CLAIMS

1. A plasma temperature control apparatus comprising:

a plasma generating section that turns a plasma-generating gas into plasma; and

a plasma-generating gas temperature control section that controls the temperature of the plasma-generating gas supplied to the plasma generating section, wherein

the temperature of the plasma generated in the plasma generating section is controlled by controlling the temperature of the plasma-generating gas.

2. The plasma temperature control apparatus according to claim 1, wherein the plasma-generating gas temperature control section controls the temperature of the plasma-generating to be higher or lower than room temperature.

3. The plasma temperature control apparatus according to claim 1 or 2, wherein the plasma-generating gas temperature control section controls the temperature of the plasma-generating gas to a temperature lower than room temperature, and makes the temperature of the plasma generated in the plasma generating section a temperature lower than room temperature.

4. The plasma temperature control apparatus according to any one of claims 1 to 3, wherein the plasma-generating gas temperature control section includes a plasma-generating gas cooling section and heating section, wherein

the temperature of the plasma-generating gas is controlled by the cooling section cooling the plasma-generating gas and the heating section heating the cooled plasma-generating gas.

5. The plasma temperature control apparatus according to any

one of claims 1 to 4, comprising:

a temperature measuring section that measures the temperature of the plasma, wherein

the temperature of the plasma-generating gas is controlled by feeding back the plasma temperature measured by the temperature measuring section to the plasma-generating gas temperature control section.

The invention claimed is:

1. A plasma temperature control apparatus comprising:

a plasma generating section that turns a plasma-generating gas into plasma;

a plasma-generating gas temperature control section that controls a temperature of the plasma-generating gas, supplied to the plasma generating section, by allowing a single cooling section and a single heating section to cooperate with each other, the cooling section being provided in a supplying path that supplies the plasma-generating gas to the plasma generating section, and the heating section being provided on a downstream side of the cooling section in the supply path; and

a temperature measuring section that measures a temperature of the plasma in the plasma generating section, wherein

the temperature of the plasma measured by the temperature measuring section is fed back to the plasma-generating gas temperature control section, the plasma-generating gas is cooled by the cooling section, and the cooled plasma-generating gas is heated by the heating section, thus controlling the temperature of the plasma-generating gas, so that the temperature of the plasma generated in the plasma generating section is made lower than a temperature of plasma generated from a plasma-generating gas which is not controlled for temperature by the plasma-generating gas temperature control section.

2. A plasma temperature control apparatus comprising:

a plasma generating section that turns a plasma-generating gas into plasma; and

a plasma-generating gas temperature control section that controls a temperature of the plasma-generating gas, supplied to the plasma generating section, by allowing a single cooling section and a single heating section to cooperate with each other, the cooling section being provided in a supplying path that supplies the plasma-generating gas to the plasma generating section, and the heating section being provided on a downstream side of the cooling section in the supply path; and a temperature measuring section that measures a temperature of the plasma in the plasma generating section, wherein

the temperature of the plasma measured by the temperature measuring section is fed back to the plasma-generating gas temperature control section, the plasma-generating gas is cooled by the cooling section, and the cooled plasma-generating gas is heated by the heating section, thus controlling the temperature of the plasma-generating gas, so that the temperature of the plasma generated in the plasma generating section is made at room temperature or below.

3. A plasma temperature control apparatus comprising:

a plasma generating section that turns a plasma-generating gas into plasma; and

a plasma-generating gas temperature control section that controls a temperature of the plasma-generating gas, supplied to the plasma generating section, by allowing a single cooling section and a single heating section to cooperate with each other, the cooling section being provided in a supplying path that supplies the plasma-generating gas to the plasma generating section, and the heating section being provided on a downstream side of the cooling section in the supply path; and

a temperature measuring section that measures a temperature of the plasma in the plasma generating section, wherein

the temperature of the plasma measured by the temperature measuring section is fed back to the plasma-generating gas temperature control section, the plasma-generating gas is cooled by the cooling section, and the cooled plasma-generating gas is heated by the heating section, thus controlling the temperature of the plasma-generating gas, so that the temperature of the plasma generated in the plasma generating section is made 0degree C.or below.

4. A plasma temperature control method for controlling a temperature of plasma, comprising:

a plasma generating step of turning a plasma-generating gas into plasma;

a temperature measuring step of measuring a temperature of the plasma; and

a plasma-generating gas temperature controlling step of cooling and then heating the plasma-generating gas supplied to the plasma generating step,

wherein, while the temperature of the plasma is being measured in the temperature measuring step, by controlling, the temperature of the plasma-generating gas in the plasma-generating gas temperature controlling step, the temperature of the plasma generated in the plasma generating step is made lower than a temperature of plasma generated from a plasma-generating gas that is not controlled for temperature by the plasma-generating gas temperature control step.

5. A plasma temperature control method for controlling a temperature of plasma, comprising:

a plasma generating step of turning a plasma-generating gas into plasma;

a temperature measuring step of measuring a temperature of the plasma; and

a plasma-generating gas temperature controlling step of cooling and then heating the plasma-generating gas supplied to the plasma generating step,

wherein, while the temperature of the plasma is being measured in the temperature measuring step, by controlling the temperature of the plasma-generating gas in the plasma generating gas temperature controlling step, the temperature of the plasma

generated in the plasma generating step is made at room temperature or below.

6. A plasma temperature control method for controlling a temperature of plasma, comprising:

a plasma generating step of turning a plasma-generating gas into plasma;

a temperature measuring step of measuring a temperature of the plasma; and

a plasma-generating gas temperature controlling step of cooling and then heating the plasma-generating gas supplied to the plasma generating step,

wherein, while the temperature of the plasma is being measured in the temperature measuring step, by controlling the temperature of the plasma-generating gas in the plasma generating gas temperature controlling step, the temperature of the plasma generated in the plasma generating step is made 0degreeC. or below.