

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, wherein a content of hydrogen fluoride contained in the etching gas is below 100 ppm by volume.

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

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

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

5. The etching method for silicon nitride
30 according to claim 4, wherein the inert gas is at least

one selected from among nitrogen gas, helium, argon, neon, krypton, and xenon.

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

10 7. The etching method for silicon nitride according to any one of claims 1 to 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
15 silicon nitride of the etching object is selectively etched by the etching gas.

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

9. The etching method for silicon nitride according to claim 7 or 8, wherein an etching selectivity
25 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.

10. A production method for a semiconductor element
30 for producing a semiconductor element by using the

etching method for silicon nitride according to any one of claims 1 to 9.