WHAT IS CLAIMED IS:

1. A substrate processing apparatus, comprising:

a substrate process chamber having a plasma generation space in which a processing gas is plasma-excited and a substrate processing space communicating with the plasma generation space;

a substrate mounting table installed inside the substrate processing space and configured to mount a substrate thereon;

an inductive coupling structure provided with a coil installed so as to be wound around an outer periphery of the plasma generation space, and configured so that an electrical length of the coil is an integral multiple of a wavelength of a high-frequency power supplied to the coil and a diameter of the coil is larger than a diameter of the substrate, the plasma generation space being arranged between a lower end of the coil and an upper end of the coil;

a substrate mounting table elevating part configured to raise or lower the substrate mounting table;

a gas supply part configured to supply the processing gas to the plasma generation space; and

a controller configured to control the substrate mounting table elevating part, based on a power value of the high-frequency power supplied to the coil, so that, when processing the substrate, the substrate mounted on the substrate mounting table is positioned at a height according to the power value of the high-frequency power and spaced apart by a distance of 38 mm or more downward from the lower end of the coil where a density of a plasma generated on the substrate while processing the substrate is uniform in a plane direction of the substrate.

2. The apparatus of Claim 1, wherein the controller is configured to control the substrate mounting table elevating part so that, when processing the substrate, the substrate mounted on the substrate mounting table is positioned at a height spaced apart by a distance of 138 mm or less downward from the lower end of the coil.

3. The apparatus of Claim 2, wherein the diameter of the substrate is about 300 mm,

and the diameter of the coil is 500 mm or more.

4. The apparatus of Claim 3, wherein the coil has an electrical length which is one time the wavelength of the high-frequency power.

5. The apparatus of Claim 1, wherein the controller is configured to, when processing the substrate, control the substrate mounting table elevating part based on an allowable range of an in-plane deviation of the density of the plasma in the plane direction of the substrate, which is set for each plasma process on the substrate mounted on the substrate mounting table.

6. The apparatus of Claim 4, wherein the controller is configured to, when processing the substrate, control the substrate mounting table elevating part based on an allowable range of an in-plane deviation of the density of the plasma in the plane direction of the substrate, which is set for each plasma process on the substrate mounted on the substrate mounting table.

7. A method of manufacturing a semiconductor device, comprising:

loading a substrate into a substrate process chamber having a plasma generation space in which a processing gas is plasma-excited and a substrate process space communicating with the plasma generation space;

mounting the substrate on a substrate mounting table installed inside the substrate process space;

adjusting a height of the substrate mounting table, based on a power value of a high-frequency power supplied to a coil, so that the substrate mounted on the substrate mounting table is located at a height according to the power value of the high-frequency power and spaced apart by a distance of 38 mm or more downward from a lower end of the coil where a density of a plasma generated on the substrate while processing the substrate is uniform in a plane direction of the substrate, the coil configured to wind around an outer periphery of the plasma generation space so as to have a diameter larger than a diameter of the substrate, and the plasma generation space being arranged between the lower end of the coil and an upper end of the coil;

supplying the processing gas to the plasma generation space;

plasma-exciting the processing gas supplied to the plasma generation space by supplying the high-frequency power to the coil to resonate the coil; and

processing the substrate mounted on the substrate mounting table by the plasma-excitation.

8. The method of Claim 7, wherein in the act of plasma-exciting the processing gas, the highest phase current is generated at the lower end of the coil.

9. The method of Claim 7, wherein in the act of adjusting a height of the substrate mounting table, the substrate mounting table is raised or lowered so that the height of the substrate is spaced apart by a distance of 138 mm or less downward from the lower end of the coil.

10. The method of Claim 9, wherein the diameter of the substrate is about 300 mm, and the diameter of the coil is 500 mm or more.

11. The method of Claim 7, wherein in the act of adjusting a height of the substrate mounting table, the substrate mounting table is raised or lowered according to an allowable range of an in-plane deviation of the density of the plasma in the plane direction of the substrate, which is set for each plasma process on the substrate mounted on the substrate mounting table.

12. A computer-readable recording medium storing a program for causing a computer to control a substrate processing apparatus so as to perform:

loading a substrate into a substrate process chamber having a plasma generation space in which a processing gas is plasma-excited and a substrate process space communicating with the plasma generation space;

mounting the substrate on a substrate mounting table installed inside the substrate process space;

adjusting a height of the substrate mounting table, based on a power value of a high-frequency power supplied to a coil, so that the substrate mounted on the substrate

mounting table is located at a height according to the power value of the high-frequency power and spaced apart by a distance of 38 mm or more downward from a lower end of the coil where a density of a plasma generated on the substrate while processing the substrate is uniform in a plane direction of the substrate, the coil configured to wind around an outer periphery of the plasma generation space so as to have a diameter larger than a diameter of the substrate, and the plasma generation space being arranged between the lower end of the coil and an upper end of the coil;

supplying the processing gas to the plasma generation space;

plasma-exciting the processing gas supplied to the plasma generation space by supplying the high-frequency power to the coil to resonate the coil; and

processing the substrate mounted on the substrate mounting table by the plasma-excitation.