WHAT IS CLAIMED IS:

1. A substrate processing apparatus, comprising:

a process chamber in which ~~configured to process~~ a substrate is processed;

a gas supplier configured to supply a gas into the process chamber;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite the gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, ~~and~~ a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, the fourth application electrode having a length different from the length of the third application electrode and the same length as the second reference electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

~~2. The substrate processing apparatus of Claim 1, wherein the second plasma electrode unit further includes a fourth application electrode applied with high-frequency power and having a length different from the length of the third application electrode.~~

~~3. The substrate processing apparatus of Claim 2, wherein the fourth application electrode has the same length as the second reference electrode.~~

2~~4~~. The substrate processing apparatus of Claim 1, wherein the third application electrode is shorter than the first application electrode or the second application electrode.

35. A~~The~~ substrate processing apparatus ~~of Claim 2~~, comprising:

a process chamber in which a substrate is processed;

a gas supplier configured to supply a gas into the process chamber;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite the gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, ~~wherein~~ the third application electrode ~~is~~ having a length different from a length of the first application electrode or the second application electrode and being shorter than the fourth application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

46. A~~The~~ substrate processing apparatus ~~of Claim 1~~, comprising:

a process chamber in which a substrate is processed;

a gas supplier configured to supply a gas into the process chamber;

a first plasma electrode unit including a first reference electrode applied with a reference potential and a group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite the gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, ~~wherein~~ the third application electrode being~~is~~ shorter than the second reference electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

5~~7~~. A~~The~~ substrate processing apparatus ~~of Claim 2~~, comprising:

a process chamber in which a substrate is processed;

a gas supplier configured to supply a gas into the process chamber;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite the gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, ~~wherein~~ the fourth application electrode having a length different from the length of the third application electrode and~~has~~ the same length as at least one selected from the group of the first application electrode and the second application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

6~~8~~. The substrate processing apparatus of Claim 1, wherein the first application electrode has the same length as the first reference electrode.

7~~9~~. The substrate processing apparatus of Claim 1, wherein the first plasma electrode unit includes the first application electrode and the second application electrode.

8~~10~~. The substrate processing apparatus of Claim 7~~9~~, wherein the second application electrode has the same length as the first application electrode.

9~~11~~. A~~The~~ substrate processing apparatus~~ of Claim 1~~, comprising:

a process chamber in which a substrate is processed;

a gas supplier configured to supply a gas into the process chamber;

a first plasma electrode unit including a first reference electrode applied with a reference potential and a group of a first application electrode and a second application electrode applied with high-frequency power, ~~wherein~~ the second application electrode being~~is~~ shorter than the first application electrode, and the first plasma electrode unit being configured to plasma-excite the gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

10~~2~~. A~~The~~ substrate processing apparatus~~ of Claim 2~~, comprising:

a process chamber in which a substrate is processed;

a gas supplier configured to supply a gas into the process chamber;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite the gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode and ~~wherein~~ the fourth application electrode each having a~~has the~~ length different from a~~the~~ length of the first application electrode or the second application electrode, the length of the fourth

application electrode being different from the length of the third application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

113. The substrate processing apparatus of Claim 102, wherein the fourth application electrode is shorter than the first application electrode or the second application electrode.

~~14. The substrate processing apparatus of Claim 1, wherein the second plasma electrode unit further includes a fourth application electrode applied with high-frequency power and having the same length as the third application electrode.~~

125. The substrate processing apparatus of Claim 1, further comprising:

a first high-frequency power source configured to supply high-frequency power to the at least one selected from the group of the first application electrode and the second application electrode; and

a second high-frequency power source, which is different from the first high-frequency power source, configured to supply high-frequency power to the third application electrode.

136. The substrate processing apparatus of Claim 1, further comprising:

a first high-frequency power source configured to supply high-frequency power to the first plasma electrode unit; and

a second high-frequency power source, which is different from the first high-frequency power source, configured to supply high-frequency power to the second plasma electrode unit.

147. The substrate processing apparatus of Claim 136, further comprising:

a controller configured to be capable of controlling the first high-frequency power source and the second high-frequency power source so that a total distribution including a

distribution of electric power applied to the first plasma electrode unit and a distribution of electric power applied to the second plasma electrode unit in an extension direction of the first plasma electrode unit and the second plasma electrode unit becomes uniform.

15~~8~~. The substrate processing apparatus of Claim 13~~6~~, further comprising:

a controller configured to be capable of controlling the first high-frequency power source and the second high-frequency power source so that a distribution of an amount of active species generated by plasma-exciting the gas by the first plasma electrode unit and the second plasma electrode unit becomes uniform in an extension direction of the first plasma electrode unit and the second plasma electrode unit.

16~~9~~. The substrate processing apparatus of Claim 1, wherein the first plasma electrode unit and the second plasma electrode unit are installed outside a reaction tube including the process chamber therein.

17~~20~~. A plasma generating device, comprising:

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite a gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, ~~and~~ a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, the fourth application electrode having a length different from the length of the third application electrode and the same length as the second reference electrode, and the second

plasma electrode unit being configured to plasma-excite the gas.

18. A plasma generating device, comprising:

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite a gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode and being shorter than the fourth application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

19. A plasma generating device, comprising:

a first plasma electrode unit including a first reference electrode applied with a reference potential and a group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite a gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, the third application electrode being shorter than the second reference electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

20. A plasma generating device, comprising:

a first plasma electrode unit including a first reference electrode applied with a reference

potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode unit being configured to plasma-excite a gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, the fourth application electrode having a length different from the length of the third application electrode and the same length as at least one selected from the group of the first application electrode and the second application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

21. A plasma generating device, comprising:

a first plasma electrode unit including a first reference electrode applied with a reference potential and a group of a first application electrode and a second application electrode applied with high-frequency power, the second application electrode being shorter than the first application electrode, and the first plasma electrode unit being configured to plasma-excite a gas; and

a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, and the second plasma electrode unit being configured to plasma-excite the gas.

22. A plasma generating device, comprising:

a first plasma electrode and including a first reference electrode applied with a reference

potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power, the first plasma electrode being configured to plasma-excite a gas; and

a second plasma electrode unit and including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode and the fourth application electrode each having a length different from a length of the first application electrode or the second application electrode, the length of the fourth application electrode being different from the length of the third application electrode, and the second plasma electrode being configured to plasma-excite a gas.

23~~1~~. A method of manufacturing a semiconductor device, comprising:

loading a substrate into a process chamber of a substrate processing apparatus that includes:

the process chamber in which ~~configured to process~~ the substrate is processed;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, ~~and~~ a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, and the fourth application electrode having a length different from the length of the third application electrode and the same length as the second reference electrode; and

processing the substrate by plasma-exciting a gas with the first plasma electrode unit and

the second plasma electrode unit to generate an active species and supplying the active species to the substrate.

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

loading a substrate into a process chamber of a substrate processing apparatus that includes:

the process chamber in which the substrate is processed;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode and being shorter than the fourth application electrode; and

processing the substrate by plasma-exciting a gas with the first plasma electrode unit and the second plasma electrode unit to generate an active species and supplying the active species to the substrate.

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

loading a substrate into a process chamber of a substrate processing apparatus that includes:

the process chamber in which the substrate is processed;

a first plasma electrode unit including a first reference electrode applied with a reference potential and a group of a first application electrode and a second application electrode applied with high-frequency power; and

a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, the third application electrode being shorter than the second reference electrode; and

processing the substrate by plasma-exciting a gas with the first plasma electrode unit and the second plasma electrode unit to generate an active species and supplying the active species to the substrate.

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

loading a substrate into a process chamber of a substrate processing apparatus that includes:

the process chamber in which the substrate is processed;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode, the fourth application electrode having a length different from the length of the third application electrode and the same length as at least one selected from the group of the first application electrode and the second application electrode; and

processing the substrate by plasma-exciting a gas with the first plasma electrode unit and the second plasma electrode unit to generate an active species and supplying the active species to the substrate.

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

loading a substrate into a process chamber of a substrate processing apparatus that includes:

the process chamber in which the substrate is processed;

a first plasma electrode unit including a first reference electrode applied with a reference potential and a group of a first application electrode and a second application electrode applied with high-frequency power, the second application electrode being shorter than the first application electrode; and

a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode; and

processing the substrate by plasma-exciting a gas with the first plasma electrode unit and the second plasma electrode unit to generate an active species and supplying the active species to the substrate.

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

loading a substrate into a process chamber of a substrate processing apparatus that includes:

the process chamber in which the substrate is processed;

a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power; and

a second plasma electrode unit including a second reference electrode applied with a reference potential, a third application electrode applied with high-frequency power, and a fourth application electrode applied with high-frequency power, the third application electrode and the fourth application electrode each having a length different from a length of the first application electrode or the second application electrode, and the length of the fourth application electrode being different from the length of the third application electrode; and

processing the substrate by plasma-exciting a gas with the first plasma electrode unit and the second plasma electrode unit to generate an active species and supplying the active species to the substrate.~~22. A substrate processing method, comprising:~~

~~loading a substrate into a process chamber of a substrate processing apparatus that includes:~~

~~the process chamber configured to process the substrate;~~

~~a first plasma electrode unit including a first reference electrode applied with a reference potential and at least one selected from the group of a first application electrode and a second application electrode applied with high-frequency power; and~~

~~a second plasma electrode unit including a second reference electrode applied with a reference potential and a third application electrode applied with high-frequency power, the third application electrode having a length different from a length of the first application electrode or the second application electrode; and~~

~~processing the substrate by plasma-exciting a gas with the first plasma electrode unit and the second plasma electrode unit to generate an active species and supplying the active species to the substrate.~~