 7, wherein the coating is deposited via inkjet deposition.

12. The method of claim 7, wherein the hardmask material includes chromium (Cr), titanium nitride (TiN), silicon carbide (SiC), silicon oxide (SiO_x), zirconium oxide (ZrO_x),

titanium oxide (TiO_x), tantalum nitride (TaN), aluminum nitride (AlN), carbon, or combinations thereof.

13. A waveguide, comprising:
a first grating, a second grating, and an intermediate region between the first grating and the second grating of the waveguide;
the first grating comprising a first plurality of trenches at a first depth;
the second grating comprising a second plurality of trenches at a second depth;
a cured first fill material deposited over the first grating, the second grating, and the intermediate region;
a second fill material deposited over the first grating.

14. The waveguide of claim 13, wherein the second fill material is the same as the first fill material.

15. The waveguide of claim 13, wherein the second depth is larger than the first depth.

16. The waveguide of claim 13, wherein the first plurality of trenches are filled to the first depth with the first fill material, and the second plurality of trenches are filled to the second depth with the first fill material and second fill material.

17. The waveguide of claim 13, wherein the first fill material and the second fill material are the same material.

18. The waveguide of claim 13, wherein the first depth is larger than the second depth.

19. The waveguide of claim 13, wherein the intermediate region comprises a hardmask material disposed thereon

20. The waveguide of claim 19, wherein the hardmask material includes chromium (Cr), titanium nitride (TiN), silicon carbide (SiC), silicon oxide (SiOx), zirconium oxide (ZrOx), titanium oxide (TiOx), tantalum nitride (TaN), aluminum nitride (AlN), carbon, or combinations thereof.