

WHAT IS CLAIMED IS:

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1. An etching method performed by an etching apparatus, the etching method comprising:

placing, on a mount table of the etching apparatus, a wafer that includes a multi-layer film including a first silicon-containing film and a second silicon-containing film different from the first silicon-containing film and a single-layer film including the first silicon-containing film;

15 setting a temperature of the wafer at -35°C or lower;

supplying, by a first radio-frequency power supply of the etching apparatus, a first radio-frequency power with a first frequency to generate plasma from a hydrogen-containing gas and a fluorine-containing gas;

20 performing a first process of applying a second radio-frequency power with a second frequency lower than the first frequency to the mount table by a second radio-frequency power supply of the etching apparatus; and

25 performing a second process of stopping the application of the second radio-frequency power, wherein the first process and the second process are repeated multiple times; and

30 the first process is shorter in time than the second process.

2. The etching method as claimed in claim 1,
wherein in the second process, the supply of the first
radio-frequency power is also stopped in synchronization
with the stopping of the application of the second
5 radio-frequency power.

10 3. The etching method as claimed in claim 1,
wherein a duration of the first process is less than or
equal to one third of a duration of the second process.

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4. The etching method as claimed in claim 1,
wherein the hydrogen-containing gas is a hydrogen (H_2)
gas and the fluorine-containing gas is a carbon
20 tetrafluoride (CF_4) gas.

25 5. The etching method as claimed in claim 1,
wherein
the multi-layer film and the single-layer film
are etched by the generated plasma; and
in the second process, the supply of the first
30 radio-frequency power is reduced in synchronization with
the stopping of the application of the second radio-
frequency power.

6. An etching method performed by an etching apparatus, the etching method comprising:

placing, on a mount table of the etching apparatus, a wafer that includes a multi-layer film including a first silicon-containing film and a second silicon-containing film different from the first silicon-containing film and a single-layer film including the first silicon-containing film;

setting a temperature of the wafer at -35°C or lower;

supplying, by a first radio-frequency power supply of the etching apparatus, a first radio-frequency power with a first frequency to generate plasma from a hydrogen-containing gas and a fluorine-containing gas;

applying a second radio-frequency power with a second frequency lower than the first frequency to the mount table by a second radio-frequency power supply of the etching apparatus, at least one of the first radio-frequency power and the second radio-frequency power being a pulse wave; and

controlling a duty ratio of the pulse wave.

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7. The etching method as claimed in claim 6, wherein the duty ratio is less than or equal to 50%.

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8. The etching method as claimed in claim 7, wherein

both of the first radio-frequency power and the second radio-frequency power are pulse waves; and

the duty ratio of the first radio-frequency power is the same as the duty ratio of the second radio-frequency power.

10 9. The etching method as claimed in claim 6, wherein the hydrogen-containing gas is a hydrogen (H_2) gas and the fluorine-containing gas is a carbon tetrafluoride (CF_4) gas.

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10. The etching method as claimed in claim 6, wherein

20 the multi-layer film and the single-layer film are etched by the generated plasma; and

the supply of the first radio-frequency power is reduced in synchronization with stopping the application of the second radio-frequency power.

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11. An etching method performed by an etching apparatus, the etching method comprising:

30 placing, on a mount table of the etching apparatus, a wafer that includes a multi-layer film including a first film and a second film different from

the first film and a single-layer film including the first film;

outputting, by a first radio-frequency power supply of the etching apparatus, a first radio-frequency power with a first frequency to generate plasma from a process gas;

applying a second radio-frequency power with a second frequency lower than the first frequency to the mount table by a second radio-frequency power supply of the etching apparatus; and

stopping the application of the second radio-frequency power, wherein

the application of the second radio-frequency power to the mount table and the stopping of the application of the second radio-frequency power are repeated to concurrently etch the multi-layer film and the single-layer film.

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12. The etching method as claimed in claim 11, wherein a duration of the application of the second radio-frequency power to the mount table is shorter than a duration of the stopping of the application of the second radio-frequency power.

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