Claims

1. A process kit ring for use in a plasma processing system, the process kit ring, comprising:

an annular body formed from a plasma resistant material, the annular body having an outer diameter greater than 200 mm, the annular body comprising:

a top surface; and

a bottom surface opposite the top surface, the bottom surface substantially perpendicular to a centerline of the annular body;

one or more hollow inner cavities formed in the annular body about the centerline and at least partially defined by the top surface and the bottom surface, the one or more hollow inner cavities arranged in a circle within the annular body;

one or more features formed in the one or more hollow inner cavities, the one or more features extending from the top surface to the bottom surface and further defining the one or more hollow inner cavities, the one or more features comprising ribs or fins;

a first vent hole formed in the annular body and in fluid communication with at least one of the one or more hollow inner cavities; and

a second vent hole formed in the annular body and in fluid communication with at least one of the one or more hollow inner cavities, the second vent hole formed on an opposite surface of the annular body relative to the first vent hole.

2. The process kit ring of claim 1, wherein each of the one or more hollow inner cavities are arranged in one or more annular rows about the centerline.

3. The process kit of claim 2, wherein the one or more hollow inner cavities in each annular row are in fluid communication with each other.

4. The process kit ring of claim 1, wherein the first and second vent holes are shielded from the plasma processing region.

5. The process kit ring of claim 4, wherein each of the first and second vent holes have an area of about 3.14 mm^2.

6. The process kit ring of claim 1, wherein the annular body and the one or more hollow inner cavities are formed by a three-dimensional printing process.

7. The process kit ring of claim 1, wherein the top surface includes a three-dimensionally printed surface texture.

8. The process kit ring of claim 1, wherein the bottom surface is configured to be supported by a pedestal assembly and the top surface is configured to be at least partially supported by a cover ring.

9. The process kit ring of claim 1, wherein the bottom surface is configured to be at least partially supported by a deposition ring.

10. The process kit ring of claim 1, wherein the annular body is formed from stainless steel.

11. A process kit for a substrate processing chamber, comprising:

a first process kit ring, comprising:

a first body formed from a first plasma resistant material, the first body having a first outer diameter greater than 200 mm, the first body comprising:

a first top surface; and

a first bottom surface opposite the first top surface, the first bottom surface substantially perpendicular to a first centerline of the first body;

one or more first hollow inner cavities formed in the first body about the first centerline and at least partially defined by the first top surface and the first bottom surface, the one or more first hollow inner cavities arranged in a circle within the first body;

one or more first ribs formed in the one or more first hollow inner cavities, the one or more first ribs extending from the first top surface to the first bottom surface and further defining the one or more first hollow inner cavities; and

two or more first vent holes formed in the first body and in fluid communication with at least one of the one or more first hollow inner cavities, the two or more first vent holes formed on opposite surfaces of the first body relative to one another; and

a second process kit ring at least partially covering the first process kit ring, the second process kit ring, comprising:

a second body formed from a second plasma resistant material, the second body having a second outer diameter greater than 200 mm, the second body comprising:

a second top surface; and

a second bottom surface opposite the second top surface, the second bottom surface substantially parallel to a second centerline of the second process kit ring and configured to at least partially cover the first process kit ring;

one or more second hollow inner cavities formed in the second body about the second centerline and at least partially defined by the second top surface and the second bottom surface, the one or more second hollow inner cavities arranged in a circle within the second body;

one or more second ribs formed in the one or more second hollow inner cavities, the one or more second ribs extending from the second top surface to the second bottom surface and further defining the one or more second hollow inner cavities; and

two or more second vent holes formed in the second body and in fluid communication with at least one of the one or more second hollow inner cavities, the two or more second vent holes formed on opposite surfaces of the second body relative to one another.

12. The process kit of claim 11, wherein the one or more first hollow inner cavities are arranged in one or more rows about the first centerline.

13. The process kit of claim 12, wherein each of the one or more first vent holes have an open area of about 3.14 mm^2.

14. The process kit of claim 11, wherein the one or more second hollow inner cavities are arranged in one or more rows about the second centerline.

15. The process kit of claim 14, wherein each of the one or more second vent holes have an open area of about 3.14 mm^2.

16. The process kit of claim 11, wherein the first process kit ring and the second process kit ring are formed by a three-dimensional printing process.

17. The process kit of claim 11, wherein the first process kit ring and the second process kit ring are formed from stainless steel.

18. The process kit of claim 11, wherein each of the one or more first hollow inner cavities are interconnected via a first set of holes formed in the one or more first ribs and each of the one or more second hollow inner cavities are interconnected via a second set of holes formed in the one or more second ribs.

19. The process kit of claim 11, wherein the first process kit ring further comprises: a three-dimensionally printed surface texture formed on the first top surface.

20. The process kit of claim 11, wherein the second process kit ring further comprises: a three-dimensionally printed surface texture formed on the second top surface.