CLAIMS

[Claim 1] A surface treatment composition that are supplied as a vapor to a surface of a wafer having an uneven pattern on the surface and used to form a water-repellent protective film on the surface, the surface treatment composition comprising:

a silylating agent; and

a solvent,

wherein the silylating agent contains a trialkylsilylamine,

the solvent contains at least one or more selected from the group consisting of glycol ether acetate and glycol acetate, and

a total content of the glycol ether acetate and the glycol acetate is 50% by mass or more in 100% by mass of a total amount of the solvent,

wherein a boiling point difference between a boiling point of the solvent and a boiling point of the silylating agent at 1 atm (the boiling point of the solvent - the boiling point of the silylating agent) is 20°C or more.

[Claim 2] The surface treatment composition according to claim 1,

wherein a content of the silylating agent is 0.3% by mass or more and 30% by mass or less in 100% by mass of the surface treatment composition.

[Claim 3] The surface treatment composition according to claim 1 or 2,

wherein a total content of the glycol ether acetate and the glycol acetate is 50% by mass or more in 100% by mass of the surface treatment

composition.

[Claim 4] The surface treatment composition according to any one of claims 1 to 3,

wherein the trialkylsilylamine includes one or more selected from the group consisting of trimethylsilyldimethylamine, trimethylsilyldiethylamine, and N-(trimethylsilyl)-tertiary-butylamine.

[Claim 5] The surface treatment composition according to any one of claims 1 to 4,

wherein a water contact angle on a silicon wafer surface after a surface treatment, which is measured by the following procedure, is 70° or more,

(the procedure)

a silicon wafer having a thermal oxide film layer over a surface is immersed in 1% by mass of hydrofluoric acid at 25°C for 10 minutes and cleaned by being immersed in pure water at 25°C for 1 minute and in 2-propanol (iPA) at 25°C for 1 minute,

the cleaned silicon wafer is disposed horizontally in a state in which a puddle of iPA is formed on the silicon wafer, and a vapor of the surface treatment composition is supplied to the silicon wafer,

subsequently, a state of the vapor is changed, on the surface of the silicon wafer, to a liquid to replace iPA held on the surface with the liquid,

subsequently, the silicon wafer is immersed in iPA at 25°C for 1 minute,

then, an air is blown to the silicon wafer to remove iPA on the surface, and

the water contact angle on the surface of the silicon wafer obtained by the above-described steps is measured in accordance with JIS R 3257: 1999 "Testing method of wettability of substrate glass surface" using approximately 2 μl of pure water.

[Claim 6] The surface treatment composition according to any one of claims 1 to 5,

wherein the surface treatment composition does not contain a fluorine-based solvent.

[Claim 7] The surface treatment composition according to any one of claims 1 to 6,

wherein the surface treatment composition does not contain an acyclic carbonate ester.

[Claim 8] The surface treatment composition according to any one of claims 1 to 7,

wherein the surface treatment composition does not contain a catalyst.

[Claim 9] The surface treatment composition according to any one of claims 1 to 8,

wherein the number of particles larger than 0.2 μm, which is measured using a light scattering liquid borne particle detector, is 1.0×10^4 or less per 1 mL of the surface treatment composition.

[Claim 10] The surface treatment composition according to any one of claims 1 to 9,

wherein a total content of Na, Mg, Ca, Mn, Fe, Cu, Li, Al, Cr, Ni, Zn, and Ag, which is measured using inductively coupled plasma mass spectrometry, is 100 mass ppb or less in the surface treatment composition.

[Claim 11] A method for producing a wafer, comprising:

a step of preparing a wafer having an uneven pattern on a surface;

a step of cleaning the surface of the wafer by supplying a cleaning liquid; and

a step of supplying a vapor of a surface treatment composition to the surface on which the cleaning liquid is held, changing, on the surface, a state of the vapor to a liquid to replace the cleaning liquid with the liquid, and forming a water-repellent protective film on at least a part of the surface,

wherein the surface treatment composition

contains a silylating agent and a solvent,

the silylating agent contains a trialkylsilylamine,

the solvent contains at least one or more selected from the group consisting of glycol ether acetate and glycol acetate, and

a total content of the glycol ether acetate and the glycol acetate is 50% by mass or more in 100% by mass of a total amount of the solvent,

wherein, in the surface treatment composition, a boiling point difference between a boiling point of the solvent and a boiling point

of the silylating agent at 1 atm (the boiling point of the solvent – the boiling point of the silylating agent) is 20°C or more.

[Claim 12] The method for producing a wafer according to claim 11, wherein, in the surface treatment composition, a content of the silylating agent is 0.3% by mass or more and 30% by mass or less in 100% by mass of the surface treatment composition.

[Claim 13] The method for producing a wafer according to claim 11 or 12,

wherein, in the surface treatment composition, a total content of the glycol ether acetate and the glycol acetate is 50% by mass or more in 100% by mass of the surface treatment composition.

[Claim 14] The method for producing a wafer according to any one of claims 11 to 13,

wherein, in the surface treatment composition, the trialkylsilylamine includes one or more selected from the group consisting of trimethylsilyldimethylamine, trimethylsilyldiethylamine, and N-(trimethylsilyl)-tertiary-butylamine.

[Claim 15] The method for producing a wafer according to any one of claims 11 to 14,

wherein the surface treatment composition does not contain a fluorine-based solvent.

[Claim 16] The method for producing a wafer according to any one of claims 11 to 15,

wherein the surface treatment composition does not contain an acyclic carbonate ester.

[Claim 17] The method for producing a wafer according to any one of claims 11 to 16,

wherein the surface treatment composition does not contain a catalyst.

[Claim 18] The method for producing a wafer according to any one of claims 11 to 17,

wherein, in the surface treatment composition, the number of particles larger than 0.2 μm, which is measured using a light scattering liquid borne particle detector, is 1.0×10^4 or less per 1 mL of the surface treatment composition.

[Claim 19] The method for producing a wafer according to any one of claims 11 to 18,

wherein, in the surface treatment composition, a total content of Na, Mg, Ca, Mn, Fe, Cu, Li, Al, Cr, Ni, Zn, and Ag, which is measured using inductively coupled plasma mass spectrometry, is 100 mass ppb or less in the treatment composition.

[Claim 20] The method for producing a wafer according to any one of claims 11 to 19,

wherein the vapor of the surface treatment composition is supplied in a state in which IPA is held on the surface of the wafer.

[Claim 21] The method for producing a wafer according to any one of claims 11 to 20, further comprising:

a step of preparing the surface treatment composition using a raw material having 2,000 mass ppm or less of a total amount of moisture in the raw material with respect to a total amount of the raw material.