CLAIMS

1. A method for extending the lifetime of an electrostatic chuck, said chuck comprising a metal cooling plate and a first ceramic plate attached to said metal cooling plate, said method comprising:

performing a low temperature process to remove the first ceramic plate from the metal cooling plate after a period of use, wherein the metal cooling plate comprises a plurality of protrusions extending from a planar portion;

providing a second ceramic plate, said second ceramic plate being unused;

applying indium between the second ceramic plate and the metal cooling plate, wherein the indium is applied to the planar portion of the metal cooling plate to the height of the protrusions, said indium being removable by a low-temperature process; and

solidifying the indium to form an electrostatic chuck comprising the metal cooling plate, the second ceramic plate and bond between the metal cooling plate and the second ceramic plate.

2. The method of claim 1 wherein the indium is removable by heating the material to a temperature of less than about 200°C.

3. The method of claim 1 wherein the protrusions have a height of about 0.01 inches.

4. The method of claim 1 wherein the bond does not extend past the edges of the metal cooling plate and is not recessed from the edges of the metal cooling plate.

5. A method for refurbishing an electrostatic chuck, said chuck comprising a metal cooling plate having openings therein and a first ceramic plate attached to said metal cooling plate, said method comprising:

removing an aluminum ring from the metal cooling plate, said aluminum ring being machine-matched to a plurality of protrusions on the metal cooling plate;

heating the electrostatic chuck to a temperature of less than about 200°C to remove the first ceramic plate from the metal cooling plate after a period of use;

providing a second ceramic plate having openings therein, said second ceramic plate being unused;

aligning the second ceramic plate with metal cooling plate such that the openings within the second ceramic plate align with the openings in the metal cooling plate;

applying indium bonding material between the metal cooling plate and the second ceramic plate; and

solidifying the indium bonding material to form an indium bond between the metal cooling plate and the second ceramic plate, wherein the indium bond does not extend past the cooling plate and further wherein the second ceramic plate extends beyond the indium bond,

re-attaching the aluminum ring to the metal cooling plate.

6. The method of claim 5, further comprising masking the openings in the cooling plate prior to applying the indium bonding material.

7. The method of claim 5 wherein the second ceramic plate comprises a bond-contacting side and a non-bond-contacting side.

8. The method of claim 5 wherein the protrusions have a height of about 0.01 inches.

9. The method of claim 8 wherein applying bonding material comprises applying it to the planar portion of the metal cooling plate to the height of the protrusions.

10. The method of claim 5 further comprising masking an annular ring on the bond-contacting side of the second ceramic plate, said ring extending from the edge of the second ceramic plate to a distance of at least about 0.1 inches from the edge of the second ceramic plate.

Claims

1. A method for extending the lifetime of an electrostatic chuck, said chuck comprising a metal cooling plate and a first ceramic plate attached to said metal cooling plate, said method comprising:

performing a low temperature process to remove the first ceramic plate from the metal cooling plate after a period of use;

providing a second ceramic plate, said second ceramic plate being unused;

applying bonding material between the second ceramic plate and the metal cooling plate, said bonding material being removable by a low-temperature process; and

solidifying the bonding material to form an electrostatic chuck comprising the metal cooling plate, the second ceramic plate and bond between the metal cooling plate and the second ceramic plate.

2. The method of claim 1 wherein the performing a low temperature process to remove the first ceramic plate from the metal cooling plate comprises heating the electrostatic chuck to a temperature of less than about 200°C.

3. The method of claim 1 or 2 wherein the bonding material comprises indium.

4. The method of any of claim 1-3 wherein the bonding material is removable by heating the material to a temperature of less than about 200°C.

5. The method of any of claims 1-4 wherein the metal cooling plate comprises a planar portion and a plurality of protrusions extending from the planar portion, said protrusions having a height of about 0.01 inches.

6. The method of claim 5 wherein applying bonding material comprises applying bonding material to the planar portion of the metal cooling plate to the height of the protrusions.

7. The method of any of claims 1-6 wherein the bond does not extend past the edges of the metal cooling plate and is not recessed from the edges of the metal cooling plate.

8. A method for refurbishing an electrostatic chuck, said chuck comprising a metal cooling plate having openings therein and a first ceramic plate attached to said metal cooling plate, said method comprising:

heating the electrostatic chuck to a temperature of less than about 200°C to remove the first ceramic plate from the metal cooling plate after a period of use;

providing a second ceramic plate having openings therein, said second ceramic plate being unused;

aligning the second ceramic plate with metal cooling plate such that the openings within the second ceramic plate align with the openings in the metal cooling plate;

applying indium bonding material between the metal cooling plate and the second ceramic plate; and

solidifying the indium bonding material to form an indium bond between the metal cooling plate and the second ceramic plate, wherein the indium bond does not extend past the cooling plate and further wherein the second ceramic plate extends beyond the indium bond.

9. The method of claim 8, further comprising masking the openings in the cooling plate prior to applying the indium bonding material.

10. The method of claim 8 or 9 wherein the second ceramic plate comprises a bond-contacting side and a non-bond-contacting side.

11. The method of any of claims 8-10 wherein the metal cooling plate comprises a planar portion and a plurality of protrusions extending from the planar portion, said protrusions having a height of about 0.01 inches.

12. The method of claim 11 further comprising, prior to heating the electrostatic chuck, removing an aluminum ring from the cooling plate, said aluminum ring being machine-matched to the plurality of protrusions and, after forming the indium bond, re-attaching the aluminum ring to the metal cooling plate.

13. The method of claim 11 wherein applying bonding material comprises applying it to the planar portion of the metal cooling plate to the height of the protrusions.

14. The method of any of claims 10 - 13 further comprising masking an annular ring on the bond-contacting side of the second ceramic plate, said ring extending from the edge of the second ceramic plate to a distance of at least about .1 inches from the edge of the second ceramic plate.

15. A method for extending the lifetime of an electrostatic chuck, said chuck comprising a metal cooling plate and a first ceramic plate attached to said metal cooling plate, said method comprising:

performing a process to remove the first ceramic plate from the metal cooling plate after a period of use;

providing a second ceramic plate, said second ceramic plate being unused;

applying elastomeric bonding material between the second ceramic plate and the metal cooling plate; and

solidifying the bonding material to form an electrostatic chuck comprising the metal cooling plate, the second ceramic plate and bond between the metal cooling plate and the second ceramic plate.

16. The method of claim 15 wherein applying elastomeric bonding material between the second ceramic plate and the metal cooling plate comprising applying bonding material on the metal cooling plate up to a height between about 2-4 mils.

17. The method of claim 15 or 16 wherein performing a process to remove the first ceramic plate from the metal cooling plate comprises heating the first ceramic plate and the metal cooling plate to a temperature of at least about 250°C.

18. The method of any of claims 15-17 wherein performing a process to remove the first ceramic plate from the metal cooling plate comprises heating the first ceramic plate and the metal cooling plate to a temperature of at least about 300°C.