

CLAIMS

What is claimed is:

1. A method of forming a component of a plasma processing chamber, the method comprising:
 - 5 providing at least one single crystal metal oxide ingot;
 - machining the at least one single crystal metal oxide ingot to form the component; and
 - performing a surface treatment on the component after machining.
- 10 2. The method of Claim 1, further comprising annealing the at least one single crystal metal oxide ingot before machining.
3. The method of Claim 1, wherein the at least one single crystal metal oxide is single crystal spinel.
- 15 4. The method of Claim 1, wherein the at least one single crystal metal oxide is single crystal YAG.
5. The method of Claim 1, wherein machining comprises drilling a hole in the component.
- 20 6. The method of Claim 1, wherein machining comprises slicing the at least one single crystal metal oxide ingot.
7. The method of Claim 5, wherein the component is a gas injector.
8. The method of Claim 1, further comprising bonding a second single crystal metal oxide ingot to the at least one single crystal metal oxide ingot before machining.
- 30 9. A component of a plasma processing chamber formed by the method of Claim 1.

10. A component of a plasma processing chamber, wherein at least one plasma facing surface of the component comprises single crystal metal oxide material.
11. The component of Claim 10, wherein the at the least one plasma facing surface of the component is machined from a single crystal metal oxide ingot.
12. The component of Claim 10, wherein the at least one plasma facing surface comprises a layer of the single crystal metal oxide material bonded to a body of the component.
- 10 13. The component of Claim 10, wherein the single crystal metal oxide material is single crystal spinel.
14. The component of Claim 10, wherein the single crystal metal oxide material is single crystal YAG.
- 15 15. The component of Claim 10, wherein the component is a gas injector, wherein the nose of the gas injector comprises the single crystal metal oxide material, wherein the nose is a portion of the gas injector that is exposed to plasma in the plasma processing chamber.
- 20 16. The component of Claim 15, wherein the nose is diffusion bonded to a body of the component, wherein the body is formed of a material that is different from the single metal oxide material.
- 25 17. The component of Claim 16, wherein the body is formed of a polycrystalline material.
18. A gas injector of a plasma processing chamber, comprising:
- 30 a body; and
at least one plasma facing surface comprising a single crystal metal oxide material.

19. The gas injector of Claim 18, wherein the single crystal metal oxide material is single crystal spinel.
20. The gas injector of Claim 18, wherein the single crystal metal oxide material is
5 single crystal YAG.
21. The gas injector of Claim 18, wherein the gas injector is machined from a single crystal metal oxide ingot.
- 10 22. The gas injector of Claim 18, wherein the single crystal metal oxide ingot is annealed before being machined.
23. The gas injector of Claim 18, wherein the at least one plasma facing surface comprises a layer of the single crystal metal oxide material bonded to the body.
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23. The gas injector of Claim 18, further comprising a central passage machined through the body.
24. The gas injector of Claim 23, further comprising a plurality of smaller
20 passages machined through the body, wherein the plurality of smaller passages surround the central passage.
25. The gas injector of Claim 24, wherein each of the plurality of smaller passages feeds into a side gas injector hole and each of the plurality of smaller passages has a
25 portion that is oriented at an angle within the gas injector to feed into the side gas injector hole.