SUMMARY

TECHNICAL PROBLEM

[0006]

Incidentally, when silicon nitride is etched using an etching solution composition containing phosphoric acid and water, ammonium phosphate [$(NH_4)_3PO_4$)] and silicic acid [$SiO_x(OH)_{4-2x}]_n$ are generated in the solution. As the silicic acid concentration of the solution increases, silicic acid molecules undergo dehydration condensation to form silica [SiO_x], which is likely to be deposited on the surface of silicon oxide. Such deposition may cause defects such as short circuits and defective interconnections in semiconductor products, and therefore, should be avoided to the extent possible.

[0007]

In addition, in order to selectively etch away silicon nitride from a semiconductor containing silicon nitride and silicon oxide, it is necessary to increase the etch rate of silicon nitride and decrease the etch rate of silicon oxide. However, silicon oxide is also etched by water, and therefore, when an aqueous etching solution composition is used, it is necessary to take measures to reduce the etching of silicon oxide.

[0008]

With regard to this, Patent Document 1 includes the

[0010]

Thus, conventional etching solution compositions have difficulties in reducing the deposition of silica on the surface of silicon oxide while having a high selectivity ratio. There is still room for improvement in etching solution compositions.

[0011]

With the above problems in mind, the present disclosure has been made. It is an object of the present disclosure to provide an etching solution composition that is capable of both having a high etch selectivity of silicon nitride and reducing the deposition of silica on the surface of silicon oxide.

SOLUTION TO PROBLEM

[0011a] In an aspect, there is provided an inorganic acid-based etching solution composition for selectively etching away silicon nitride from a semiconductor containing silicon nitride and silicon oxide, the etching solution composition comprising:

an etch inhibitor that reduces etching of silicon oxide; and

a deposition inhibitor that reduces deposition of silica on a surface of silicon oxide,

wherein

the etch inhibitor includes a first etch inhibitor

having, in the molecular structure, at most three of alkoxy groups, hydroxy groups, and/or functional groups that are a precursor of a hydroxy group, and a second etch inhibitor having, in the molecular structure, at least four of alkoxy groups, hydroxy groups, and/or functional groups that are a precursor of a hydroxy group.

[0012]

A characteristic feature of an etching solution composition according to the present disclosure for solving the above problem is an inorganic acid-based etching solution composition for selectively etching away silicon nitride from a semiconductor containing silicon nitride and silicon oxide, the etching solution composition comprising:

an etch inhibitor that reduces etching of silicon oxide; and

a deposition inhibitor that reduces deposition of silica on a surface of silicon oxide,