Claims

1. A process kit, comprising:

an upper edge ring including an integrally formed top ledge and skirt, wherein the skirt extends downward from the top ledge, wherein the top ledge of the upper edge ring is configured to support a substrate in a spaced-apart relation to a support surface of a substrate support heater pedestal to facilitate repositioning of the substrate relative to a support surface of the substrate support heater pedestal, wherein the skirt covers the outer edges of the substrate support heater pedestal to prevent heat loss from the substrate support heater pedestal, wherein the upper edge ring includes one or more alignment holes, and wherein the upper edge ring includes one or more alignment tabs that extend downward from a lower surface of the top ledge; and

a lower edge ring that at least partially supports the upper edge ring and aligns the upper edge ring with the substrate support heater pedestal when the substrate support heater pedestal is in a raised processing position, wherein the lower edge ring is disposed entirely within the inner diameter of the skirt, wherein the lower edge ring includes a plurality of cone cut outs disposed on a top surface of the lower edge ring, wherein the lower edge ring includes a plurality of angled cut outs formed on an outer diameter of the lower edge ring, wherein the plurality of angled cut outs are spaced equidistantly apart, and wherein the one or more alignment tabs of the upper edge ring are disposed in a corresponding number of the plurality of angled cut outs formed in the lower edge ring when the substrate support heater pedestal is in a raised processing position; and

a shadow ring that couples with the upper edge ring when the substrate support heater pedestal is in a raised processing position, wherein the shadow ring includes one or more alignment pins that extend downward from a lower surface of the shadow ring and through the corresponding one or more alignment holes of the upper edge ring and into the plurality of cone cut outs disposed on the top surface of the lower edge ring, such that the upper edge ring, lower edge ring, and shadow ring are all in alignment when the substrate support heater pedestal is in a raised processing position.

2. A rotatable substrate support heater pedestal and process kit for supporting a substrate in a process chamber, comprising:

a primary substrate support having a support surface to support the substrate during processing, where the substrate support heater pedestal includes a shaft connected to an actuator to move the substrate support heater pedestal vertically and rotationally about an axis of the shaft; and

the process kit comprising:

an upper edge ring including an integrally formed top ledge and skirt, wherein the skirt extends downward from the top ledge, wherein the top ledge of the upper edge ring is configured to support the substrate in a spaced-apart relation to a support surface of the substrate support heater pedestal to facilitate repositioning of the substrate relative to the support surface of the substrate support heater pedestal, wherein the upper edge ring includes one or more alignment holes, and wherein the upper edge ring includes one or more alignment tabs that extend downward from a lower surface of the top ledge; and

a lower edge ring that at least partially supports the upper edge ring and aligns the upper edge ring with the substrate support heater pedestal when the substrate support heater pedestal is in a raised processing position, wherein the lower edge ring is disposed entirely within the inner diameter of the skirt, wherein the lower edge ring includes a plurality of cone cut outs disposed on a top surface of the lower edge ring, wherein the lower edge ring includes a plurality of angled cut outs formed on an outer diameter of the lower edge ring, wherein the plurality of angled cut outs are spaced equidistantly apart, and wherein the one or more alignment tabs of the upper edge are disposed in a corresponding number of the plurality of angled cut outs formed in the lower edge ring when the substrate support heater pedestal is in a raised processing position; and

a shadow ring that couples with the upper edge ring when the substrate support heater pedestal is in a raised processing position, wherein the shadow ring includes one or more alignment pins that extend downward

from a lower surface of the shadow ring and through the corresponding one or more alignment holes of the upper edge ring and into the plurality of cone cut outs disposed on the top surface of the lower edge ring, such that the upper edge ring, lower edge ring, and shadow ring are all in alignment when the substrate support heater pedestal is in a raised processing position.

3. The rotatable substrate support heater pedestal and process kit of claim 2, wherein the process kit further includes:

a bottom plate disposed on a bottom of the process chamber that supports the upper edge ring when the substrate support heater pedestal is in a lowered non-processing position.

4. A process kit for use with a rotatable substrate support heater pedestal for supporting a substrate in a process chamber, comprising:

an upper edge ring including an integrally formed top ledge and skirt, wherein the skirt extends downward from the top ledge, and wherein the upper edge ring includes one or more alignment holes;

a lower edge ring that at least partially supports the upper edge ring and aligns the upper edge ring with the substrate support heater pedestal when the substrate support heater pedestal is in a raised processing position, wherein the lower edge ring is disposed entirely within the inner diameter of the skirt, and wherein the lower edge ring includes a plurality of cone cut outs disposed on a top surface of the lower edge ring;

a bottom plate disposed on a bottom of the process chamber that supports the upper edge ring when the substrate support heater pedestal is in a lowered non-processing position; and

a shadow ring that couples with the upper edge ring when the substrate support heater pedestal is in a raised processing position, wherein the shadow ring includes one or more alignment pins that extend downward from a lower surface of the shadow ring and through the corresponding one or more alignment holes of the upper edge ring and into the plurality of cone cut outs disposed on the top surface of the lower edge ring, such that the upper edge ring, lower edge ring, and shadow ring

are all in alignment when the substrate support heater pedestal is in a raised processing position.

5. The process kit of claim 4, wherein the upper edge ring surrounds the substrate support heater pedestal.

6. The process kit of claim 4, wherein the top ledge of the upper edge ring is configured to support the substrate in a spaced-apart relation to a support surface of the substrate support heater pedestal to facilitate repositioning of the substrate relative to the support surface of the substrate support heater pedestal.

7. The process kit of claim 4, wherein the skirt covers the outer edges of the substrate support heater pedestal to prevent heat loss from the substrate support heater pedestal.

8. The process kit of claim 4, wherein a height of the skirt is about 1 inch to about 3 inches.

9. The process kit of claim 4, wherein the skirt of the upper edge ring has an inner diameter of about 12 inches to about 15 inches and an outer diameter of about 12.5 inches to about 15.5 inches, and wherein an inner diameter of the top ledge central opening is about 10.5 inches to about 13.5 inches.

10. The process kit of claim 4, wherein the top ledge of the upper edge ring includes an inner lip to support an outer peripheral edge of the substrate.

11. The process kit of claim 4, wherein the upper edge ring includes one or more top features at the inner diameter of the top ledge, and wherein the top feature is an annular angled edge such that a gap of about 15 mils to about 25 mils between the substrate and the upper edge ring is maintained to facilitate heater edge gas purging.

12. The process kit of claim 4, wherein the upper edge ring includes one or more alignment tabs that extend downward from a lower surface of the top ledge to facilitate alignment of the upper edge ring with the lower edge ring.

13. The process kit of claim 4, wherein the lower edge ring includes an annular body having a central opening and an inner surface, and wherein the lower edge ring has an inner diameter of about 11 inches to about 14 inches and an outer diameter of about 12 inches to about 15 inches.

14. The process kit of claim 4, wherein the lower edge ring includes a plurality of cone cut outs disposed on a top surface of the lower edge ring to facilitate alignment of the shadow ring, and wherein the plurality of cone cut outs are spaced equidistantly apart.

15. The process kit of claim 12, wherein the lower edge ring includes a plurality of angled cut outs formed on an outer diameter of the lower edge ring that facilitate alignment of the lower edge ring with the upper edge ring during in-chamber heater rotation, and wherein the plurality of angled cut outs are spaced equidistantly apart.

16. The process kit of claim 4, wherein the lower edge ring includes a plurality of bottom alignment tabs formed on a bottom surface of the lower edge ring to facilitate alignment of the lower edge ring with the substrate support heater pedestal.

17. The process kit of claim 4, wherein the upper edge ring includes a foot at the bottom of the skirt, and wherein the bottom plate contacts the foot of the upper edge ring to stop a downward movement of the upper edge ring when the substrate support heater pedestal is in a lowered non-processing position.

18. The process kit of claim 4, wherein the bottom plate includes one or more centering tabs that jut out along a periphery of an outer diameter of the bottom plate to facilitate centering of the bottom plate with respect to the process chamber body.

19. The process kit of claim 4, wherein the bottom plate is also a reflector to reflect radiant energy toward the substrate support heater pedestal and/or upper edge ring.

20. The process kit of claim 4, wherein the shadow ring further includes one or more alignment tabs that extend downward from a lower surface of the shadow ring.