

CLAIMS

[Claim 1]

A vacuum processing method for etching a titanium-containing film formed on a sample placed on a sample stage in a processing chamber, the vacuum processing method comprising:

an etching step of cyclically etching the film; and

a cleaning step of cleaning a titanium-containing reaction product,

wherein

after the etching step, radicals generated by using a mixed gas of nitrogen trifluoride (NF_3) gas, argon (Ar) gas, chlorine (Cl_2) gas, and nitrogen (N_2) gas are deposited in the processing chamber to react with the titanium-containing reaction product, while heating by IR light and desorbing the reacted reaction product.

[Claim 2]

A vacuum processing method for etching a titanium-containing film formed on a sample placed on a sample stage in a processing chamber, the vacuum processing method comprising:

an etching step of etching the film by using a plasma;

and

a cleaning step of cleaning a titanium-containing reaction product,
wherein

after the etching step, radicals generated by using a mixed gas of nitrogen trifluoride (NF_3) gas, argon (Ar) gas, chlorine (Cl_2) gas, and nitrogen (N_2) gas are deposited in the processing chamber to react with the titanium-containing reaction product, while heating by IR light and desorbing the reacted reaction product.

[Claim 3]

The vacuum processing method according to claim 1 or 2,
wherein

a flow rate ratio of the nitrogen (N_2) gas to a flow rate of the mixed gas is 30% or less.

[Claim 4]

The vacuum processing method according to claim 1 or 2,
further comprising:

a step of cleaning an inside of the processing chamber by using a mixed gas of sulfur hexafluoride (SF_6) gas and argon (Ar) gas; and
wherein

the step is performed between the etching step and the cleaning step.

[Claim 5]

The vacuum processing method according to claim 4,
wherein

the step is depositing radicals generated by using the mixed gas of sulfur hexafluoride (SF_6) gas and argon (Ar) gas in the processing chamber to react with a silicon-containing reaction product, and cleaning the silicon-containing reaction product while heating by IR light and desorbing the reacted reaction product.