CLAIMS

WHAT IS CLAIMED IS:

1. A coil structure applied to a plasma processing apparatus, wherein the coil structure (10) includes at least one coil set (100);

the coil set (100) includes a first coil (110) and a second coil (120), the first coil (110) and the second coil (120) are wound to form an annular area, a first end of the first coil (110) and a first end of the second coil (120) are close to an inner ring of the annular area, and a second end of the first coil (110) and a second end of the second coil (120) are close to an outer ring of the annular area;

the first end of the first coil (110) is electrically connected to the first end of the second coil (120); and

the first coil (110) forms a first projection on a plane perpendicular to an axial direction of the coil structure (10), and the second coil (120) forms a second projection on the plane perpendicular to the axial direction of the coil structure (10), and the first projection and the second projection are mirror-symmetrical to each other.

2. The coil structure according to claim 1, wherein, along the axial direction of the coil structure (10), the first end of the first coil (110) and the first end of the second coil (120) are arranged at an interval in an up-down direction, the second end of the first coil (110) and the second end of the second coil (120) are arranged at an interval in the up-down direction, a connection line between the first end of the first coil (110) and the first end of the second coil (120) is parallel to an axis of the coil structure (10), and a connection line between the second

end of the first coil (110) and the second end of the second coil (120) is parallel to the axis of the coil structure (10).

3. The coil structure according to claim 2, wherein the coil structure (10) includes at least two coil sets (100), and first ends of first coils (110) of the at least two coil sets are on a first plane, first ends of second coils (120) of the at least two coil sets (100) are on a second plane, second ends of first coils (110) of the at least two coil sets are on a third plane, second ends of second coils (120) of the at least two coil sets (100) are on a fourth plane, and a predetermined distance exists between the first plane and the second plane and between the third plane and the fourth plane.

4. The coil structure according to claim 3, wherein the predetermined distance is 10 mm.

5. The coil structure according to claim 3, wherein the first ends of the first coils (110) of the at least two coil sets (100) are arranged uniformly along a circumferential direction of the coil structure (10), and the second ends of the first coils (110) of the at least two coil sets (100) are arranged uniformly along the circumferential direction of the coil structure (10).

6. The coil structure according to claim 1, wherein winding trajectories of the first coil (110) and the second coil (120) are both in an involute shape.

7. The coil structure according to claim 6, wherein a radial radius change amount of each turn of the first coil (110) and/or the second coil (120) is a = 60 mm.

8. The coil structure according to claim 1, wherein a number of winding turns of the first coil (110) and a number of winding turns of the second coil (120) are both integer multiples of 0.5 turns.

9. The coil structure according to claim 1, wherein the coil structure (10) includes an even number of coil sets (100).

10. A plasma processing apparatus comprising a radio frequency (RF) source (700), a reaction chamber (300), a dielectric member (400) arranged on a top of the reaction chamber (300), and the coil structure (10) of any one of claims 1 to 9, the coil structure (10) is arranged on the dielectric member (400), and the RF source (700) is configured to provide RF power to the coil structure (10).

11. The plasma processing apparatus according to claim 10, wherein the plasma processing apparatus further includes a connection structure, and the connection structure includes a first connector (210) and a second connector (220);

the second end of the first coil (110) of each coil set (100) is electrically connected to the first connector (210), and the second end of the first coil (110) of each coil set (100) is electrically connected to the second connector (220); and

one of the first connector (210) and the second connector (220) is configured to input RF power, and the other one is configured to be grounded.

12. The plasma processing apparatus according to claim 11, wherein the first connector (210) and the second connector (220) are both in an annular structure, and the first connector (210) and the second connector (220) are arranged at an interval along the axial direction of the coil structure (10).

13. The plasma processing apparatus according to claim 11, wherein the connection structure further includes a third connector (230) and a fourth connector (240);

the third connector (230) is electrically connected to the first connector (210) through a first connection bar (250), and the fourth connector (240) is electrically connected to the second connector (220) through a second connection bar (260); and

one of the third connector (230) and the fourth connector (240) is configured to input RF power, and the other one is configured to be grounded.

14. The plasma processing apparatus according to claim 13, wherein the third connector (230) and the fourth connector (240) both have an annular structure and are arranged at an interval along the axial direction of the coil structure (10).

15. The plasma processing apparatus according to claim 13, wherein a plurality of first connection bars (250) and a plurality of second connection bars (260) are provided, and the plurality of first connection bars (250) and the plurality of second connection bars (260) are uniformly arranged along the circumferential direction of the coil structure (10).

16. The plasma processing apparatus according to claim 11, wherein the second end of the first coil (110) of each coil set (100) is used as an input end, and the second end of the second coil (120) of each coil set (100) is used as an output end, the first connector (210) includes a first connection segment (212), the first connection segment (212) is connected to the input end, each first connection segment (212) is connected to the input end with a number of at least one, and the first connector (210) includes at least two first connection segments (212); and/or

the second connector (220) includes a second connection segment (222), the second connection segment (222) is connected to the output end, each second connection segment (222) is connected to the output end with a number of at least one, and the second connector (220) includes at least two second connection segments (222).

17. The plasma processing apparatus according to claim 16, wherein the coil structure (10) includes a plurality of coil sets (100), and the at least two first connection segments (212) are arranged at an interval along the circumferential direction to enclose to from a first contour (213), and a number of coil sets (100) is twice a number of first connection segments (212), a number of input ends connected to each first connection segment (212) is two, at least two second connection segments (222) are arranged at an interval along the circumferential direction to enclose to form a second contour (223), a number of coil sets is twice a number of second connection segments (222), and a number of output ends connected to each second connection segment (222) is two.

18. The plasma processing apparatus according to claim 17, wherein the first contour (213) is annular, the second contour (223) is annular, and the first contour (213) and the second contour (223) are coaxial.

19. The plasma processing apparatus according to claim 17, wherein an interval between any two neighboring first connection segments (212) of the at least two first connection segments (212) is same, and/or an interval between any two neighboring second connection segments (222) of the at least two second connection segments (222) is same.

20. The plasma processing apparatus according to claim 17, wherein the connection structure (200) further includes at least two first connection bars (250), and a number of the first connection bars (250) is same as the number of first connection segments (212), the first end of the first connection bar (250) is connected to a corresponding first connection segment (212), and the second end of the first connection bar (250) is configured to input RF power; and/or

the connection structure (200) further includes at least two second connection bars (260), a number of the second connection bars (260) is same as the number of second connection segments (222), the first end of the second connection bar (260) is connected to a corresponding segment of the second connection segment (222), and the second end of the second connection bar (260) is configured to be grounded.

21. The plasma processing apparatus according to claim 20, wherein second ends of the at least two first connection bars (250) are connected to a first point, and the first point is used as a power input end (270) configured to input RF power; and/or second ends of the at least

two second connection bars (260) are connected to a second point, and the second point is used as a ground end (280) configured to be grounded.

22. The plasma processing apparatus according to claim 20, wherein two ends of the first connection segment (212) are electrically connected to the input ends, respectively, and a connection position of the first connection bar (250) and the first connection segment (212) is located at a middle position of the first connection segment (212) along a length direction; and/or

two ends of the second connection segment (222) are electrically connected to the output ends, respectively, and a connection position of the second connection bar (260) and the second connection segment (222) is located at a middle position of the second connection segment (222) along the length direction.

23. The plasma processing apparatus according to claim 10, wherein at least two coil structures (10) are provided, the at least two coil structures (10) are sleeved at an interval in a radial direction, or the at least two coil structures (10) are arranged at the interval along the axial direction, and along the axial direction, radial dimensions of the at least two coil structures (10) gradually increase or decrease.