CLAIMS

1. A showerhead pedestal assembly for a substrate processing chamber, the showerhead pedestal assembly including:

a faceplate; and

a platen connected with the faceplate, the platen including at least one groove, a heater element disposed at least partially within the at least one groove, and a filler cap also at least partially disposed within the at least one groove so as to secure the heater element within the at least one groove, wherein the at least one groove is profiled to accept at least one portion of the heater element and the filler cap is secured to the platen by a friction stir welded joint.

2. The showerhead pedestal assembly of claim 1, wherein the faceplate includes a plurality of apertures distributed across a surface of the faceplate facing away from the platen and configured to allow the flow of a gas through the showerhead pedestal assembly and away from the surface of the faceplate facing away from the platen.

3. The showerhead pedestal assembly of claim 1, wherein:

the heater element follows a curvilinear path that is distributed across the platen, and

at least a portion of the filler cap follows the curvilinear path.

4. The showerhead pedestal assembly of claim 3, wherein the curvilinear path is a serpentine path.

5. The showerhead pedestal assembly of claim 3 or 4, wherein the heater element includes at least a first segment that follows a first arcuate path, a second segment that follows a second arcuate path, and a third segment that follows a third arcuate path, wherein the first arcuate path, the second arcuate path, and the third arcuate path are concentric with one another and each have a different radius.

6. The showerhead pedestal assembly of claim 5, wherein the heater element further includes a fourth segment that follows a fourth arcuate path and a fifth segment that follows a fifth arcuate path, the fourth arcuate path and the fifth arcuate path are concentric with one another, the fourth arcuate path and the second arcuate path have the same radius, and the fifth arcuate path and the third arcuate path have the same radius.

7. The showerhead pedestal assembly of claim 1, wherein the filler cap includes at least one baffle that protrudes from the platen.

8. The showerhead pedestal assembly of claim 7, wherein the at least one baffle includes a curved formation, the curved formation matching a profile of a respective portion of the at least one groove in the platen.

9. The showerhead pedestal assembly of claim 7, wherein the at least one baffle includes a friction stir welded material.

10. The showerhead pedestal assembly of claim 7, wherein the at least one baffle is provided along an upper surface of the filler cap.

11. The showerhead pedestal assembly of claim 7, wherein a portion of the filler cap includes a heat sink, the heat sink providing a body of relatively cooler material than a material of the platen during operation of the showerhead pedestal assembly.

12. The showerhead pedestal assembly of claim 7, wherein the at least one baffle includes at least one aperture allowing the passage of gas therethrough.

13. The showerhead pedestal assembly of claim 7, wherein the at least one baffle is provided in a series of baffles extending in a spaced array along a path followed by the heater element, the spaced array of baffles including one or more gaps between sequential baffles allowing the passage of gas therethrough.

14. The showerhead pedestal assembly of claim 9, wherein the friction stir welded material of the at least one baffle is dissimilar to a material of the

faceplate or the heater element and enables the creation of a friction stir welded joint between the heater element and the faceplate.

15. The showerhead pedestal assembly of claim 7, wherein the at least one baffle includes a plurality of concentric rings of baffles.

16. The showerhead pedestal assembly of claim 15, wherein at least one ring of the plurality of concentric rings of baffles includes spaced-apart baffles.

17. The showerhead pedestal assembly of claim 16, wherein each of the spaced-apart baffles includes one or more apertures formed therein allowing a specific or controlled flow of gas through the one or more apertures.

18. The showerhead pedestal assembly of claim 16, wherein a gap between a pair of the spaced-apart baffles in the at least one ring of baffles is sized to allow a specific or controlled flow of gas to pass therethrough.

19. The showerhead pedestal assembly of claim 1, further comprising a power supply connected with the heater element, wherein the heater element is energized by the power supply during formation of the friction stir welded joint.

20. A method of forming a showerhead pedestal assembly for a substrate processing chamber, the method comprising:

providing a faceplate;

connecting a platen with the faceplate, the platen including a heater element extending through at least one groove in the platen, the at least one groove profiled to accept at least one portion of the heater element extending therethrough;

installing a filler cap into the at least one groove to secure the heater element in the at least one groove; and

forming a friction stir welded joint between the filler cap and the platen.

21. The method of claim 20, further comprising forming in the faceplate a plurality of apertures to allow the passage of a gas through the showerhead

pedestal assembly to an underside of a substrate supported by the showerhead pedestal assembly.

22. The method of claim 20, wherein:

the heater element follows a curvilinear path that is distributed across the platen, and

at least a portion of the filler cap follows the curvilinear path.

23. The method of claim 22, wherein the curvilinear path is a serpentine path.

24. The method of claim 22, wherein the heater element includes at least a first segment that follows a first arcuate path, a second segment that follows a second arcuate path, and a third segment that follows a third arcuate path, wherein the first arcuate path, the second arcuate path, and the third arcuate path are concentric with one another and each have a different radius.

25. The method of claim 24, wherein the heater element further includes a fourth segment that follows a fourth arcuate path and a fifth segment that follows a fifth arcuate path, the fourth arcuate path and the fifth arcuate path are concentric with one another, the fourth arcuate path and the second arcuate path have the same radius, and the fifth arcuate path and the third arcuate path have the same radius.

26. The method of claim 20, wherein the filler cap includes at least one baffle that protrudes from the platen.

27. The method of claim 26, wherein the at least one baffle includes a curved formation, the curved formation matching a profile of a respective portion of the at least one groove in the platen.

28. The method of claim 26, further comprising forming the at least one baffle by friction stir welding.

29. The method of claim 26, further comprising providing the at least one baffle along an upper surface of the filler cap.

30. The method of claim 26, wherein a portion of the filler cap includes a heat sink, the heat sink providing a body of relatively cooler material than a material of the platen during operation of the showerhead pedestal assembly.

31. The method of claim 26, wherein the at least one baffle includes at least one aperture allowing the passage of gas therethrough.

32. The method of claim 26, wherein the at least one baffle is provided in a series of baffles extending in a spaced array along a path followed by the heater element, the spaced array of baffles including one or more gaps between sequential baffles allowing the passage of gas therethrough.

33. The method of claim 28, wherein a material included in the friction stir welding of the at least one baffle is dissimilar to a material of the faceplate or the heater element and enables the creation of a friction stir welded joint between the heater element and the faceplate.

34. The method of claim 26, wherein the at least one baffle includes a plurality of concentric rings of baffles.

35. The method of claim 34, wherein at least one ring of the plurality of concentric rings of baffles includes spaced-apart baffles.

36. The method of claim 35, wherein each of the spaced-apart baffles includes one or more apertures formed therein allowing a specific or controlled flow of gas through the one or more apertures.

37. The method of claim 35, wherein a gap between a pair of the spaced-apart baffles in the at least one ring of baffles is sized to allow a specific or controlled flow of gas to pass therethrough.

38. The method of claim 20, further comprising providing a power supply for the heater element and energizing the heater element by the power supply during formation of the friction stir welded joint.