

CLAIMS

What is claimed is:

1. A showerhead for a substrate processing system comprising:
a body including a top surface, a bottom surface, and sides that define a plenum;
5 an inlet connected to the top surface of the body to supply a purge gas to the plenum;
a recessed region on the bottom surface of the body;
a non-recessed region on the bottom surface of the body surrounding the recessed region; and
10 a first plurality of through holes extending from the plenum through the bottom surface in the recessed region to disperse the purge gas onto a substrate arranged in the substrate processing system.
2. The showerhead of claim 1 wherein the body is cylindrical and wherein an outer edge of the recessed region tapers at an obtuse angle relative to a radius of the body
15 toward an outer diameter of the body.
3. The showerhead of claim 1 wherein the body is cylindrical and wherein an outer edge of the recessed region tapers along a curve toward an outer diameter of the body.
4. The showerhead of claim 1 wherein the body is cylindrical and the recessed region is circular in shape and has a diameter that is less than or equal to a diameter of the
20 substrate.
5. The showerhead of claim 1 wherein the body is cylindrical and the recessed region is circular in shape and has a diameter that is greater than or equal to a diameter of the substrate.
6. The showerhead of claim 1 wherein the body is cylindrical and the non-recessed
25 region is annular and has an inner diameter that is less than or equal to a diameter of the substrate.

7. The showerhead of claim 1 wherein the body is cylindrical and the non-recessed region is annular and has an inner diameter that is greater than or equal to a diameter of the substrate.
8. A system comprising:
- 5 the showerhead of claim 1;
a showerhead pedestal including a top surface defining a second plurality of through holes configured to output a plasma gas mixture; and
a carrier ring arranged on the top surface of the showerhead pedestal and configured to support the substrate at a predetermined distance from the top surface of
10 the showerhead pedestal,
wherein the showerhead is arranged above the carrier ring.
9. The system of claim 8 further comprising a spacer ring arranged on the top surface of the showerhead pedestal under the carrier ring to define a gap in which to strike the plasma.
- 15 10. The system of claim 8 wherein the recessed region of the showerhead is arranged above the substrate and the non-recessed region of the showerhead is arranged above the carrier ring.
11. The system of claim 47 wherein the plenum extends over the non-recessed region of the showerhead and the showerhead further comprises a third plurality of through
20 holes extending from the plenum through the bottom surface of the body in the non-recessed region to disperse the purge gas onto at least one of the substrate and the carrier ring.
12. The system of claim 8 wherein the bottom surface of the body of the showerhead contacts the carrier ring.
- 25 13. The system of claim 8 wherein the recessed region of the showerhead has a height and the bottom surface of the body is arranged at a second distance above the carrier ring, wherein the second distance is equal to the height.

14. The system of claim 8 wherein the body of the showerhead is cylindrical and the recessed region of the showerhead is circular in shape and has a diameter that is less than or equal to an inner diameter of the carrier ring.
15. The system of claim 8 wherein the body of the showerhead is cylindrical and the
5 recessed region of the showerhead is circular in shape and has a diameter that is greater than or equal to an inner diameter of the carrier ring.
16. The system of claim 8 wherein the body of the showerhead is cylindrical and the non-recessed region of the showerhead is annular and has an inner diameter that is less than or equal to an inner diameter of the carrier ring.
- 10 17. The system of claim 8 wherein the body of the showerhead is cylindrical and the non-recessed region of the showerhead is annular and has an inner diameter that is greater than or equal to an inner diameter of the carrier ring.
18. The system of claim 8 further comprising:
a gas distribution system to supply the purge gas to the showerhead; and
15 a controller to control pressure of the purge gas supplied to the showerhead.
19. The system of claim 8 further comprising:
an actuator to move the showerhead pedestal vertically relative to the showerhead; and
a controller to control the actuator to adjust a distance between the showerhead
20 and the carrier ring.
20. The system of claim 8 further comprising:
an RF source configured to strike plasma between a bottom surface of the substrate and the top surface of the showerhead pedestal,
wherein the purge gas dispersed onto a top surface of the substrate prevents
25 processing by the plasma from occurring on the top surface of the substrate and bevel edges of the substrate.

21. The system of claim 8 further comprising:
- an RF source configured to strike plasma between a bottom surface of the substrate and the top surface of the showerhead pedestal,
 - wherein the purge gas prevents processing by the plasma from occurring on a top
- 5 surface of the substrate and bevel edges of the substrate without depleting processing by the plasma on the bottom surface of the substrate.