

CLAIMS

1. An electrostatic chuck comprising:
 - (a) a body having a top surface with a total area and a bottom surface, the top surface configured to support a wafer during processing and comprising:
 - (i) a central region comprising a plurality of substrate support mesas extending from a top surface of the CR and having an aggregate contact area coverage;
 - (ii) an inner channel (IC) with an IC width surrounding the CR;
 - (iii) an inner band (IB) with an IB width surrounding the IC, wherein a first depth of the IC from a top surface of the CR to a bottom surface of the IC is less than a second depth of the IC from a top surface of the IB to the bottom surface of the IC;
 - (iv) an outer channel (OC) with an OC width surrounding the IB, wherein a depth of the OC from the top surface of the electrostatic chuck to a bottom surface of the OC is greater than the first depth of the IC; and
 - (v) an outer band (OB) with an OB width surrounding the OC; and
 - (b) a controller configured to control temperature across the wafer secured to the top surface of the electrostatic chuck during processing.
2. The electrostatic chuck of claim 1, wherein a pressure of coolant within each of the IC and the OC is less than or equal to 20 Torr.
3. The electrostatic chuck of claim 1, wherein an inner channel pressure (IC pressure) within the IC is less than an outer channel pressure (OC pressure) within the OC.
4. The electrostatic chuck of claim 3, wherein a difference between the OC pressure and the IC pressure is greater than or equal to 8 Torr.
5. The electrostatic chuck of claim 4, wherein the OC pressure is greater than or equal to 14 Torr.

6. The electrostatic chuck of claim 5, wherein a ratio of the OC pressure to the IC pressure is in a range of 2.33 to 4.
7. The electrostatic chuck of claim 1, wherein the aggregate contact area coverage of the plurality of substrate support mesas is less than or equal to 10% of the total area of the top surface of the electrostatic chuck.
8. The electrostatic chuck of claim 7, wherein the aggregate contact area coverage of the plurality of substrate support mesas is less than or equal to 7% of the total area of the top surface of the electrostatic chuck.
9. The electrostatic chuck of claim 8, wherein the aggregate contact area coverage of the plurality of substrate support mesas is less than or equal to 5% of the total area of the top surface of the electrostatic chuck.
10. The electrostatic chuck of claim 1, wherein the plurality of substrate support mesas are circular in shape.
11. The electrostatic chuck of claim 1, wherein the OC width is in a range of 2 mm to 6 mm.
12. The electrostatic chuck of claim 1, wherein the OB width is in a range of 3.5 mm to 4 mm.