CLAIMS

1. A substrate processing apparatus comprising:

a chamber;

a substrate support disposed in the chamber;

a gas supply disposed in the chamber and connected to a supply source of reaction gas containing HF gas and $C_xH_yF_z$ gas (where x and z are integers equal to or greater than 1 and y is an integer equal to or greater than 0); and

a plasma-generator configured to form a plasma from the reaction gas supplied to the chamber from the gas supply;

a controller configured to control the gas supply to supply the reaction gas into the chamber such that a flow rate ratio of the HF gas is the largest relative to a total flow rate of the reaction gas, in order to etch a silicon-containing film of a substrate supported by the substrate support, and to control the plasma-generator to generate a plasma from the reaction gas in the chamber; and

wherein at least a portion of the chamber exposed to the plasma is made of a conductive silicon-containing material.

2. The substrate processing apparatus according to claim 1, wherein the flow rate of the $C_xH_yF_z$ gas supplied to the chamber is 5vol% or more relative to the overall flow rate of the reaction gas.

3. The substrate processing apparatus according to claim 1, wherein an inner wall of the chamber is configured by applying a liner made of a conductive silicon-containing material.

4. The substrate processing apparatus according to claim 1, further comprising an upper electrode arranged facing the substrate support, wherein the upper electrode has the gas supply.

5. The substrate processing apparatus according to claim 4, wherein the upper electrode comprises a top plate having a plurality of gas discharge holes for supplying the reaction gas to the chamber, and the top plate is made of a conductive silicon material.

6. The substrate processing apparatus according to claim 1, comprising a power source for supplying negative direct current voltage or low RF power to the chamber.

7. The substrate processing apparatus according to claim 4, comprising a power source for supplying negative direct current voltage or low RF power to the upper electrode.

8. The substrate processing apparatus according to claim 1, wherein a side wall constituting the chamber has the gas supply.

9. A substrate processing method comprising the steps of:

preparing a substrate comprising a silicon-containing film on a substrate support disposed in a chamber;

supplying a reaction gas containing HF gas and $C_xH_yF_z$ gas (where x and z are integers equal to or greater than 1 and y is an integer equal to or greater than 0) to the chamber, the flow rate ratio of the HF gas being the largest relative to a total flow rate of the reaction gas; and

forming plasma from the reaction gas supplied to the chamber in order to etch the silicon-containing film,

wherein at least a portion of the chamber exposed to the plasma is made of a conductive silicon-containing material.

10. The substrate processing method according to claim 9, wherein the flow rate of the $C_xH_yF_z$ gas is 5vol% or more relative to the overall flow rate of the reaction gas.

11. The substrate processing method according to claim 9, wherein an inner wall of the chamber is configured by applying a liner made of a conductive silicon-containing material.

12. The substrate processing method according to claim 9, wherein negative direct current voltage or low RF power is supplied to the chamber in the step of forming plasma.

13. The substrate processing method according to claim 9, wherein a side wall constituting the chamber has a gas supply that supplies the reaction gas to the chamber.

14. The substrate processing method according to claim 9, wherein an upper electrode arranged facing the substrate support is further provided, the upper electrode having a gas supply that supplies the reaction gas to the chamber.

15. The substrate processing method according to claim 14, wherein the upper electrode comprises a top plate having a plurality of gas discharge holes for supplying the reaction gas to the chamber, and the top plate is made of a conductive silicon material.

16. The substrate processing method according to claim 14, wherein negative direct current voltage or low RF power is supplied to the upper electrode in the step of forming plasma.

17. The substrate processing method according to claim 9, wherein the $C_xH_yF_z$ gas is at least one type selected from the group consisting of $C_4H_2F_6$ gas, $C_4H_2F_8$ gas, $C_3H_2F_4$ gas, and $C_3H_2F_6$ gas.

18. The substrate processing method according to claim 9, wherein the reaction gas further comprises at least one type selected from the group consisting of phosphorus-containing gases, halogen-containing gases, oxygen-containing gases, and nitrogen-containing gases.