CLAIMS

1. A method of forming a photonic structure, comprising:

etching a semiconductor substrate to create a cavity below a ledge portion of the semiconductor substrate; and

forming an element of a photonic device from the ledge portion of the semiconductor substrate; and

wherein the photonic device element comprises a waveguide core;

wherein the method of forming the photonic structure further comprises filling the cavity with a cladding material; and

wherein the cavity has a generally rectangular cross-sectional shape.

2. A method as in Claim 1, wherein the cladding material comprises an oxide.

3. A method as in Claim 2, wherein the semiconductor substrate comprises a silicon substrate.

4. A method as in Claim 3, wherein the oxide comprises silicon dioxide.

5. A method as in Claim 1, further comprising: using a mask and a first etch to form a trench in a surface of the semiconductor substrate; and, using a first isotropic etch through the trench to form the cavity.

6. A method as in Claim 1, further comprising: forming a hard mask over the semiconductor substrate; forming a patterned photoresist over the hard mask to define a location for a trench; and etching the semiconductor substrate through the hard mask to form the trench.

7. A method as in Claim 6, further comprising forming an oxide material between the hard mask and semiconductor substrate.

8. A method as in Claim 5, further comprising: forming an etch protective liner on sidewalls of the trench before performing the first isotropic etch.

9. A method as in Claim 8, wherein the etch protective liner comprises an oxide.

10. A method as in Claim 9, wherein the oxide comprises silicon dioxide.

11. A method as in Claim 5, wherein the first isotropic etch comprises a hydroxide etch.

12. A method as in Claim 11, wherein the hydroxide etch comprises using NH_4OH or TMAH as the etchant.

13. A method as in Claim 11, further comprising performing a second isotropic etch following the first isotropic etch to etch the cavity.

14. A method as in Claim 13, wherein the second isotropic etch comprises using a buffered fluoride as the etchant.

15. A method as in Claim 14, wherein the buffered fluoride etchant solution comprises NH_4F : QEII : H_2O_2.

16. A method as in Claim 1, wherein the cavity is filled with the cladding material after the photonic device element is formed.

17. A method as in Claim 1, further comprising forming a cladding material over and around the sides of the photonic device element.

18. A method as in Claim 17, wherein the cladding material over and around the sides of the photonic device element comprises an oxide.

19. A method as in Claim 18, wherein the oxide comprises silicon dioxide.

20. A method of forming a photonic structure, comprising:

etching a semiconductor substrate to create a cavity below a ledge portion of the semiconductor substrate;

forming an element of a photonic device from the ledge portion of the semiconductor substrate; and

using a mask and a first etch to form a trench in a surface of the semiconductor substrate; and, using a first isotropic etch through the trench to form the cavity; and

wherein the first isotropic etch comprises a hydroxide etch;

wherein the method of forming the photonic structure further comprises performing a second isotropic etch following the first isotropic etch to etch the cavity; and

wherein the forming of the photonic device element occurs after the second isotropic etch.