

isotropically and selectively a polysilicon film.

Patent Literature 1 relates to etching under the condition where no plasma is generated and describes examples of using
5 N₂ as a diluent gas.

Citation List

Patent Literature

[0006]

Patent Literature 1: JP 6080166 B

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Summary ~~of Invention~~

[0006a] In a first aspect of the present disclosure, there is provided an etching method for plasma-etching a silicon substrate containing silicon or in addition having a silicon oxide film using a halogen fluoride having a nitrogen (N₂) content of 1vol% or less as an etching gas,

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wherein an etching gas further contains 90vol% or less of a diluent gas selected from Ar, Ne, Kr and Xe.

[0006b] In another aspect of the present disclosure, there is provided a method for producing a semiconductor using the etching method as disclosed herein.

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Technical Problem

[0007]

Recently, processing patterns in semiconductor integrated circuit production processes have become remarkably
5 miniaturized and therefore development of a dry etching technique with high precision (high selectivity, high aspect ratio and high speed) has been strongly demanded.

[0008]

In normal etching, as an inert gas or a deposition agent
10 and a diluent, N_2 may be included.

However, the present inventors consider that, when using the halogen fluoride as the etching gas, during a high precision dry etching, when N_2 exists in the etching gas, silicon nitride is generated by the reaction of the fluorinated

~~According to a first aspect of the present invention, there is provided~~

~~[1] An~~ etching method for plasma-etching a silicon substrate containing silicon or in addition having a silicon oxide film using a halogen fluoride having a nitrogen (N₂) content of 1vol% or less as an etching gas.

~~[2] The etching method according to [1], wherein~~In an embodiment, a halogen fluoride is at least one selected from ClF₃, BrF₅, IF₃, IF₇, ClF, BrF₃, IF₅ and BrF.

~~[3] The etching method according to [1] or [2], In an embodiment,~~wherein an etching gas further contains 90vol% or less of a diluent gas selected from Ar, Ne, Kr and Xe.

~~[4] The etching method according to [1] to [3], In an embodiment, the above etching method comprises~~comprising the steps of:

providing a mask in a silicon substrate containing silicon or in addition having a silicon oxide film, transporting the substrate into a processing chamber and mounting the substrate on a mount table inside the processing chamber;

decompressing the inside of the processing chamber;

supplying the etching gas into the processing chamber; and

forming plasma inside the processing chamber to perform anisotropic etching based on an electric potential difference between the plasma and the mounted substrate.

~~According to a second aspect of the present invention, there is provided~~

~~[5] a~~A method for producing a semiconductor using the ~~above~~ etching method according to [1] to [4].

Advantageous Effects of Invention

~~{0011}~~

~~According to embodiments of the present invention, the~~

[0011]

According to the present invention, the N₂ content in the etching gas composed of halogen fluoride is adjusted to be equal to or lower than a predetermined amount and therefore it is possible to provide a method for precisely etching silicon or a silicon oxide film.

Brief Description of Drawings

[0012]

[Fig. 1] is a schematic drawing showing an etching device used in the present invention.

Description of Embodiments

[0013]

Hereinafter, the embodiments of the present invention are described below.

In the etching method according to the present invention, silicon or a silicon oxide film on a substrate surface is etched by using a halogen fluoride.

[0014]

Substrate

Substrates are not particularly limited as far as they can be processed by plasma etching and include, for example, glass substrates, silicon substrates and GaAs substrates.

Among these substrates, silicon substrates are suitable in the present invention when using the silicon substrates

CLAIMS

[Claim 1]

An etching method for plasma-etching a silicon
5 substrate containing silicon or in addition having a silicon
oxide film using a halogen fluoride having a nitrogen (N₂)
content of 1vol% or less as an etching gas,

wherein an etching gas further contains 90vol% or less
of a diluent gas selected from Ar, Ne, Kr and Xe.

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[Claim 2]

The etching method according to Claim 1, wherein a
halogen fluoride is at least one selected from ClF₃, BrF₅, IF₃,
IF₇, ClF, BrF₃, IF₅ and BrF.

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~~[Claim 3]~~

~~—The etching method according to Claim 1 or 2, wherein an
etching gas further contains 90vol% or less of a diluent gas
selected from Ar, Ne, Kr and Xe.~~

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[Claim 34]

The etching method according to any one of Claims 1 or
2 to 3, comprising the steps of:

providing a mask in a silicon substrate having silicon or a silicon oxide film, transporting the substrate into a processing chamber and mounting the substrate on a mount table inside the processing chamber;

5 decompressing the inside of the processing chamber;
supplying the etching gas into the processing chamber;
and

forming plasma inside the processing chamber to perform anisotropic etching based on an electric potential difference
10 between the plasma and the mounted substrate.

[Claim [45](#)]

A method for producing a semiconductor using the etching method according to any one of Claims 1 to [34](#).