

What is claimed is:

1. An electrostatic chuck comprising:
 - a top surface and a bottom surface, the top surface comprising:
 - 5 a central region comprising a plurality of substrate support mesas;
 - an inner channel (IC) with an IC width surrounding the central region;
 - an inner band (IB) with an IB width surrounding the inner channel;
 - an outer channel (OC) with an OC width surrounding the inner
 - 10 band; and
 - an outer band (OB) with an OB width surrounding the outer channel; and
 - a controller configured to control temperature across a wafer secured to the top surface of the electrostatic chuck during processing.
- 15 2. The electrostatic chuck of claim 1, wherein a maximum pressure of coolant within the IC and the OC is about 20 Torr.
3. The electrostatic chuck of claim 1, wherein a pressure within the inner channel
- 20 (IC pressure) is less than pressure within the outer channel (OC pressure).
4. The electrostatic chuck of claim 3, wherein a difference between the IC pressure and the OC pressure is greater than or equal to about 8 Torr.
- 25 5. The electrostatic chuck of claim 3, wherein the OC pressure is greater than or equal to about 14 Torr.
6. The electrostatic chuck of claim 3, wherein a ratio of the OC pressure to the IC pressure is in a range of about 2.5 to about 4.
- 30 7. An electrostatic chuck comprising:
 - a top surface and a bottom surface, the top surface comprising:
 - a central region comprising a plurality of substrate support mesas;

an inner channel (IC) with an IC width surrounding the central region;

an inner band (IB) with an IB width surrounding the inner channel;

an outer channel (OC) with an OC width surrounding the inner

5 band; and

an outer band (OB) with an OB width surrounding the outer channel,

wherein the electrostatic chuck is configured to have a H% with an R/2 of less than or equal to about 2% across a wafer during processing.

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8. The electrostatic chuck of claim 7, wherein the R/2 is less than or equal to about 0.5% across the wafer.

15 9. The electrostatic chuck of claim 7, wherein a surface roughness of one or more of the plurality of substrate support mesas, the inner band or the outer band is reduced relative to a standard electrostatic chuck.

10. The electrostatic chuck of claim 9, wherein surface roughness of the outer band is reduced by an amount in a range of about 70% to about 90%.

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11. The electrostatic chuck of claim 7, wherein the plurality of substrate support mesas are circular in shape.

25 12. The electrostatic chuck of claim 7, wherein a contact area of the plurality of substrate support mesas are reduced in size relative to a standard electrostatic chuck.

30 13. The electrostatic chuck of claim 7 wherein an area of the plurality of substrate support mesas comprises less than about 10% of a total area of the top surface.

14. The electrostatic chuck of claim 7, wherein the OB width is increased by a percentage in a range of about 65% to about 70% relative to a standard electrostatic chuck.

15. The electrostatic chuck of claim 7, wherein the OB width is increased by an amount in a range of about 1.3 mm to about 1.7 mm.
- 5 16. The electrostatic chuck of claim 7, wherein the OB width is increased by a percentage in a range of about 110% to about 150% relative to a standard electrostatic chuck.
- 10 17. The electrostatic chuck of claim 7, wherein the OB width is increased by an amount in a range of about 2.8 mm to about 3.1 mm.
18. The electrostatic chuck of claim 7, wherein the IB width is increased by a percentage in a range of about 50% to about 60% relative to a standard electrostatic chuck.
- 15 19. The electrostatic chuck of claim 7, wherein the IB width is increased by an amount in a range of about 1.2 mm to about 1.6 mm.
- 20 20. A method of modifying a standard electrostatic chuck to improve tuning of a concentration of hydrogen across a wafer surface secured to a top surface of an electrostatic chuck, the method comprising one or more of:
- 25 reducing surface roughness of the top surface of the electrostatic chuck;
 changing a shape of a plurality of substrate support mesas;
 decreasing a contact area for a plurality of substrate support mesas;
 increasing a width of an inner band of the electrostatic chuck;
 increasing a width of an outer band of the electrostatic chuck;
 increasing a pressure within an outer channel; and
 decreasing a pressure within an inner channel.