CLAIMS

1. A ground structure comprising:

a ground mount having a receiving a portion for receiving a ground connector through which a ground current flows outward to an external electrical reservoir; a ground clamp holding the ground connector in the receiving portion of the ground mount, the ground clamp being shaped into a cylinder of which a sidewall is partially removed in a longitudinal direction to thereby include an opening portion through which an inner space of the cylinder is communicated with an exterior of the ground clamp, and enclosing the ground connector such that an outer surface of the ground connector makes contact with an inner surface of the ground clamp;

a pair of stumbling portions folded from an outer surface of the ground clamp neighboring the opening portion and spaced apart from each other by a width of the opening portion; and

a ground wiring electrically connected to the ground clamp and the ground mount, the ground current on the ground connector flowing to the ground mount via the ground clamp by the ground wiring, so that the ground current flows from the ground connector to the external electrical reservoir.

2. The ground structure of claim 1, when the ground connector makes surface contact with the ground clamp by an interference fit, so that the ground connector is hold to the ground clamp by a frictional force on a contact surface between the ground connector and the ground clamp.

3. The ground structure of claim 2, wherein the ground connector includes a

conductive metal and the ground clamp includes an elastic material.

4. The ground structure of claim 1, wherein the stumbling portion includes a protrusion protruded from an outer surface of the ground clamp neighboring the opening portion and an extension folded from the protrusion and extending in a circumferential line of the ground clamp, so that a gap space is defined by the outer surface of the ground clamp and the stumbling portion.

5. The ground structure of claim 4, further comprising a constrictor coupled to the stumbling portion, the constrictor applying an attractive force to the symmetrical stumbling portions toward each other to thereby reinforce a frictional force between the ground connector and the ground clamp.

6. The ground structure of claim 5, wherein the constrictor includes an elastic metal clip.

7. The ground structure of claim 1, wherein a thermal expansion coefficient of the ground clamp is about 50% to about 150% of that of the ground connector.

8. The ground structure of claim 1, further comprising a conductive thin film coated on the inner surface of the ground clamp, so that the outer surface of the ground connector makes surface contact with the conductive thin film.

9. The ground structure of claim 8, wherein the conductive thin film includes any one material selected from the group consisting of gold (Au), silver (Ag), platinum (Pt) and

compounds thereof.

10. The ground structure of claim 1, further comprising a contact terminal positioned on an outer surface of the ground clamp and connected to the ground wring.

11. The ground structure of claim 10, wherein the contact terminal includes a contact hole penetrating the a sidewall of the ground clamp, a connecting unit inserted into the contact hole and a fixing unit fixing the connecting unit to the ground clamp.

12. The ground structure of claim 11, wherein the fixing unit includes a nut and the connecting unit includes a bolt corresponding to the nut at an end portion thereof.

13. The ground structure of claim 1, wherein the ground connector includes nickel (Ni) and the ground clamp includes any one material selected from the group consisting of nickel (Ni), beryllium (Be), copper (Cu) and an alloy thereof.

14. The ground structure of claim 1, wherein the ground wiring includes a flexible cable such that the flexible cable absorbs the thermal expansion of the ground connector hold to the ground clamp.

15. The ground structure of claim 14, wherein the receiving portion of the ground mount includes a ground hole at a bottom thereof, the ground connector being extended into the ground hole by thermal expansion in a longitudinal direction.

16. A heater for a chemical vapor deposition apparatus, comprising:

a body having a flat upper surface on which a substrate is positioned;

a ground electrode positioned in the body;

a heating unit positioned in the body and generating heat for heating the substrate; and

a ground structure including a ground mount having a receiving a portion for receiving a ground connector through which a ground current flows outward to an external electrical reservoir, a ground current flowing from the ground electrode to the ground connector; a ground clamp holding the ground connector in the receiving portion of the ground mount, the ground clamp being shaped into a cylinder of which a sidewall is partially removed in a longitudinal direction to thereby include an opening portion through which an inner space of the cylinder is communicated with an exterior of the ground clamp, and enclosing the ground connector such that an outer surface of the ground connector makes contact with an inner surface of the ground clamp; a pair of stumbling portions folded from an outer surface of the ground clamp neighboring the opening portion and spaced apart from each other by a width of the opening portion; and a ground wiring electrically connected to the ground clamp and the ground mount, the ground current on the ground connector flowing to the ground mount via the ground clamp by the ground wiring, so that the ground current flows from the ground connector to the external electrical reservoir.

17. The heater of claim 16, wherein the body includes one of ceramics and quartz.

18. The heater of claim 16, wherein the ground structure further includes a through hole spaced from the receiving portion and penetrating through the ground mount, a power line for applying an electrical power to the heating unit being connected to the heating unit and an external power source through the through hole.

19. An apparatus for performing a chemical vapor deposition (CVD) process, comprising:

a process chamber in which the CVD process is performed on a substrate;

a shower head positioned at an upper portion of the process chamber and injecting source gases for the CVD process to an inside of the process chamber;

a plasma electrode to which an electric power is applied for transforming the source gases into plasma source;

a heater positioned at a lower portion of the process chamber under the shower head and having a heating unit for heating the substrate and a ground electrode for discharging charged particles of the plasma source out of the process chamber as a ground current; and

a ground structure positioned under the heater,

wherein the ground structure includes a ground mount having a receiving a portion for receiving a ground connector through which a ground current flows outward to an external electrical reservoir, a ground current flowing from the ground electrode to the ground connector; a ground clamp holding the ground connector in the receiving portion of the ground mount, the ground clamp being shaped into a cylinder of which a sidewall is partially removed in a longitudinal direction to thereby include an opening portion through which an inner space of the cylinder is communicated with an exterior of the ground clamp, and enclosing the ground connector such that an outer surface of the ground connector makes contact with an inner surface of the ground clamp; a pair of stumbling portions folded from an outer surface of the ground clamp neighboring the opening portion and spaced apart from each other by a width of the opening portion; and a ground wiring electrically connected to the ground clamp and the ground mount, the ground current on the ground connector flowing to the ground mount via the ground clamp by the ground wiring, so that the ground current

flows from the ground connector to the external electrical reservoir.

20. The apparatus of claim 19, wherein the ground structure further includes a through hole spaced from the receiving portion and penetrating through the ground mount, a power line for applying an electrical power to the heating unit being connected to the heating unit and an external power source through the through hole.

CLAIMS

1. A ground structure for a heater of a chemical vapor deposition apparatus, comprising:

a ground mount having a receiving a portion for receiving a ground connector through which a ground current flows outward to an external electrical reservoir;

a ground clamp holding the ground connector in the receiving portion of the ground mount, the ground clamp being shaped into a cylinder of which a sidewall is partially removed in a longitudinal direction to thereby include an opening portion through which an inner space of the cylinder is communicated with an exterior of the ground clamp, and enclosing the ground connector such that an outer surface of the ground connector makes contact with an inner surface of the ground clamp;

a pair of stumbling portions folded from an outer surface of the ground clamp neighboring the opening portion and spaced apart from each other by a width of the opening portion;

a ground wiring electrically connected to the ground clamp and the ground mount, the ground current on the ground connector flowing to the ground mount via the ground clamp by the ground wiring, so that the ground current flows from the ground connector to the external electrical reservoir; and

a metal clip coupled to the stumbling portion, the metal clip applying an attractive force to the symmetrical stumbling portions toward each other to thereby reinforce a frictional force between the ground connector and the ground clamp,

wherein the stumbling portion includes a protrusion protruded from an outer surface of the ground clamp neighboring the opening portion and an extension folded from the protrusion and extending in a circumferential line of the ground clamp, so that a gap space is defined by the outer surface of the ground clamp and the stumbling portion..

2. The ground structure of claim 1, when the ground connector makes surface contact with the ground clamp by an interference fit, so that the ground connector is hold to the ground clamp by a frictional force on a whole surface between the ground connector and the ground clamp.

3. The ground structure of claim 2, wherein the ground connector includes a conductive metal and the ground clamp includes an elastic material.

4. The ground structure of claim 1, wherein a thermal expansion coefficient of the ground clamp is 50% to 150% of that of the ground connector.

5. The ground structure of claim 1, further comprising a conductive thin film coated on the inner surface of the ground clamp, so that the outer surface of the ground connector makes surface contact with the conductive thin film.

6. The ground structure of claim 5, wherein the conductive thin film includes any one material selected from the group consisting of gold (Au), silver (Ag), platinum (Pt) and compounds thereof.

7. The ground structure of claim 1, further comprising a contact terminal positioned on an outer surface of the ground clamp and connected to the ground wring.

8. The ground structure of claim 7, wherein the contact terminal includes a contact hole

penetrating the a sidewall of the ground clamp, a connecting unit inserted into the contact hole and a fixing unit fixing the connecting unit to the ground clamp.

9. The ground structure of claim 8, wherein the fixing unit includes a nut and the connecting unit includes a bolt corresponding to the nut at an end portion thereof.

10. The ground structure of claim 1, wherein the ground connector includes nickel (Ni) and the ground clamp includes any one material selected from the group consisting of nickel (Ni), beryllium (Be), copper (Cu) and an alloy thereof.

11. The ground structure of claim 1, wherein the ground wiring includes a flexible cable such that the flexible cable absorbs the thermal expansion of the ground connector hold to the ground clamp.

12. The ground structure of claim 11, wherein the receiving portion of the ground mount includes a ground hole at a bottom thereof, the ground connector being extended into the ground hole by thermal expansion in a longitudinal direction.

13. A heater for a chemical vapor deposition apparatus, comprising:

a body having a flat upper surface on which a substrate is positioned;

a ground electrode positioned in the body;

a heating unit positioned in the body and generating heat for heating the substrate; and

a ground structure including a ground mount having a receiving a portion for receiving a ground

connector through which a ground current flows outward to an external electrical reservoir, a ground current flowing from the ground electrode to the ground connector; a ground clamp holding the ground connector in the receiving portion of the ground mount, the ground clamp being shaped into a cylinder of which a sidewall is partially removed in a longitudinal direction to thereby include an opening portion through which an inner space of the cylinder is communicated with an exterior of the ground clamp, and enclosing the ground connector such that an outer surface of the ground connector makes contact with an inner surface of the ground clamp; a pair of stumbling portions folded from an outer surface of the ground clamp neighboring the opening portion and spaced apart from each other by a width of the opening portion; a ground wiring electrically connected to the ground clamp and the ground mount, the ground current on the ground connector flowing to the ground mount via the ground clamp by the ground wiring, so that the ground current flows from the ground connector to the external electrical reservoir; and a metal clip coupled to the stumbling portion, the metal clip applying an attractive force to the symmetrical stumbling portions toward each other to thereby reinforce a frictional force between the ground connector and the ground clamp,

wherein the stumbling portion includes a protrusion protruded from an outer surface of the ground clamp neighboring the opening portion and an extension folded from the protrusion and extending in a circumferential line of the ground clamp, so that a gap space is defined by the outer surface of the ground clamp and the stumbling portion.

14. The heater of claim 13, wherein the body includes one of ceramics and quartz.

15. The heater of claim 13, wherein the ground structure further includes a through hole

spaced from the receiving portion and penetrating through the ground mount, a power line for applying an electrical power to the heating unit being connected to the heating unit and an external power source through the through hole.

16. An apparatus for performing a chemical vapor deposition (CVD) process, comprising:

a process chamber in which the CVD process is performed on a substrate;

a shower head positioned at an upper portion of the process chamber and injecting source gases for the CVD process to an inside of the process chamber;

a plasma electrode to which an electric power is applied for transforming the source gases into plasma source;

a heater positioned at a lower portion of the process chamber under the shower head and having a heating unit for heating the substrate and a ground electrode for discharging charged particles of the plasma source out of the process chamber as a ground current; and

a ground structure positioned under the heater,

wherein the ground structure includes a ground mount having a receiving a portion for receiving a ground connector through which a ground current flows outward to an external electrical reservoir, a ground current flowing from the ground electrode to the ground connector; a ground clamp holding the ground connector in the receiving portion of the ground mount, the ground clamp being shaped into a cylinder of which a sidewall is partially removed in a longitudinal direction to thereby include an opening portion through which an inner space of the cylinder is communicated with an exterior of the ground clamp, and enclosing the ground connector such that an outer surface of the ground connector makes contact with an inner surface of the ground clamp; a pair of stumbling portions folded from an outer surface of the ground clamp neighboring the

opening portion and spaced apart from each other by a width of the opening portion; a ground wiring electrically connected to the ground clamp and the ground mount, the ground current on the ground connector flowing to the ground mount via the ground clamp by the ground wiring, so that the ground current flows from the ground connector to the external electrical reservoir; and a metal clip coupled to the stumbling portion, the metal clip applying an attractive force to the symmetrical stumbling portions toward each other to thereby reinforce a frictional force between the ground connector and the ground clamp,

wherein the stumbling portion includes a protrusion protruded from an outer surface of the ground clamp neighboring the opening portion and an extension folded from the protrusion and extending in a circumferential line of the ground clamp, so that a gap space is defined by the outer surface of the ground clamp and the stumbling portion..

17. The apparatus of claim 16, wherein the ground structure further includes a through hole spaced from the receiving portion and penetrating through the ground mount, a power line for applying an electrical power to the heating unit being connected to the heating unit and an external power source through the through hole.