CLAIMS

1. A dry etching method comprising:

dry etching in which an etching gas containing a halogen fluoride, the halogen fluoride being a compound of bromine or iodine and fluorine, is brought into contact with a member to be etched having an etching object, the etching object being an object to be etched by the etching gas, to etch the etching object without using plasma,

wherein the etching object contains at least one metal selected from ~~among titanium,~~ indium~~,~~ and tin~~.~~<u>,</u>

<u>wherein the content of a halogen simple substance gas contained in the etching gas is less than 5% by volume.</u>

2. The dry etching method according to claim 1,

wherein the halogen fluoride is at least one selected from among bromine monofluoride, bromine trifluoride, bromine pentafluoride, iodine pentafluoride, and iodine heptafluoride.

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

wherein the etching gas is a mixed gas containing the halogen fluoride and an inert gas.

~~4. The dry etching method according to any one of claims 1 to 3,~~

~~wherein the content of a halogen simple substance gas contained in the etching gas is less than 5% by volume.~~

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

wherein the dry etching is performed under a temperature condition of 40°C to 250°C.

~~6~~5. The dry etching method according to any one of claims 1 to ~~4~~3,

wherein the dry etching is performed under a temperature condition of 80°C to 150°C.

~~7~~6. The dry etching method according to any one of claims 1 to ~~6~~5,

wherein the dry etching is performed under a pressure condition of 1 Pa to 100 kPa.

~~8~~7. The dry etching method according to any one of claims 1 to ~~7~~6,

wherein the member to be etched has a non-etching object, the non-etching object being not an object to be etched by the etching gas, and the etching object,

the non-etching object has at least one selected from among copper, nickel, cobalt, and photoresist, and

the etching object is selectively etched against the non-etching object.

~~9~~8. The dry etching method according to any one of claims 1 to ~~8~~7,

wherein the etching object is at least one selected from among a simple substance of the metal, an oxide of the metal, a nitride of the metal, an oxynitride of the metal, and an oxyfluoride of the metal.

~~10~~9. A production method for a semiconductor element for manufacturing a semiconductor element by using the dry etching method according to any one of claims 1 to ~~9~~8,

wherein the member to be etched is a semiconductor substrate having the etching object, and

the production method includes processing in which at least a part of the etching object is removed from the semiconductor substrate by the etching.

~~11~~10. A cleaning method for cleaning an inner surface of a chamber of a semiconductor element manufacturing apparatus by using the dry etching method according to any one of claims 1 to ~~9~~8,

wherein the member to be etched is the chamber, the chamber has, on its inner surface, a deposit adhering due to an operation of the semiconductor element manufacturing apparatus, and the deposit is the etching object, and

the cleaning method includes cleaning for removing the deposit from the inner surface of the chamber by the etching.