

CLAIMS

WHAT IS CLAIMED IS:

1. A lower electrode mechanism, comprising:
 - a base for carrying a workpiece to be processed;
 - a lower electrode chamber disposed under the base including: an electromagnetic shielding space and a non-electromagnetic shielding space isolated from each other, the chamber of the lower electrode chamber includes a first through hole and a second through hole, and the electromagnetic shielding space and the non-electromagnetic shielding space respectively connect to outside through the first through hole and the second through hole to prevent first components disposed in the electromagnetic shielding space from being interfered by a second component disposed in the non-electromagnetic shielding space;
 - the base includes a base body and an insulating disk disposed sequentially from top to bottom;
 - the lower electrode mechanism further includes an introduction assembly, the introduction assembly including a first introduction section, a second introduction section, and a third introduction section that are sequentially connected, in which the first introduction section is embedded in the insulating disk; the second introduction section is located in the electromagnetic shielding space; and the third introduction section protrudes outside the lower electrode chamber through the first through hole;
 - the first introduction section includes:

a radio frequency sleeve, an upper end of which is electrically connected to the base body, a lower end of which extends to a lower surface of the insulating disk and being connected to the second introduction section;

a first insulator disposed in the radio frequency sleeve, which includes an upper contact surface in contact with a lower surface of the base body and a lower contact surface opposite to the second introduction section; and

a plurality of first conductive channels formed in the first insulator, each of the first conductive channels extends from the upper contact surface to the lower contact surface, and each of the first components passes through each of the first conductive channels in a one-to-one correspondence.

2. The lower electrode mechanism according to claim 1, wherein the chamber of the lower electrode chamber includes a chamber body, a first extension portion is formed on one side of the chamber body, and the first through hole and the second through hole are formed and horizontally disposed in the first extension portion.

3. The lower electrode mechanism according to claim 2, wherein a second extension portion is formed on the other side of the chamber body opposite to the first extension portion, the second extension is symmetrical with the first extension portion with respect to a center line of the base in a radial direction.

4. The lower electrode mechanism according to claim 1, wherein the lower electrode mechanism further includes a first shielding module, the first shielding module is disposed

between an inner end of the first through hole connected to the lower electrode chamber and the base, and is located in the lower electrode chamber to form a first electromagnetic shielding chamber, the first electromagnetic shielding chamber being the electromagnetic shielding space; and

a space outside the first electromagnetic shielding chamber in the lower electrode chamber is the non-electromagnetic shielding space.

5. The lower electrode mechanism according to claim 4, wherein the first shielding module includes:

a shielding sleeve having an arc shape, one end of which is disposed under the base, and the other end of which is connected to the first through hole to form the first electromagnetic shielding chamber.

6. The lower electrode mechanism according to claim 1, wherein the radio frequency sleeve is a vertically arranged straight cylinder, a connecting barrel having a diameter smaller than the straight cylinder is formed at a top of the straight cylinder, and the connecting barrel is embedded in the base body;

a lower end of the straight cylinder extends to the lower surface of the insulating disk and is connected to the second introduction section;

the first insulator includes a center portion embedded in the straight cylinder and an outer ring portion disposed around an outer peripheral wall of the straight cylinder, in which a lower surface of the center portion is used as the lower contact surface and an upper surface of the outer ring portion is used as the upper contact surface;

a first channel is formed in the center form, a second channel is formed in a cylindrical wall of the straight cylinder, and a third channel is formed in the outer ring portion, the first channel, the second channel, and the third channel are connected to form the first conductive channel.

7. The lower electrode mechanism according to claim 6, wherein the plurality of first conductive channels are disposed in layers in a vertical direction in the first insulator.

8. The lower electrode mechanism according to claim 7, wherein the plurality of first conductive channels include:

at least one first conductive channel corresponding to a heating wire, and at least one first conductive channel corresponding to an electrostatic adsorption wire; and

the conductive channel corresponding to the heating wire being located in a lower layer of the conductive channel corresponding to the electrostatic absorption wire.

9. The lower electrode mechanism according to claim 1, wherein the radio frequency sleeve is a cone, a diameter of an upper end of the cone is larger than a diameter of a lower end of the cone;

the upper end of the cone is electrically connected to the base body, and the lower end of the cone extends to the lower surface of the insulating disk and is connected to the second introduction section;

the first insulator is embedded in the cone and conforms to the shape of the cone.

10. The lower electrode mechanism according to claim 1, wherein the second introduction section includes:

a first radio frequency conduit having an arc shape, and an upper end of the first radio frequency conduit is connected to the first introduction section, a lower end of the first radio frequency conduit is connected to the third introduction section;

a second insulator, which is disposed in the first radio frequency conduit, and a first end surface of the second insulator is opposite to the first introduction section, a second end surface of the second insulator is opposite to the third introduction section; and

a plurality of second conductive channels formed in the second insulator, each of the second conductive channels is disposed along an axis of the first radio frequency conduit, and the second conductive channels extend from the first end surface to the second end surface;

each of the first components passes through each of the second conductive channels in a one-to-one correspondence.

11. The lower electrode mechanism according to claim 1, wherein the third introduction section includes:

a second radio frequency conduit, one end of the second radio frequency conduit is connected to the second introduction section, and the other end of the second radio frequency conduit extends horizontally along the axis of the first through hole to the outside of the lower electrode chamber;

a third insulator, which is disposed in the second radio frequency conduit, and a first end surface of the third insulator is opposite to the second introduction section; and

a plurality of third conductive channels formed in the third insulator, each of the third conductive channels is disposed along an axis of the second radio frequency conduit, and the third conductive channels extend from the first end surface of the third insulator to a second end surface of the third insulator;

each of the first components passes through each of the third conductive channels in a one-to-one correspondence and protrudes from the second end surface of the third insulator.

12. The lower electrode mechanism according to claim 11, wherein a conductive pin is disposed on one end of the second radio frequency conduit corresponding to the second end surface of the third insulator;

a fourth channel is disposed in a sidewall of the second radio frequency conduit between the second end surface of the third insulator and the conductive pin, the first components extending from the second end surface of the third insulator extends outwardly from the fourth channel.

13. The lower electrode mechanism according to claim 1, wherein the first components includes a plurality of heating wires and at least one electrostatic adsorption wire, in which,

the plurality of heating wires are symmetrically distributed around an axis of the electromagnetic shielding space; and

the at least one electrostatic adsorption wire is disposed inside the plurality of heating wires.

14. The lower electrode mechanism according to claim 1, wherein an inner diameter of the electromagnetic shielding space is 2 to 6 times of an outer diameter of the second introduction section.

15. The lower electrode mechanism according to claim 14, wherein the outer diameter of the second introduction section ranges from 15 to 50 mm.

16. The lower electrode mechanism according to claim 1, wherein a thickness of the insulating disk ranges from 60 to 300 mm.

17. The lower electrode mechanism according to any one of claims 1 and 6-12, wherein the lower electrode mechanism further includes:

at least one first insulating ring, the third introduction section is fixed to an inner wall of the electromagnetic shielding space through the first insulating ring to be isolated from the inner wall of the electromagnetic shielding space; and/or

at least one second insulating ring, the third introduction section is fixed to an inner wall of the first through hole through the second insulating ring to be isolated from the inner wall of the first through hole.

18. A reaction chamber, comprising:
the lower electrode mechanism according to any one of claims 1-17 disposed in the reaction chamber.

19. The reaction chamber according to claim 18, wherein the lower electrode mechanism is connected to the reaction chamber, a third through hole and a fourth through hole are formed in the reaction chamber, the third through hole is connected to the first through hole to form a first introduction channel, the fourth through hole is connected to the second through hole to form a second introduction channel;

the first components protrude outside the reaction chamber through the first introduction channel, the second component protrudes outside the reaction chamber through the second introduction channel.

20. The reaction chamber according to claim 19, wherein the lower electrode mechanism further includes a second shielding module, the second shielding module is disposed outside the reaction chamber, and forms a second shielding chamber that closes an outer end of the first introduction channel connected to the outside.

21. The reaction chamber according to claim 19, wherein the chamber body of the lower electrode chamber is connected to a sidewall of the reaction chamber, the third through hole and the fourth through hole are formed on the sidewall of the reaction chamber.

22. The reaction chamber according to claim 19, wherein a fifth through hole is disposed on a sidewall of the reaction chamber, a side cover is disposed on an outer side of the fifth through hole, the chamber body of the lower electrode chamber is connected to the side cover, and the third through hole and the fourth through hole are formed in the side cover;

a horizontal rail is disposed at a bottom of the reaction chamber, the side cover is connected to the horizontal rail; and

the side cover can move to the outside of the reaction chamber to allow the lower electrode mechanism to move out of the reaction chamber in one piece.