

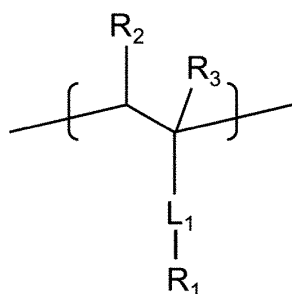
Patent Claims

1. A substrate cleaning solution comprising an insoluble or hardly soluble solute (A), a soluble solute (B), and a solvent (C):
wherein
the solvent (C) comprises water (C-1); and
the content of the soluble solute (B) is 0.1 to 500 mass % based on water (C-1);
preferably the substrate cleaning solution is dripped on a substrate and dried to remove at least a part of the solvent (C) to form a film, the film being then removed from the substrate by a remover;
preferably the insoluble or hardly soluble solute (A) is insoluble or hardly insoluble by the remover; and/or
preferably the soluble solute (B) is soluble by the remover.
2. The substrate cleaning solution according to claim 1, wherein the soluble solute (B) is a compound comprising carboxyl, sulfo, or phospho:
preferably the acid dissociation constant pK_a (H_2O) of the soluble solute (B) is -5 to 11.
3. The substrate cleaning solution according to claim 1 or 2, wherein the solvent (C) comprises an organic solvent (C-2):
preferably the organic solvent (C-2) has volatility; and/or
preferably the boiling point of the organic solvent (C-2) at one atmospheric pressure is 50 to 250°C.
4. The substrate cleaning solution according to one or more of claims 1 to 3, wherein the insoluble or hardly soluble solute (A) comprises at least one of novolak derivatives, phenol derivatives, polystyrene derivatives, polyacrylate derivatives, polymaleic acid derivatives, polycarbonate derivatives, polyvinyl alcohol derivatives, polymethacrylate derivatives, and copolymer of any combination of any of these:

preferably the insoluble or hardly soluble solute (A) does not contain fluorine and/or silicon.

5. The substrate cleaning solution according to one or more of claims 1 to 4, wherein the soluble solute (B) is a crack accelerating component (B'), where the crack accelerating component (B') comprises hydrocarbon comprising carboxyl.

6. The substrate cleaning solution according to one or more of claims 1 to 5, wherein the soluble solute (B) comprises a structural unit represented by the formula (B-1):



(B-1)

where

L₁ is a linker selected from at least one of a single bond, C₁₋₄ alkylene, phenylene, ether, carbonyl, amide, and imide,

R₁ is carboxyl, sulfo, or phospho,

R₂ is hydrogen, methyl, or carboxyl, and

R₃ is hydrogen or methyl.

7. The substrate cleaning solution according to one or more of claims 1 to 6, wherein the solubility of the insoluble or hardly soluble solute (A) in 5.0 mass % ammonia water is less than 100 ppm, and the solubility of the soluble solute (B) in 5.0 mass % ammonia water is 100 ppm or more:

preferably the solubility is determined under the condition of 20 to 35°C (more preferably 25±2°C) by providing a flask charged with 100 ppm of the (A) or (B) in 5.0 mass % ammonia water, covering the flask with a cap, shaking for 3 hours in a shaker,

and confirming whether (A) or (B) is dissolved or not.

8. The substrate cleaning solution according to one or more of claims 1 to 7, wherein the content of the insoluble or hardly soluble solute (A) is 0.1 to 50 mass % based on the substrate cleaning solution:

preferably the content of the soluble solute (B) is 1 to 100 mass % based on the insoluble or hardly soluble solute (A);
and/or

preferably the content of the solvent (C) is 0.1 to 99.9 mass % based on the substrate cleaning solution.

9. The substrate cleaning solution according to one or more of claims 1 to 8, wherein the weight-average molecular weight (M_w) of the insoluble or hardly soluble solute (A) is 150 to 500,000:

preferably the molecular weight of the soluble solute (B) is 500 to 500,000.

10. The substrate cleaning solution according to one or more of claims 1 to 9, further comprising a further additive (D), wherein the further additive (D) comprises a surfactant, an acid, a base, an antibacterial agent, a germicide, an antiseptic, or an antifungal agent,

preferably the content of the further additive (D) is 0 to 100 mass % (more preferably 0 to 10 mass %) based on the insoluble or hardly soluble solute (A).

11. A method for manufacturing a cleaned substrate, comprising:

- (1) dripping the substrate cleaning solution according to one or more of claims 1 to 10 on a substrate;
- (2) removing at least a part of the solvent (C) to form a film;
- (3) making the film hold particles on the substrate; and
- (4) applying a remover on the substrate to remove the film holding particles.

12. The method for manufacturing a cleaned substrate according to claim 11, wherein the substrate in (1) is a non-processed substrate or processed substrate:
preferably the surface of the substrate is a semiconductor,
and/or
preferably the surface of the substrate is selected from the group consisting of Si, Ge, SiGe, Si₃N₄, TaN, SiO₂, TiO₂, Al₂O₃, SiON, HfO₂, T₂O₅, HfSiO₄, Y₂O₃, GaN, TiN, SiCN, NbN, Cu, Ta, W, Hf, Al, Ru, Co and amorphous carbon.

13. The method for manufacturing a cleaned substrate according to claim 11 or 12, comprising at least one of the following steps:
(0-1) processing the substrate by etching to form a pattern and removing an etching mask;
(0-2) cleaning the substrate;
(0-3) prewetting the substrate;
(0-4) cleaning the substrate;
(5) dripping water or an organic solvent on the substrate after the removal of the film in which particles are held and removing water or the organic solvent to clean the substrate further.

14. The method for manufacturing a cleaned substrate according to one or more of claims 11 to 13, wherein the step (2) is carried out by spin-drying the substrate:
preferably the spin-dry is carried out at 500 to 3,000 rpm for 0.5 to 90 seconds and/or
preferably the substrate is a disk shape substrate and has a diameter of 200 to 600 nm.

15. A device manufacturing method, comprising the method for manufacturing a cleaned substrate according to one or more of claims 11 to 14.