WHAT IS CLAIMED IS:

1. A substrate processing apparatus comprising:

a process chamber configured to process a substrate;

a first gas supplier configured to supply a metal-containing gas into the process chamber;

a second gas supplier configured to supply a first oxygen-containing gas into the process chamber; and

an exhauster including a gas exhaust pipe and a trap configured to collect a component of the metal-containing gas contained in an exhaust gas by using plasma, the exhauster being configured to discharge the exhaust gas from an interior of the process chamber,

wherein the trap includes:

a trap mechanism configured to collect the component of the metal-containing gas contained in the exhaust gas;

a plasma generator configured to generate the plasma;

a third gas supplier configured to supply a second oxygen-containing gas to the plasma generator;

a high-frequency power supply configured to supply high-frequency power to the plasma generator; and

a fourth gas supplier configured to supply a gas from the plasma generator to the trap mechanism.

2. The substrate processing apparatus according to claim 1, wherein the trap is disposed between a pump configured to exhaust the interior of the process chamber and an auxiliary pump configured to support the pump.

3. The substrate processing apparatus according to claim 1, wherein the plasma generator

activates the second oxygen-containing gas by forming plasma from the second oxygen-containing gas and supplies the activated second oxygen-containing gas to the trap mechanism via the fourth gas supplier.

4. The substrate processing apparatus according to claim 1, wherein the plasma generator includes an electrode connected to the high-frequency power supply and an electrode connected to a ground that is a reference potential.

5. The substrate processing apparatus according to claim 3, wherein the component of the metal-containing gas is caused to react with the second oxygen-containing gas activated by the plasma generator in the trap mechanism.

6. The substrate processing apparatus according to claim 1, wherein the trap mechanism includes a trap fin to which the component of the metal-containing gas adheres.

7. The substrate processing apparatus according to claim 6, wherein a product generated by a reaction between the component of the metal-containing gas and the second oxygen-containing gas activated by the plasma generator is caused to adhere to the trap fin.

8. The substrate processing apparatus according to claim 6, wherein the trap fin is made of stainless steel.

9. The substrate processing apparatus according to claim 2, wherein the pump is a dry pump, and the auxiliary pump is a mechanical booster pump.

10. The substrate processing apparatus according to claim 1, wherein the first oxygen-containing gas and the second oxygen-containing gas are the same gas.

11. The substrate processing apparatus according to claim 10, wherein the first oxygen-containing gas and the second oxygen-containing gas are ozone.

12. The substrate processing apparatus according to claim 1, wherein the first oxygen-containing gas and the second oxygen-containing gas are different gases.

13. The substrate processing apparatus according to claim 12, wherein the first oxygen-containing gas is oxygen, and the second oxygen-containing gas is ozone.

14. The substrate processing apparatus according to claim 10, comprising an ozonizer configured to generate ozone.

15. The substrate processing apparatus according to claim 1, further comprising a controller configured to be capable of controlling the first gas supplier, the second gas supplier, and the exhauster to alternately perform (a) supplying the metal-containing gas from the first gas supplier into the process chamber and (b) supplying the first oxygen-containing gas from the second gas supplier into the process chamber, and perform (c) discharging the exhaust gas containing the component of the metal-containing gas after (a) and (d) collecting the component of the metal-containing gas contained in the exhaust gas.

16. An exhauster comprising:

a gas exhaust pipe; and

a trap configured to collect a component of a metal-containing gas contained in an exhaust gas by using an oxygen-containing gas activated with plasma,

wherein the exhauster is configured to discharge the exhaust gas from an interior of a process chamber,

wherein the trap includes:

a trap mechanism configured to collect the component of the metal-containing gas contained in the exhaust gas;

a plasma generator configured to generate the plasma;

a third gas supplier configured to supply a second oxygen-containing gas to the plasma generator;

a high-frequency power supply configured to supply high-frequency power to the plasma generator; and

a fourth gas supplier configured to supply a gas from the plasma generator to the trap mechanism.

17. A method of manufacturing a semiconductor device, the method comprising:

accommodating a substrate in a process chamber of a substrate processing apparatus including: the process chamber configured to process the substrate; a first gas supplier configured to supply a metal-containing gas into the process chamber; a second gas supplier configured to supply a first oxygen-containing gas into the process chamber; and an exhauster including a gas exhaust pipe, and a trap configured to collect a component of the metal-containing gas contained in an exhaust gas by using plasma, the exhauster being configured to discharge the exhaust gas from the process chamber;

supplying the metal-containing gas into the process chamber;

discharging the component of the metal-containing gas from the process chamber; and

collecting the component of the metal-containing gas by the trap,

wherein the trap includes:

a trap mechanism configured to collect the component of the metal-containing gas contained in the exhaust gas;

a plasma generator configured to generate the plasma;

a third gas supplier configured to supply a second oxygen-containing gas to the plasma generator;

a high-frequency power supply configured to supply high-frequency power to the plasma generator; and

a fourth gas supplier configured to supply a gas from the plasma generator to the trap mechanism.

18. A program that causes, by a computer, a substrate processing apparatus including: a process chamber configured to process a substrate; a first gas supplier configured to supply a metal-containing gas into the process chamber; a second gas supplier configured to supply a first oxygen-containing gas into the process chamber; and an exhauster including a gas exhaust pipe and a trap configured to collect a component of the metal-containing gas contained in an exhaust gas by using plasma, the exhauster being configured to discharge the exhaust gas from the process chamber, to perform a process comprising;

accommodating the substrate in the process chamber;

supplying the metal-containing gas into the process chamber;

discharging the component of the metal-containing gas from the process chamber; and

collecting the component of the metal-containing gas by the trap,

wherein the trap includes:

a trap mechanism configured to collect the component of the metal-containing gas contained in the exhaust gas;

a plasma generator configured to generate the plasma;

a third gas supplier configured to supply a second oxygen-containing gas to the plasma generator;

a high-frequency power supply configured to supply high-frequency power to the plasma generator; and

a fourth gas supplier configured to supply a gas from the plasma generator to the trap mechanism.