CLAIMS

1. A semiconductor processing chamber comprising:

a chamber body defining a substrate processing region;

a substrate support positioned within the substrate processing region; and

an atomic oxygen sensor positioned within the substrate processing region proximate to the substrate support, wherein the atomic oxygen sensor includes at least one electrode comprising metallic gold.

2. The semiconductor processing chamber of claim 1, wherein the atomic oxygen sensor includes a ceramic electrolyte comprising yttria stabilized zirconia.

3. The semiconductor processing chamber of claim 1, wherein the atomic oxygen sensor is surrounded by an ion suppression screen that reduces a flux of ions contacting the atomic oxygen sensor.

4. The semiconductor processing chamber of claim 1, wherein the atomic oxygen sensor comprises a reversible barrier configured to prevent gases in the chamber from contacting the atomic oxygen sensor.

5. The semiconductor processing chamber of claim 1, wherein the semiconductor processing chamber further comprises a gas inlet to permit gases to flow into the substrate processing region, and wherein the atomic oxygen sensor is positioned between the gas inlet and the substrate support.

6. The semiconductor processing chamber of claim 1, wherein the semiconductor processing chamber further comprises a gas outlet to permit gases to flow out of the substrate processing region, and wherein the atomic oxygen sensor is positioned between the substrate support and the gas outlet.

7. The semiconductor processing chamber of claim 1, wherein the semiconductor processing chamber is a plasma processing chamber comprising at least one of:

a plurality of coils to generate an inductively-coupled plasma in the substrate processing region;

at least two electrodes to generate a capacitively-coupled plasma in the substrate processing region; or

an inlet for remote plasma effluents generated by a remote plasma system positioned outside the semiconductor processing chamber.

8. A semiconductor processing chamber comprising:

a chamber body defining a substrate processing region;

a gas inlet in the chamber body to supply gas to the substrate processing region, and a gas outlet in the chamber body to remove gas effluents from the substrate processing region; and

an atomic oxygen sensor positioned within the substrate processing region between the gas inlet and the gas outlet, wherein the atomic oxygen sensor includes at least one electrode comprising metallic gold.

9. The semiconductor processing chamber of claim 8, wherein the semiconductor processing chamber further comprises a substrate support positioned within the substrate processing region.

10. The semiconductor processing chamber of claim 8, wherein the atomic oxygen sensor is positioned closer to the gas inlet than the gas outlet.

11. The semiconductor processing chamber of claim 8, wherein the atomic oxygen sensor is positioned closer to the gas outlet than the gas inlet.

12. The semiconductor processing chamber of claim 8, wherein the atomic oxygen sensor includes a ceramic electrolyte comprising yttria stabilized zirconia.

13. A semiconductor processing method comprising:

flowing an oxygen-containing gas into a substrate processing region of a semiconductor processing chamber;

detecting a concentration of atomic oxygen in the substrate processing region with an atomic oxygen sensor positioned in the semiconductor processing chamber, wherein the atomic oxygen sensor includes at least one electrode comprising metallic gold, and includes a solid electrolyte that selectively conducts atomic oxygen ions; and

adjusting the flow of the oxygen-containing gas into the semiconductor processing chamber based on the concentration of atomic oxygen detected by the atomic oxygen sensor.

14. The semiconductor processing method of claim 13, wherein the method further comprises reducing a flux of ions in the substrate processing region from contacting the atomic oxygen sensor.

15. The semiconductor processing method of claim 14, wherein the method further comprises unblocking the atomic oxygen sensor from gases in the substrate processing region to permit the sensor to detect the concentration of atomic oxygen in the substrate processing region.

16. The semiconductor processing method of claim 13, wherein the solid electrolyte of the atomic oxygen sensor comprises yttria stabilized zirconia.

17. The semiconductor processing method of claim 13, wherein the atomic oxygen sensor detects the concentration of atomic oxygen in the oxygen-containing gas supplied to the substrate processing region from a gas inlet in the semiconductor processing chamber.

18. The semiconductor processing method of claim 13, wherein the atomic oxygen sensor detects the concentration of atomic oxygen in an effluent gas before it exits the substrate processing region through a gas outlet in the semiconductor processing chamber.

19. The semiconductor processing method of claim 13, wherein the method further comprises generating a plasma from the oxygen-containing gas, wherein the atomic oxygen sensor detects the concentration of atomic oxygen in the plasma.