

WHAT IS CLAIMED IS:

1. An etching method, comprising:

controlling a temperature of a chiller configured to cool a pedestal so as to keep the temperature at -20 degrees C. or lower;

generating plasma from a hydrogen-containing gas and a fluoride-containing gas supplied from a gas supply source by supplying first high frequency power having a first frequency supplied to the pedestal from a first high frequency power source;

etching a silicon oxide film deposited on a substrate placed on the pedestal by the generated plasma; and

supplying second high frequency power having a second frequency lower than the first frequency of the first high frequency power to the pedestal from a second high frequency power source in a static eliminating process after the step of etching the silicon oxide film.

2. The etching method as claimed in claim 1,

wherein the hydrogen-containing gas is hydrogen (H_2) gas, and
the fluoride-containing gas is carbon tetrafluoride (CF_4) gas.

3. The etching method as claimed in claim 1,

wherein the hydrogen-containing gas is hydrogen (H_2) gas, and
the fluoride-containing gas is nitrogen trifluoride (NF_3) gas.

4. The etching method as claimed in claim 1,

wherein the substrate is held on an electrostatic chuck provided on the pedestal, and
the electrostatic chuck is made of titanium.

5. The etching method as claimed in claim 1,

wherein the step of etching the silicon oxide film deposited on the substrate comprises a step of supplying a heat transfer gas to a back surface of the substrate placed on the pedestal, and
the heat transfer gas is controlled so as to have a pressure of 2000 Pa (15 Torr) or higher.

6. The etching method as claimed in claim 1,

wherein the temperature of the chiller is controlled so as to become -60 degrees C. or lower.

7. The etching method as claimed in claim 1,

wherein the step of supplying the second high frequency power to the pedestal includes a step of supplying the first high frequency power to the pedestal before supplying the second high frequency power to the pedestal in the static eliminating process.

8. The etching method as claimed in claim 7,

wherein the step of supplying the second high frequency power to the pedestal further includes a step of supplying both of the first frequency power and the second frequency power to the pedestal in a superimposed manner, and

the first frequency power in the step of supplying both of the first frequency power and the second frequency power to the pedestal is higher than the first frequency power in the step of supplying the first high frequency power to the pedestal before supplying the second high frequency power to the pedestal in the static eliminating process.

9. The etching method as claimed in claim 1,

wherein a first partial pressure of the fluoride-containing gas is lower than a second partial pressure of the hydrogen-containing gas.