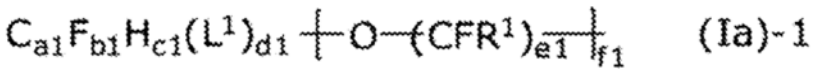
CLAIMS

1. A semiconductor aqueous composition, comprising:
a single or plurality of surfactant(s) having a monovalent anion part represented by formula (I) and a monovalent cation part other than hydrogen ion; water, and a C_{3-30} alcohol compound which has 1 to 3 hydroxy groups and may be substituted by F,

Chain 1 - X^1 - N- - X^2 - Chain 2 (I)
wherein,
X^1 is -C(=O)- or -$S(=O)_2$-,
X^2 is -C(=O)- or -$S(=O)_2$-,
Chain 1 is a linear or branched C_{1-20} alkyl, wherein one or more H in the C_{1-20} alkyl are replaced by F, and one or more methylenes in Chain 1 may be replaced by -O-, and Chain 2 is a linear or branched C_{1-20} alkyl, wherein one or more H in the C_{1-20} alkyl are replaced by F, and one or more methylenes in Chain 2 may be replaced by -O-, with the proviso that Chain 1 and Chain 2 may be bonded to form a ring structure.

2. The composition according to claim 1, wherein Chain 1 is represented

by formula (Ia)-1 and Chain 2 is represented by formula (Ia)-2: wherein



(Ia)-1

L^1 is a single bond, which bonds to Chain 2,
a1 is 0, 1, 2, 3, 4, or 5, b1 is an integer of 1 or more, c1 is an integer of 0 or more, d1 is 0 or 1, and b1+c1+d1=2(a1)+1,
R^1 is each independently -F, -CF_3, -CF_2H,-CFH_2, or -CH_3, and when e1 ≥ 2, each R^1 can be the same to or different from each other,
e1 is 0, 1, 2, or 3, and
f1 is 0, 1, 2, or 3,



(Ia)-2

L^2 is a single bond, which bonds to Chain 1,

a2 is 0, 1, 2, 3, 4, or 5, b2 is an integer of one or more, c2 is an integer of 0 or more, d2 is 0 or 1, and b2+c2+d2=2(a2)+1,

R^2 is each independently -F, $-CF_3$, $-CF_2H$, $-CFH_2$, or $-CH_3$, and when $e2 \geq 2$, each R^2 can be the same to or different from each other,

e2 is 0, 1, 2, or 3,

f2 is 0, 1, 2, or 3;

with the proviso that when d1 is 1, d2 is 1, and L^1 and L^2 come together as one single bond to form a ring structure, wherein Chain 1 and Chain 2 is bonded via the single bond.

3. The composition according to claim 1, wherein the monovalent cation part comprises at least any one of a metallic cation, an inorganic ammonium cation, or an organic ammonium cation.

4. The composition according to claim 1, wherein the monovalent cation part is represented by formula (Ib):

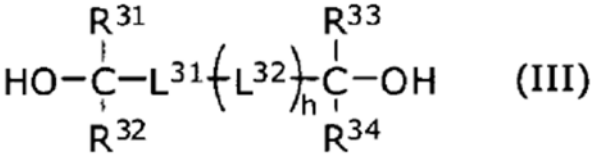
+NHpRb4-p (Ib)

wherein,

Rb is each independently a linear C_{1-3} alkyl, wherein one or more H in the C_{1-3} alkyl may be replaced by hydroxy, and

p is 0, 1, 2, 3, or 4.

5. The composition according to claim 1, wherein the alcohol compound is represented by the formula (III):



(III)

wherein,

R^{31}, R^{32}, R^{33} and R^{34} are each independently H, F, or a C_{1-5} alkyl,

L^{31} and L^{32} are each independently a C_{1-20} alkylene, a C_{1-20} cycloalkylene, a C_{2-4} alkenylene, a C_{2-4} alkynylene, or a C_{6-20} arylene, wherein these groups may be substituted by F, a C_{1-5} alkyl, or hydroxy, and

h is 0, 1, or 2.

6. The composition according to claim 1, wherein the content of the surfactant is 0.005 to 2.0 mass % based on the total mass of the composition.

7. The composition according to claim 1, wherein the content of the alcohol compound is 0.005 to 2.0 mass % based on the total mass of the composition.

8. The composition according to claim 1, further comprising an antibacterial agent, a germicide, an antiseptic, an antifungal agent, a surfactant other than said surfactant, an acid, a base, an organic solvent, or any mixture of any of these.

9. A semiconductor aqueous cleaning composition, consisting of the semiconductor aqueous composition according to claim 1.

10. A resist pattern cleaning composition, consisting of the semiconductor aqueous composition according to claim 1.

11. A method for manufacturing a resist pattern, using the semiconductor aqueous composition according to claim 1.

12. A method for manufacturing a resist pattern, comprising;
    (1) applying a photosensitive resin composition on a substrate, with or without one or more interlayers, to form a photosensitive resin layer;
    (2) exposing the photosensitive resin layer to radiation;
    (3) developing the exposed photosensitive resin layer; and
    (4) cleaning the developed layer with the semiconductor aqueous composition comprising:

    a single or plurality of surfactant(s) having a monovalent anion part represented by formula (I) and a monovalent cation part other than hydrogen ion; and water,

    Chain 1 - X^1 - N- - X^2 - Chain 2 (I)

    wherein,

    X^1 is -C(=O)- or -$S(=O)_2$-,

    X^2 is -C(=O)- or -$S(=O)_2$-,

Chain 1 is a linear or branched C_{1-20} alkyl, wherein one or more H in the C_{1-20} alkyl are replaced by F, and one or more methylenes in Chain 1 may be replaced by -O-, and Chain 2 is a linear or branched C_{1-20} alkyl, wherein one or more H in the C_{1-20} alkyl are replaced by F, and one or more methylenes in Chain 2 may be replaced by -O-, with the proviso that Chain 1 and Chain 2 may be bonded to form a ring structure.

13. The method for manufacturing a resist pattern according to claim 12, wherein the photosensitive resin composition is a chemically amplified photosensitive resin composition, and extreme ultraviolet radiation is used for the exposure.

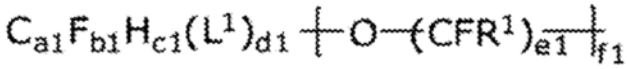
14. The method for manufacturing a resist pattern according to claim 11, wherein the minimum space size of the resist pattern in a circuit unit is 10 to 30 nm.

15. A method for manufacturing a semiconductor, comprising the method for manufacturing a resist pattern according to claim 11.

16. A method for manufacturing a semiconductor, comprising performing etching using the resist pattern produced by the method according to claim 11 as a mask, and processing the substrate.

17. The method for manufacturing a semiconductor according to claim 16, comprising forming wiring on the processed substrate.

18. The method according to claim 12, wherein Chain 1 is represented by formula (Ia)-1 and Chain 2 is represented by formula (Ia)-2: wherein



(Ia)-1

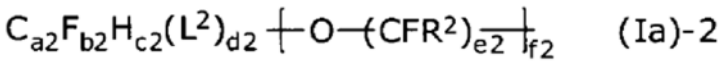
L^1 is a single bond, which bonds to Chain 2,

a1 is 0, 1, 2, 3, 4, or 5, b1 is an integer of 1 or more, c1 is an integer of 0 or more, d1 is 0 or 1, and b1+c1+d1=2(a1)+1,

R^1 is each independently -F, -CF3, -CF2H, -CFH_2, or -CH_3, and when e1 ≥ 2, each R1 can be the same to or different from each other,

e1 is 0, 1, 2, or 3, and

f1 is 0, 1, 2, or 3,



(Ia)-2

L^2 is a single bond, which bonds to Chain 1,

a2 is 0, 1, 2, 3, 4, or 5, b2 is an integer of one or more, c2 is an integer of 0 or more, d2 is 0 or 1, and b2+c2+d2=2(a2)+1,

R^2 is each independently -F, $-CF_3$, $-CF_2H$, $-CFH_2$, or $-CH_3$, and when e2 ≥ 2, each R^2 can be the same to or different from each other,

e2 is 0, 1, 2, or 3,

f2 is 0, 1, 2, or 3;

with the proviso that when d1 is 1, d2 is 1, and L^1 and L^2 come together as one single bond to form a ring structure, wherein Chain 1 and Chain 2 is bonded via the single bond.

19. The method according to claim 12, wherein the monovalent cation part comprises at least any one of a metallic cation, an inorganic ammonium cation, or an organic ammonium cation.

20. The method according to claim 12, wherein the monovalent cation part is represented by formula (Ib):

+NHpRb4-p (Ib)

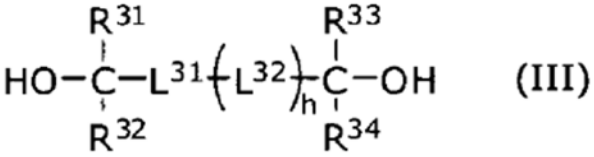
wherein,

Rb is each independently a linear C_{1-3} alkyl, wherein one or more H in the C_{1-3} alkyl may be replaced by hydroxy, and

p is 0, 1, 2, 3, or 4.

21. The method according to claim 12, further comprising a C_{3-30} alcohol compound which has 1 to 3 hydroxy groups and may be substituted by F.

22. The method according to claim 21, wherein the alcohol compound is represented by the formula (III):



(III)

wherein,

R^{31}, R^{32}, R^{33} and R^{34} are each independently H, F, or a C_{1-5} alkyl,

L^{31} and L^{32} are each independently a C_{1-20} alkylene, a C_{1-20} cycloalkylene, a C_{2-4} alkenylene, a C_{2-4} alkynylene, or a C_{6-20} arylene, wherein these groups may be substituted by F, a C_{1-5} alkyl, or hydroxy, and

h is 0, 1, or 2.

23. The method according to claim 12, wherein the content of the surfactant is 0.005 to 2.0 mass % based on the total mass of the composition.

24. The method according to claim 12, wherein the content of the alcohol compound is 0.005 to 2.0 mass % based on the total mass of the composition.

25. The method according to claim 12, further comprising an antibacterial agent, a germicide, an antiseptic, an antifungal agent, a surfactant other than said surfactant, an acid, a base, an organic solvent, or any mixture of any of these.

26. A semiconductor aqueous composition, comprising:

a single or plurality of surfactant(s) having a monovalent anion part represented by formula (I) and a monovalent cation part other than hydrogen ion; water, and an alcohol compound having a content of 0.005 to 2.0 mass % based on the total mass of the composition,

Chain 1 - X^1 - N- - X^2 - Chain 2 (I)

wherein,

X^1 is -C(=O)- or -$S(=O)_2$-,

X^2 is -C(=O)- or -$S(=O)_2$-,

Chain 1 is a linear or branched C_{1-20} alkyl, wherein one or more H in the C_{1-20} alkyl are replaced by F, and one or more methylenes in Chain 1 may be replaced by -O-, and Chain 2 is a linear or branched C_{1-20} alkyl, wherein one or more H in the C_{1-20} alkyl are replaced by F, and one or more methylenes in Chain 2 may be replaced by -O-, with the proviso that Chain 1 and Chain 2 may be bonded to form a ring structure.