CLAIMS

1. A gas distribution plate for a substrate processing system, comprising:

an outer ring including a stepped interface on a radially inner surface thereof;

N inner rings, wherein:

N is an integer greater than zero,

at least one of the N inner rings is circumferentially segmented and includes an inner stepped interface and an outer stepped interface, and

the outer stepped interface of a radially outer one of the N inner rings is configured to rest on and mate with the stepped interface of the outer ring; and

a center portion including an outer stepped interface on a radially outer surface thereof that is configured to rest on and mate with the inner stepped interface of a radially inner one of the N inner rings.

2. The gas distribution plate of claim 1, wherein at least one of the N inner rings includes a plurality of gas through holes.

3. The gas distribution plate of claim 2, wherein, when nested together, the outer ring, the N inner rings and the center portion define planar upper and lower surfaces.

4. The gas distribution plate of claim 1, wherein N = 2.

5. The gas distribution plate of claim 1, wherein N = 3.

6. The gas distribution plate of claim 1, wherein:

each of the N inner rings includes C circumferential portions, where C is an integer greater than one, and

each of the C circumferential portions includes a body having a first arcuate portion and a second arcuate portion,

wherein the first arcuate portion is radially and circumferentially offset relative to the second arcuate portion.

7. The gas distribution plate of claim 6, wherein C = 2.

8. The gas distribution plate of claim 6, wherein:

the first arcuate portion has an inner diameter and an outer diameter,

the second arcuate portion has an inner diameter and an outer diameter, and

the inner diameter of the first arcuate portion is greater than the inner diameter of the second arcuate portion and less than the outer diameter of the second arcuate portion.

9. The gas distribution plate of claim 6, wherein:

the second arcuate portion of a first one of the C circumferential portions lies below the first arcuate portion of the first one of the C circumferential portions,

the second arcuate portion of the first one of the C circumferential portions includes a slot defining a plenum surrounding gas through holes, and

the slot is located on a cantilevered section of the second arcuate portion extending from the second arcuate portion of the first one of the C circumferential portions.

10. The gas distribution plate of claim 9, further comprising gas through holes on a first arcuate portion of a second one of the C circumferential portions, wherein the gas through holes of the first arcuate portion of the second one of the C circumferential portions align with the gas through holes of the second arcuate portion of the first one of the C circumferential portions when assembled.

11. The gas distribution plate of claim 1, wherein the outer ring, the N inner rings, and the center portion are made of a material that is RF transparent.

12. The gas distribution plate of claim 1, wherein the outer ring, the N inner rings, and the center portion are made of alumina.

13. The gas distribution plate of claim 1, wherein the outer ring, the N inner rings, and the center portion are made of aluminum nitride.

14. The gas distribution plate of claim 1, wherein:

the outer ring is made of alumina; and

the N inner rings and the center portion are made of aluminum nitride.

15. The gas distribution plate of claim 1, wherein interfacing surfaces of the outer ring, the N inner rings and the center portion are polished.

16. A gas distribution assembly comprising:

a top plate; and

the gas distribution plate of claim 1,

wherein

the top plate is disposed on the gas distribution plate, and

a gap exists between the top plate and the gas distribution plate for passage of gas to holes in one or more of the N inner rings.

17. A substrate processing system comprising:

a processing chamber including a substrate support;

a coil arranged outside of the processing chamber; and

the gas distribution plate of claim 1 arranged between the processing chamber and the coil.

18. The substrate processing system of claim 17, wherein at least one of the N inner rings includes a plurality of through holes.

19. The substrate processing system of claim 17, wherein N = 2.

20. The substrate processing system of claim 17, wherein:

each of the N inner rings includes C circumferential portions, where C is an integer greater than one, and

each of the C circumferential portions includes a body having a first arcuate portion and a second arcuate portion, wherein the first arcuate portion is radially and circumferentially offset relative the second arcuate portion.

21. The substrate processing system of claim 20, wherein C = 2.