

## CLAIMS

1. An etching method for silicon nitride comprising:

5 placing an etching step in which an etching object containing silicon nitride in an etching gas containing halogen fluoride, the halogen fluoride being a compound of bromine or iodine and fluorine, to etch the silicon nitride of the etching object under a pressure of 1 Pa to  
10 80 kPa without using plasma.

~~2. The etching method for silicon nitride according to claim 1, wherein a content of hydrogen fluoride contained in the etching gas is below 100 ppm by~~  
15 volume.

~~3~~2. The etching method for silicon nitride according to claim 1 ~~or 2~~, wherein a temperature of the etching object is 155°C to 500°C.

20 ~~4~~3. The etching method for silicon nitride according to any one of claims 1 to ~~3~~2, wherein the content of the halogen fluoride contained in the etching gas is equal to or more than 1% by volume.

25 ~~5~~4. The etching method for silicon nitride according to any one of claims 1 to ~~4~~3, wherein the etching gas is a gas composed of only the halogen fluoride, or a mixed gas composed of the halogen fluoride  
30 and an inert gas.

~~6~~5. The etching method for silicon nitride according to claim ~~5~~4, wherein the inert gas is at least one selected from among nitrogen gas, helium, argon, neon, krypton, and xenon.

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~~7~~6. The etching method for silicon nitride according to any one of claims 1 to ~~6~~5, wherein the halogen fluoride is at least one selected from among bromine trifluoride, bromine pentafluoride, iodine pentafluoride, and iodine heptafluoride.

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~~8~~7. The etching method for silicon nitride according to any one of claims 1 to ~~7~~6, wherein the etching object contains the silicon nitride and an etching-resistant material configured to suppress etching of the silicon nitride by the etching gas, and the silicon nitride of the etching object is selectively etched by the etching gas.

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~~9~~8. The etching method for silicon nitride according to claim ~~8~~7, wherein the etching-resistant material contains at least one selected from among silicon dioxide, photoresist, and amorphous carbon.

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~~10~~9. The etching method for silicon nitride according to claim ~~8-7~~or 9~~8~~, wherein an etching selectivity ratio is 10 or more, the etching selectivity ratio being a ratio of an etching rate of the silicon nitride to an etching rate of the etching-resistant material.

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~~11~~10. A production method for a semiconductor element for producing a semiconductor element by using the etching method for silicon nitride according to any one of claims 1 to ~~10~~9.

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