

CLAIMS

1. A plasma processing apparatus, comprising:
 - a chamber having a plasma processing space;
 - 5 a stage disposed in the plasma processing space, the stage having an electrostatic chuck;
 - a semiconductive ring disposed on the stage so as to surround a substrate placed on the stage, the semiconductive ring having a body and an annular protrusion protruding
 - 10 downward from the body;
 - a conductive member disposed in the stage, the conductive member having a plurality of conductive pins disposed along a circumferential direction of the semiconductive ring, and an arc portion connected to a lower
 - 15 part of the respective conductive pin and extending along the circumferential direction;
 - a conductive layer disposed on an inner peripheral surface of the annular protrusion, the conductive layer being in contact with the plurality of conductive pins, and
 - 20 the conductive layer having a resistivity of $0.02\ \Omega\cdot\text{cm}$ or less; and
 - a power source configured to apply a pulsed DC voltage to the semiconductive ring through the conductive member and the conductive layer to change a thickness of a plasma
 - 25 sheath above the semiconductive ring.

2. The plasma processing apparatus according to claim 1,
wherein the conductive layer is in ohmic contact with the
semiconductive ring.
- 5 3. The plasma processing apparatus according to claim 2,
wherein the conductive layer is formed of a conductive metal.
4. The plasma processing apparatus according to claim 3,
wherein the conductive metal is any one of Al, Ni, Co, V,
10 Ti, Zr, Hf, W, and Au.
5. The plasma processing apparatus according to claim 4,
wherein the semiconductive ring is made of any one of Si,
GaAs, SiC, and GaN.
- 15 6. The plasma processing apparatus according to claim 1,
further comprising an insulating support portion disposed
so as to surround the semiconductive ring and configured to
support the annular protrusion of the semiconductive ring.
- 20 7. The plasma processing apparatus according to claim 1,
wherein a space is formed between the semiconductive ring
and the plurality of conductive pins.
- 25 8. The plasma processing apparatus according to claim 1,
wherein the conductive pins are arranged at regular

intervals along the circumferential direction.

9. The plasma processing apparatus according to claim 1,
further comprising: a heat transfer gas supply mechanism
5 configured to supply a heat transfer gas between the stage
and the semiconductive ring.