

WHAT IS CLAIMED IS:

1. A substrate processing apparatus, comprising:
 - a process container including a cylindrical portion, a process chamber being formed in the process container and a substrate being arranged in the process chamber;
 - a gas supplier configured to supply a processing gas to the process chamber;
 - an electrode installed in a spiral shape to surround the process container from outside of the cylindrical portion of the process container and supplied with high-frequency power to plasma-excite the processing gas; and
 - a mover configured to be capable of moving the electrode with respect to the process container in a radial direction of the cylindrical portion.
2. The apparatus of Claim 1, wherein the mover is configured to be capable of moving the electrode with respect to the process container in one direction, which is a radial direction of the cylindrical portion, and another direction, which is a radial direction of the cylindrical portion and is orthogonal to the one direction.
3. The apparatus of Claim 1, wherein the mover includes:
 - a movable part installed directly or indirectly on the electrode and configured to move integrally with the electrode; and
 - an adjuster configured to move the movable part to adjust the position of the movable part.
4. The apparatus of Claim 3, wherein the mover includes a driver configured to operate the adjuster.
5. The apparatus of Claim 4, further comprising:

an input part configured to receive an input of movement information for moving the electrode from an operator; and

a controller configured to be capable of controlling the driver and to operate the adjuster by the driver based on the movement information inputted to the input part.

6. The apparatus of Claim 5, further comprising a memory configured to store processing conditions as the movement information and relative positions of the electrode with respect to the process container corresponding to the processing conditions,

wherein the controller is configured to be capable of controlling the driver based on the processing conditions, which are inputted through the input part, and the relative positions of the electrode with respect to the process container corresponding to the processing conditions, which are stored in the memory.

7. The apparatus of Claim 6, wherein the processing conditions include at least one selected from the group of a temperature of the substrate to be processed, a pressure in the process chamber, a type of the processing gas for processing the substrate, a flow rate of the processing gas, and high-frequency power supplied to the electrode.

8. The apparatus of Claim 6, wherein the processing conditions include at least a relative position between the electrode and the substrate in a direction perpendicular to a surface of the substrate to be processed in the process chamber.

9. The apparatus of Claim 6, wherein the processing conditions include at least a type of the substrate to be processed.

10. The apparatus of Claim 6, wherein the processing conditions include at least a processing time of the substrate to be processed.

11. The apparatus of one of Claims 5 to 10, wherein the controller keeps the driver in a non-operating state while the substrate is being processed.
12. The apparatus of one of Claims 5 to 10, wherein at a predetermined timing while the substrate is processed in the process chamber, the controller operates the driver to move the electrode to a predetermined position.
13. The apparatus of Claim 1, further comprising a high-frequency power source configured to supply high-frequency power having a wavelength, which is an integer multiple of an electrical length of the electrode, to the electrode.
14. The apparatus of Claim 1, further comprising a shield configured to cover the electrode from outside in the radial direction and to shield an electric field generated by the electrode, wherein the shield is configured to move integrally with the electrode.
15. The apparatus of Claim 14, further comprising a support part configured to support the shield and the electrode from below, wherein the mover moves the shield and the electrode by moving the support part.
16. The apparatus of one of Claims 5 to 10, further comprising a display configured to display an amount of movement of the electrode with respect to a predetermined reference position.
17. A method of manufacturing a semiconductor device, comprising:
loading a substrate into a process chamber formed in a process container including a cylindrical portion;

moving an electrode, which is installed in a spiral shape to surround the process container from outside of the cylindrical portion of the process container, with respect to the process container;

supplying a processing gas to the process chamber; and

supplying high-frequency power to the electrode to plasma-excite the processing gas supplied to the process chamber.

18. The method of Claim 17, wherein in the act of moving the electrode with respect to the process container, the electrode is moved with respect to the process container based on processing conditions for the substrate inputted by an operator as movement information for moving the electrode.

19. A program that causes, by a computer, a substrate processing apparatus to perform:
loading a substrate into a process chamber formed in a process container including a cylindrical portion;

moving an electrode, which is installed in a spiral shape to surround the process container from outside of the cylindrical portion of the process container, with respect to the process container;

supplying a processing gas to the process chamber; and

supplying high-frequency power to the electrode to plasma-excite the processing gas supplied to the process chamber.

20. The program of Claim 19, wherein in the act of moving the electrode with respect to the process container, the electrode is moved with respect to the process container based on processing conditions for the substrate inputted by an operator as movement information for moving the electrode.