WHAT IS CLAIMED IS:

1. An optical polarizer comprising:

an optical waveguide configured to propagate light at a designated polarization mode, and comprising a bend in a same plane of the propagated light,

wherein the bend has a geometry configured to contain in the optical waveguide the designated polarization mode of the propagated light and radiate outside the optical waveguide a second polarization mode of the propagated light, wherein the designated polarization mode is a transverse electrical (TE) mode, and wherein the second polarization mode is a transverse magnetic (TM) mode.

2. The optical polarizer of claim 1, wherein the second polarization mode is orthogonal to the designated polarization mode.

3. The optical polarizer of claim 1, wherein the geometry of the bend is one of circular, adiabatic, Bezier curve shaped, and sine curve shaped.

4. The optical polarizer of claim 1, wherein the geometry of the bend comprises an adiabatic sine curve coupled to a straight waveguide section, a constant radius turn coupled to the adiabatic sine curve, and a second adiabatic sine curve coupled to the constant radius turn and to a second straight waveguide section.

5. The optical polarizer of claim 1, wherein the bend is about a 90 degree bend in the optical waveguide.

6. The optical polarizer of claim 1, wherein the bend is about a 180 degree bend in the optical waveguide.

7. The optical polarizer of claim 1, wherein the optical waveguide including the bend comprises a core of silicon.

8. The optical polarizer of claim 7, wherein the optical waveguide including the bend comprises a cladding of silicon oxide surrounding the core.

9. The optical polarizer of claim 1, wherein the optical waveguide including the bend is comprised of silicon on an insulator substrate.

10. An optical device comprising:

an optical waveguide configured to propagate light at a designated polarization mode; and

a bent waveguide coupled to the optical waveguide, and configured with a bent geometry to contain in the bent waveguide the designated polarization mode of the propagated light and radiate outside the bent waveguide a second polarization mode of the propagated light, wherein the designated mode is a transverse electrical (TE) mode and wherein the bent waveguide has a rectangular cross section profile with a larger width than height or the designated mode is a transverse magnetic (TM) mode and wherein the bent waveguide has a rectangular cross section profile with a larger height than width.

11. The optical device of claim 10, wherein the optical waveguide and the bent waveguide are fabricated via a same sequence of lithographic processes using same semiconductor and dielectric materials.

12. The optical device of claim 10, wherein the bent waveguide comprises a series of bents having one of a serpentine shape, a double serpentine shape, and a spiral shape.

13. The optical device of claim 10, wherein the bent waveguide is surrounded with a light absorbing material.

14. The optical device of claim 13, wherein the light absorbing material is one of germanium and doped silicon on a substrate.

15. The optical device of claim 10, wherein the optical device is an optical receiver further comprising:

a polarizing beam splitter (PBS) coupled to the optical waveguide via the bent waveguide, wherein the bent waveguide is a polarizer for first light mode from the PBS to the optical waveguide;

a second optical waveguide similar to the optical waveguide and rotated by about 90 degrees with respect to the optical waveguide, wherein the second optical waveguide is coupled to the PBS; and

a second bent waveguide similar to the bent waveguide and rotated by about 90 degrees with respect to the bent waveguide, wherein the rotated second bent waveguide is positioned between the PBS and the rotated second optical waveguide, and is a polarizer for a second light mode from the PBS to the second optical waveguide.

16. The optical device of claim 10, wherein the optical device is an optical switch further comprising:

a polarization splitter; and

a switch matrix comprising the optical waveguide and coupled to the polarization splitter via the bent waveguide, wherein the bent waveguide is a polarizer for a transverse electrical mode between the polarization splitter and the switch matrix.

17. The optical device of claim 16, wherein the optical switch further comprises a polarization rotator positioned between the bent waveguide and the polarization splitter.

18. A method for making a polarizer device, the method comprising:

forming an optical waveguide on a substrate using semiconductor fabrication processes, wherein the forming includes shaping a geometry and dimensions of the optical waveguide to support a designated polarization mode for light propagation according to a desired operation wavelength;

forming a series of bends in the waveguide during the semiconductor fabrication processes, wherein the forming includes shaping a geometry and dimensions of the bends to contain the designated polarization mode within the waveguide and radiate outside the waveguide a second polarization mode, wherein the designated polarization mode is a transverse electrical (TE) mode, and wherein the second polarization mode is a transverse magnetic (TM) mode; and

placing, on the substrate, a light absorbing material around the waveguide and the bends of the waveguide.