

CLAIMS

[Claim 1]

An etching fluid for forming irregularities on a silicon substrate surface,
the etching fluid comprising:

(A) an alkali component;

(B) a phosphonic acid derivative or a salt thereof; and

(C) a compound that contains at least one selected from the group consisting of a carboxy group, a sulfo group, a carboxy or sulfo group forming a salt, and a carboxymethyl group within the molecule;

wherein the concentration of the alkali component (A) is 0.3 mass% to 25 mass%, the concentration of the phosphonic acid derivative or a salt thereof (B) is 0.3 mass% to 25 mass%, and the concentration of the compound (C) is 0.0001 mass% to 25 mass%.

[Claim 2]

The etching fluid according to claim 1, wherein the alkali component (A) is sodium hydroxide or potassium hydroxide.

[Claim 3]

The etching fluid according to claim 1 or 2, wherein the phosphonic acid derivative or a salt thereof (B) is 1-hydroxyethylidene-1,1-diphosphonic acid or a salt thereof.

[Claim 4]

The etching fluid according to any one of claims 1 to 3, wherein the compound (C) is at least one selected from the group consisting of carboxylic acid, a salt of carboxylic acid, sulfonic acid, and a salt of sulfonic acid.

[Claim 5]

The etching fluid according to claim 4, wherein the compound (C) is a compound represented by the following general formula (I);



wherein R^1 is any of an alkyl group of 4 to 12 carbon atoms, an alkenyl group, an alkoxy group, and an aryl group, and X is a carboxy group or a sulfo group.

[Claim 6]

The etching fluid according to claim 5, wherein the compound (C) is a compound of the general formula (I) in which R^1 is an alkyl group having a branched structure, an

[Claim 11]

The etching fluid according to claim 10, wherein the compound having a carboxymethyl group within the molecule is a compound that contains a monosaccharide as a basic constituting unit.

[Claim 12]

The etching fluid according to claim 11, wherein the compound having a carboxymethyl group within the molecule is a carboxymethyl cellulose salt.

[Claim 13]

The etching fluid according to any one of claims 1 to 12, wherein the alkali component (A), the phosphonic acid derivative or a salt thereof (B), and the compound (C) are mixed in a mass ratio A/(B + C) of 0.1 to 10.

~~[Claim 14]~~

~~———— The etching fluid according to any one of claims 1 to 13, wherein the concentration of the alkali component (A) is 0.3 mass% to 25 mass%, the concentration of the phosphonic acid derivative or a salt thereof (B) is 0.1 mass% to 25 mass%, and the concentration of the compound (C) is 0.0001 mass% to 25 mass%.~~

[Claim ~~15~~14]

A method for treating a surface of a silicon substrate,
the method comprising dipping the silicon substrate in the etching fluid of any one of claims 1 to ~~14~~13 to form an irregular structure on the substrate surface.