Claims:

1. A borane concentration sensor, comprising:

a body;

a plurality of windows, wherein individual ones of the plurality of windows are disposed at opposite ends of the body, and wherein the body and the plurality of windows define a one or more cell volume;volumes;

a radiation source disposed outside of the cell volume and proximate to a first window of the plurality of windows; and

a first radiation detector;

a first optical filter disposed between the first radiation detector and the radiation source, the first optical filter having a first center transmission wavelength λ_C within +/- 250 nm of an IR absorption peak of diborane;

a second radiation detector; and

a second optical filter disposed between the second radiation detector and the radiation source, the second optical filter having a second center transmission wavelength within +/- 250 nm of an IR absorption peak of tetraborane.

2. The borane concentration sensor of claim 1, wherein

the first and second radiation detectors are disposed outside of the one or more cell volumevolumes and proximate to a second window of the plurality of windows.; and

2. The borane concentration sensor of claim 1, wherein one or both of the first and second windows are formed of MgF_2, KBr, sapphire, or combinations thereof.

3. The borane concentration sensor of claim 1, further comprising a first optical filter interposed between the first radiation detector and the second window.A method of processing a substrate, comprising:

4. The borane concentration sensor of claim 3, wherein the first optical filter has a center transmission wavelength λ_C within about +/- 250 nm of an IR absorption peak of diborane or within about +/- 250 nm of an IR absorption peak of tetraborane.

~~5. The borane concentration sensor of claim 3, further comprising a second radiation detector and a second optical filter disposed between the radiation source and the second radiation detector, wherein the first optical filter has a center transmission wavelength λ_C within about +/- 250 nm of an IR absorption peak of diborane and the second optical filter has a center transmission wavelength within about +/- 250 nm of an IR absorption peak of tetraborane.~~

~~6. A method of processing a substrate, comprising:~~

determining, by use of an optical sensor, a diborane concentration in a gas sample taken from a gas conduit fluidly coupling a first gas source and a substrate processing chamber~~, wherein determining the diborane concentration comprises using an optical sensor~~;

based on the determined diborane concentration, mixing a boron doping gas having a desired diborane concentration by changing a flowrate of a first gas from the first gas source, a second gas from a second gas source, or both; and

delivering the boron doping gas to a processing volume of the substrate processing chamber.

~~7~~4. The method of claim ~~6~~3, wherein the optical sensor comprises:

a body;

a plurality of windows, wherein individual ones of the plurality of windows are disposed at opposite ends of the body, and wherein the body and the plurality of windows define a cell volume;

a radiation source disposed outside of the cell volume and proximate to a first window of the plurality of windows; and

a first radiation detector disposed outside the cell volume and proximate to a second window of the plurality of windows.

~~8~~5. The method of claim ~~7~~4, wherein one or both of the first and second windows are formed of MgF_2, KBr, sapphire, or combinations thereof.

6. The method of claim 4, wherein the optical sensor further comprises a second radiation detector.

7. The method of claim 4, wherein the optical sensor further comprises a first optical filter interposed between the first radiation detector and the second window.

8. The method of claim 7, wherein the first optical filter has a center transmission wavelength λ_C within +/- 250 nm of an IR absorption peak of diborane or within +/- 250 nm of an IR absorption peak of tetraborane.

9. The method of claim 7, wherein the optical sensor further comprises a second radiation detector and a second optical filter disposed between the radiation source and the second radiation detector, wherein the first optical filter has a center transmission wavelength λ_C within +/- 250 nm of an IR absorption peak of diborane and the second optical filter has a center transmission wavelength within +/- 250 nm of an IR absorption peak of tetraborane.

~~10. The method of claim 7, wherein the optical sensor further comprises a first optical filter interposed between the first radiation detector and the second window.~~

~~11. The method of claim 10, wherein the first optical filter has a center transmission wavelength λ_C within about +/- 250 nm of an IR absorption peak of diborane or within about +/- 250 nm of an IR absorption peak of tetraborane.~~

~~12. The method of claim 10, wherein the optical sensor further comprises a second radiation detector and a second optical filter disposed between the radiation source and the second radiation detector, wherein the first optical filter has a center transmission wavelength λ_C within about +/- 250 nm of an IR absorption peak of diborane and the second optical filter has a center transmission wavelength within about +/- 250 nm of an IR absorption peak of tetraborane.~~

~~13~~10. A processing system comprising:

a computer readable medium having instructions stored thereon for a method of processing a substrate, comprising:

determining, by use of an optical sensor, a diborane concentration in a gas sample taken from a gas conduit fluidly coupling a first gas source and a substrate processing chamber~~, wherein determining the diborane concentration comprises using an optical sensor~~;

based on the determined diborane concentration, mixing a boron doping gas having a desired diborane concentration by changing a flowrate of a first gas from the first gas source, a second gas from a second gas source, or both; and

delivering the boron doping gas to a processing volume of ~~a~~the substrate processing chamber.

~~14~~11. The processing system of claim ~~13~~10, wherein the optical sensor comprises:

a body;

a plurality of windows, wherein individual ones of the plurality of windows are disposed at opposite ends of the body, and wherein the body and the plurality of windows define a cell volume;

a radiation source disposed outside of the cell volume and proximate to a first window of the plurality of windows; and

a first radiation detector disposed outside the cell volume and proximate to a second window of the plurality of windows.

~~15~~12. The processing system of claim ~~14~~11, wherein one or both of the first and second windows of the optical sensor are formed of MgF_2, KBr, sapphire, or combinations thereof.

13. The processing system of claim 11, wherein the optical sensor further comprises a first optical filter interposed between the first radiation detector and the second window.

14. The processing system of claim 13, wherein the first optical filter has a center transmission wavelength λ_C within +/- 250 nm of an IR absorption peak of diborane or within +/- 250 nm of an IR absorption peak of tetraborane.

15. The processing system of claim 13, wherein the optical sensor further comprises a second radiation detector and a second optical filter disposed between the radiation source and the second radiation detector, wherein the first optical filter has a center transmission wavelength λ_C within +/- 250 nm of an IR absorption peak of diborane and

the second optical filter has a center transmission wavelength within +/- 250 nm of an IR absorption peak of tetraborane.

16. The processing system of claim 15, further comprising the substrate processing chamber.

17. The processing system of claim 15, wherein the method further comprises determining a tetraborane concentration in the gas sample using the optical sensor.