

CLAIMS

1. An etching method comprising:

bringing, in the presence of plasma, an etching gas
5 containing a fluorine compound with 3 or fewer carbon
atoms having at least one bond of a carbon-oxygen double
bond and an ether bond in a molecule into contact with a
target etching member having an etching target which is
an object to be etched by the etching gas and a non-
10 etching target which is not an object to be etched by the
etching gas, and selectively etching the etching target
in comparison with the non-etching target,

wherein a concentration of the fluorine compound in
the etching gas is 0.5 vol% or more to 40 vol% or less,
15 and the etching target has silicon nitride,

wherein the etching gas is a mixed gas containing
the fluorine compound, a noble gas, and nitrogen gas, and
a concentration of the nitrogen gas in the etching gas is
10 vol% or less.

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2. The etching method according to claim 1,
wherein

the non-etching target has at least one selected
from silicon oxide, a photoresist, and amorphous carbon.

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3. The etching method according to claim 1 or
claim 2, wherein

the etching is performed under a pressure condition of 1 Pa or more to 3 kPa or less.

4. The etching method according to any one of
5 claims 1 to 3, wherein

the etching is performed under a temperature condition of 0°C or higher to 200°C or lower.

5. The etching method according to any one of
10 claims 1 to 4, wherein

the concentration of the fluorine compound in the etching gas is 1 vol% or more to 30 vol% or less.

6. The etching method according to any one of
15 claims 1 to 5, wherein

the etching gas is a mixed gas containing the fluorine compound and a dilution gas.

7. The etching method according to claim 6,
20 wherein

the dilution gas is at least one selected from nitrogen gas, helium, argon, neon, krypton, and xenon.

8. The etching method according to claim 1,
25 wherein

the etching gas is a mixed gas containing, in addition to the fluorine compound, a noble gas, and

nitrogen gas, an oxygen-containing gas other than the
fluorine compound.

9. The etching method according to any one of
5 claims 1 to 8, wherein
the fluorine compound is at least one selected from
carbonyl fluoride, oxalyl fluoride, and
hexafluoropropylene oxide.

10 10. A semiconductor element manufacturing method
for manufacturing a semiconductor element using the
etching method according to any one of claims 1 to 9,
wherein

the target etching member is a semiconductor
15 substrate having the etching target and the non-etching
target, and

the semiconductor element manufacturing method
includes removing at least a part of the etching target
from the semiconductor substrate by the etching.