CLAIMS

Claim 1. A plasma processing apparatus comprising:

a plasma processing chamber;

a pedestal disposed in the plasma processing chamber and configured such that a flow path for a heat transfer medium is formed inside;

a temperature adjuster configured to circulate the heat transfer medium through the flow path and to regulate a temperature of the heat transfer medium;

an electrostatic chuck disposed on an upper surface of the pedestal and configured to have a substrate placing portion on which a substrate is placed and an edge ring placing portion on which an edge ring surrounding the substrate is placed;

a first electrostatic electrode layer configured to be disposed in the substrate placing portion;

a second electrostatic electrode layer configured to be disposed in the edge ring placing portion;

a first electrostatic adsorption power supply configured to be electrically connected to the first electrostatic electrode layer;

a second electrostatic adsorption power supply configured to be electrically connected to the second electrostatic electrode layer; and

an adsorptive sheet disposed at least one of between the substrate placing portion and the substrate placed on the substrate placing portion, or between the edge ring placing portion and the edge ring placed on the edge ring placing portion, and configured to change in adhesive strength in response to changing temperature.

Claim 2. The plasma processing apparatus according to claim 1, further comprising a controller, wherein

the controller performs a process including:

a step of controlling a temperature of the heat transfer medium by the temperature adjuster so that adhesive strength of the adsorptive sheet increases when plasma processing is performed in the plasma processing chamber; and

a step of applying a clamping voltage from the first electrostatic adsorption power supply to the first electrostatic electrode layer and applying a clamping voltage from the second electrostatic adsorption power supply to the second electrostatic electrode layer.

Claim 3. The plasma processing apparatus according to claim 2, wherein

the controller performs a process including:

a step of controlling a temperature of the heat transfer medium by the temperature adjuster so that adhesive strength of the adsorptive sheet decreases when at least one of the substrate and the edge ring is replaced; and

a step of stopping application of the clamping voltage from the first electrostatic adsorption power supply to the first electrostatic electrode layer when the substrate is replaced, and stopping application of the clamping voltage from the second electrostatic adsorption power supply to the second electrostatic electrode layer when the edge ring is replaced.

Claim 4. The plasma processing apparatus according to any one of claims 1 to 3, wherein

the adsorptive sheet is configured such that adhesive

strength decreases in a first temperature range and adhesive strength increases in a second temperature range above the first temperature range.

Claim 5. The plasma processing apparatus according to any one of claims 1 to 3, wherein

the adsorptive sheet is configured such that its adhesive strength increases in a first temperature range and its adhesive strength decreases in a second temperature range above the first temperature range.

Claim 6. The plasma processing apparatus according to any one of claims 1 to 5, wherein

the pedestal is configured such that the flow path is formed in a region that overlaps at least partially with a region where the adsorptive sheet is disposed, when viewed in a plan view.

Claim 7. The plasma processing apparatus according to any one of claims 1 to 6, wherein

the adsorptive sheet includes a plurality of separate regions.

Claim 8. The plasma processing apparatus according to claim 7, wherein

the adsorptive sheet is configured such that a gap between the regions is 2 mm or less.

Claim 9. The plasma processing apparatus according to claim 7, wherein

the adsorptive sheet disposed between the edge ring placing portion and the edge ring is divided into a plurality of arc-shaped regions when viewed in a plan view

and a linear gap is formed between the arc-shaped regions, and the gap is oriented 30° to 60° relative to a radial direction of the edge ring.

Claim 10. The plasma processing apparatus according to any one of claims 1 to 9, wherein

the adsorptive sheet is bonded to the substrate placing portion and a surface on a side of the substrate changes in adsorption strength by changing temperature of the heat transfer medium in a range lower than bonding strength on a side of the substrate placing portion, or the adsorptive sheet is bonded to the edge ring placing portion and a surface on a side of the edge ring changes in adhesive strength by changing temperature of the heat transfer medium in a range lower than adhesive strength on a side of the edge ring placing portion.

Claim 11. The plasma processing apparatus according to any one of claims 1 to 9, wherein

the adsorptive sheet is bonded to the substrate and is configured such that a surface on a side of the substrate placing portion changes in adhesive strength by changing temperature of the heat transfer medium in a range lower than adhesive strength on a side of the substrate, or is bonded to the edge ring and is configured such that a surface on a side of the edge ring placing portion changes in adhesive strength by changing temperature of the heat transfer medium in a range lower than adhesive strength on a side of the edge ring.

Claim 12. A control method for a plasma processing apparatus,

the plasma processing apparatus comprising:

a plasma processing chamber;

a pedestal disposed in the plasma processing chamber and including a flow path for a heat transfer medium is formed inside;

a temperature adjuster for circulating the heat transfer medium through the flow path and to regulate a temperature of the heat transfer medium;

an electrostatic chuck disposed on an upper surface of the pedestal and including a substrate placing portion on which a substrate is placed and an edge ring placing portion on which an edge ring surrounding the substrate is disposed;

a first electrostatic electrode layer disposed in the substrate placing portion;

a second electrostatic electrode layer disposed in the edge ring placing portion;

a first electrostatic adsorption power supply electrically connected to the first electrostatic electrode layer;

a second electrostatic adsorption power supply electrically connected to the second electrostatic electrode layer; and

an adsorptive sheet disposed at least one of between the substrate placing portion and the substrate placed on the substrate placing portion, or between the edge ring placing portion and the edge ring placed on the edge ring placing portion, and changing in adhesive strength by changing temperature,

the control method comprising:

a step of controlling a temperature of the heat transfer medium by the temperature adjuster so that adhesive strength of the adsorptive sheet increases when plasma processing is performed in the plasma processing

chamber; and

a step of applying a clamping voltage from the first electrostatic adsorption power supply to the first electrostatic electrode layer or from the second electrostatic adsorption power supply to the second electrostatic electrode layer.