

What is claimed is:

1. An electrostatic chuck mechanism, comprising a base and an edge assembly, wherein the base comprises a bearing surface configured to bear a wafer and a step surface surrounding the bearing surface and located at an edge of the wafer, the step surface being lower than the bearing surface; the edge assembly comprises a focus ring, a base ring, and an insulation ring, the focus ring is disposed on the step surface in a manner of surrounding the bearing surface; the base ring is disposed to surround an outer peripheral wall of the base; the insulation ring is disposed at a bottom of the base and supports the base; characterized in that, the electrostatic chuck mechanism further comprises a main electrostatic heating layer and an edge electrostatic heating layer, wherein,

- the main electrostatic heating layer is disposed on the bearing surface, configured to electrostatically adsorb the wafer; and

- the edge electrostatic heating layer is disposed on the step surface, configured to electrostatically adsorb the focus ring, and is able to adjust temperature of the focus ring;

- the edge electrostatic heating layer comprises an edge heating layer and an edge insulating layer successively disposed from bottom to top, wherein

- the focus ring is overlaid on the edge insulating layer, the edge insulating layer is provided therein with a first DC electrode, and electrostatic adsorbing force is generated on the focus ring by supplying DC to the first DC electrode; and

- the edge heating layer is configured to heat the focus ring by heat transfer.

2. The electrostatic chuck mechanism according to claim 1, characterized in that, the main electrostatic heating layer comprises a main heating layer and a main insulating layer successively disposed from bottom to top, wherein

- the wafer is overlaid on the main insulating layer, the main insulating layer is provided therein with a second DC electrode, and electrostatic adsorbing force is generated on the wafer by supplying DC to the second DC electrode; and

the main heating layer is configured to heat the wafer by heat transfer.

3. The electrostatic chuck mechanism according to claim 1, characterized in that, the edge insulating layer is further provided therein with a first heating element configured to heat the focus ring by heat transfer.

4. The electrostatic chuck mechanism according to claim 1, characterized in that, the main electrostatic heating layer comprises an main insulating layer, the wafer is overlaid on the main insulating layer, the main insulating layer is provided therein with a second DC electrode, and electrostatic adsorbing force is generated on the wafer by supplying DC to the second DC electrode; and

the main insulating layer is further provided therein with a second heating element, configured to heat the wafer by heat transfer.

5. The electrostatic chuck mechanism according to any one of claims 1 to 4, characterized in that, the edge electrostatic heating layer is provided therein with a first channel configured to deliver heat exchanging gas towards between the focus ring and the edge electrostatic heating layer.

6. The electrostatic chuck mechanism according to any one of claims 1 to 4, characterized in that, the main electrostatic heating layer is provided therein with a second channel configured to deliver heat exchanging gas towards above the main electrostatic heating layer.

7. The electrostatic chuck mechanism according to any one of claims 1 to 4, characterized in that, the electrostatic chuck mechanism further comprises a RF source configured to supply RF energy to the wafer and the focus ring simultaneously.

8. The electrostatic chuck mechanism according to any one of claims 1 to 4, characterized in that, the electrostatic chuck mechanism further comprises a main RF

source and an edge RF source, wherein

the main RF source is configured to supply RF energy to the wafer; and
the edge RF source is configured to supply RF energy to the focus ring.

9. The electrostatic chuck mechanism according to any one of claims 1 to 4, characterized in that, the electrostatic chuck mechanism further comprises an edge temperature sensor, a center temperature sensor and a temperature control unit, wherein

the edge temperature sensor is disposed in the base and close to the edge of the wafer, and is configured to detect temperature at the edge of the wafer and send a detected temperature to the temperature control unit;

the center temperature sensor is disposed in the base and close to the center of the wafer, and is configured to detect temperature at the center of the wafer and send a detected temperature to the temperature control unit; and

the temperature control unit is configured to control operating state of the edge electrostatic heating layer according to the temperature at the edge to control the temperature of the focus ring, so as to control the temperature at the edge of the wafer; and configured to control operating state of the main electrostatic heating layer according to the temperature at the center to control the temperature at the center of the wafer.

10. A semiconductor processing device, comprising a reaction chamber and an electrostatic chuck mechanism provided in the reaction chamber, the electrostatic chuck mechanism configured to bear a wafer and adjust temperature of the wafer, characterized in that, the electrostatic chuck mechanism employs the electrostatic chuck mechanism according to any one of claims 1 to 9.