What is claimed is:

1. A cleaning agent for a substrate comprising [I] an organic acid having at least one carboxyl group and /or [II] a complexing agent, and [III] an organic solvent selected from the group consisting of (1) monohydric alcohols, (2) alkoxyalcohols, (3) glycols, (4) glycol ethers, (5) ketones and (6) nitriles.

2. The cleaning agent according to Claim 1, wherein the learning agent contains [I] the organic acid having at least one carboxyl group and [II] the complexing agent.

3. The cleaning agent according to Claim 1, wherein the cleaning agent is an aqueous solution.

4. The cleaning agent according to Claim 1, wherein the organic solvent is one selected from the group consisting of methanol, ethanol, isopropyl alcohol, 2-methoxyethanol, 2-(2-butoxyethoxy)ethanol, ethylene glycol, diethylene glycol monomethyl ether, acetone and acetonitrile.

5. The cleaning agent according to Claim 1, wherein the complexing agent is one selected from the group consisting of a compound having at least one phosphonic acid group in a molecule, and an ammonium salt or an alkali metal salt thereof.

6. The cleaning agent according to Claim 5, wherein the compound having at least one phosphonic acid group in a molecule is one selected from the group consisting of nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in

a molecule, an aryl polyphosphonic acid, an alkylene polyphosphonic acid, alkane polyphosphonic acids which may have a hydroxyl group, and an ammonium salt or an alkali metal salt thereof.

7. The cleaning agent according to Claim 5, wherein the compound having at least one phosphonic acid group in a molecule is one selected from the group consisting of nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule, alkane polyphosphonic acids which may have a hydroxyl group, and an ammonium salt or an alkali metal salt thereof.

8. The cleaning agent according to Claim 6, wherein the nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule is one selected from the group consisting of an alkylamino poly(alkylphosphonic acid), a mono- or polyalkylenepolyamine poly(alkylphosphonic acid), a nitrilo-poly(alkylphosphonic acid), and an ammonium salt or an alkali metal salt thereof.

9. The cleaning agent according to claim 1, wherein the complexing agent is one selected from the group consisting of:

ethylenediaminebis(methylenephosphonic acid) [EDDPO];

ethylenediaminetetrakis(ethylenephosphonic acid);

ethylenediaminetetrakis(methylenephosphonic acid) [EDTPO];

hexamethylenediaminetetrakis(methylenephosphonic acid);

isopropylenediaminebis(methylenephosphonic acid);
isopropylenediamintetra(methylenephosphonic acid);
propanediaminetetra(ethylenephosphonic acid) [PDTMP];
diaminopropanetetra(methylenephosphonic acid) [PDTPO];
diethylenetriaminepenta(ethylenephosphonic acid) [DEPPO];
diethylenetriaminepenta(methylenephosphonic acid) [DETPPO];
triethylenetetraminehexa(ethylenephosphonic acid) [TETHP];
triethylenetetraminehexa(methylenephosphonic acid) [TTHPO];
nitrilotris(methylenephosphonic acid) [NTPO];
ethylidenediphosphonic acid;
1-hydroxyethylidene-1,1'-diphosphonic acid [HEDPO];
1-hydroxypropylidene-1,1'-diphosphonic acid; and
1-hydroxybutylidene-1,1'-diphosphonic acid.

10. The cleaning agent according to Claim 1, wherein the organic acid is an organic acid having 2 or 3 carboxyl groups.

11. The cleaning agent according to Claim 1, wherein the organic acid is a dicarboxylic acid or an oxycarboxylic acid.

12. The cleaning agent according to Claim 11, wherein the oxycarboxylic acid is an oxydicarboxylic acid or an oxytricarboxylic acid.

13. The cleaning agent according to Claim 11, wherein the dicarboxylic acid is one selected from the group consisting of an oxalic acid, a malonic acid, a

succinic acid, a glutaric acid, an adipic acid, a pimelic acid, a maleic acid, a fumaric acid and a phthalic acid.

14. The cleaning agent according to Claim 11, wherein the oxycarboxylic acid is a malic acid, a tartaric acid, or a citric acid.

15. The cleaning agent according to Claim 1, wherein the organic acid is a dicarboxylic acid or an oxycarboxylic acid; the complexing agent is one selected from the group consisting of nitrogen-containing polyphosphonic acid having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule, alkane polyphosphonic acids which may have a hydroxyl group, and an ammonium salt or an alkali metal salt thereof; and the organic solvent is one selected from the group consisting of monohydric alcohols, alkoxyalcohols, glycols, glycol ethers, ketones and nitriles.

16. The cleaning agent according to Claim 1, wherein pH of the cleaning agent is 0.5 to 6.5.

17. The cleaning agent according to Claim 1, wherein the substrate is a semiconductor.

18. The cleaning agent according to Claim 1, wherein the substrate is one with metallic wiring provided thereon.

19. The cleaning agent according to Claim 18, wherein the metallic wiring is a copper wiring.

20. The cleaning agent according to Claim 1, wherein the substrate is one treated with a slurry containing benzotriazole or a derivative thereof.

21. A cleaning method for a surface of substrate,

which comprises treating the surface of substrate with the cleaning agent according to Claim 1.

22. The cleaning method according to Claim 21, wherein the treatment with the cleaning agent is dipping the surface of substrate in the cleaning agent according to Claim 1 or spraying said cleaning agent on the surface of substrate.

23. The cleaning method according to Claim 21, wherein physical cleaning is further used in combination.

24. The cleaning method according to Claim 21, wherein the substrate is one after subjecting to a chemical mechanical polishing process.

25. The cleaning agent according to Claim 21, wherein the substrate is a semiconductor.

26. The cleaning method according to Claim 21, wherein the substrate is one with metallic wiring provided thereon.

27. The cleaning method according to Claim 26, wherein the metallic wiring is a copper wiring.

28. The cleaning method according to Claim 21, wherein the substrate is one after subjecting to the treatment process with a slurry containing benzotriazole or a derivative thereof.

Claims

1. A cleaning agent for a substrate comprising [I] an organic acid having at least one carboxyl group, [II] a complexing agent selected from the group consisting of a compound having at least one phosphonic acid group in a molecule, and an ammonium salt or an alkali metal salt thereof, and [III] an organic solvent selected from the group consisting of methanol, ethanol, isopropyl alcohol, 2-methoxyethanol, 2-(2-butoxyethoxy)ethanol, ethylene glycol, diethylene glycol, diethylene glycol monomethyl ether, acetone and acetonitrile,

with the proviso that hydrochloric acid, nitric acid, sulfuric acid, phosphoric acid and hydrofluoric acid are not contained in the cleaning agent,

and wherein the pH of the cleaning agent is 0.5 to 6.5.

2. The cleaning agent according to Claim 1, wherein the cleaning agent is an aqueous solution.

3. The cleaning agent according to Claim 1, wherein the complexing agent is one selected from the group consisting of nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule, an aryl polyphosphonic acid, an alkylene polyphosphonic acid, alkane polyphosphonic acids which may have a hydroxyl group, and an ammonium salt or an alkali metal salt thereof.

4. The cleaning agent according to Claim 1, wherein the complexing agent is one selected from the group consisting of nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule, alkane polyphosphonic acids which may have a

hydroxyl group, and an ammonium salt or an alkali metal salt thereof.

5. The cleaning agent according to Claim 3, wherein the nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule is one selected from the group consisting of an alkylamino poly(alkylphosphonic acid), a mono- or polyalkylenepolyamine poly(alkylphosphonic acid), a nitrilo-poly(alkylphosphonic acid), and an ammonium salt or an alkali metal salt thereof.

6. The cleaning agent according to Claim 1, wherein the complexing agent is one selected from the group consisting of:

ethylenediaminebis(methylenephosphonic acid) [EDDPO];
ethylenediaminetetrakis(ethylenephosphonic acid);
ethylenediaminetetrakis(methylenephosphonic acid) [EDTPO]; hexamethylenediaminetetrakis(methyl-enephosphonic acid);
isopropylenediaminebis(methylenephosphonic acid);
isopropylenediamintetra(methylenephosphonic acid);
propanediaminetetra(ethylenephosphonic acid)[PDTMP];
diaminopropanetetra(methylenephosphonic acid)[PDTPO];
diethylenetriaminepenta(ethylenephosphonic acid) [DEPPO];
diethylenetriaminepenta(methylenephosphonic acid) [DETPPO];
triethylenetetraminehexa(ethylenephosphonic acid) [TETHP];
triethylenetetraminehexa(methylenephosphonic acid) [TTHPO];

nitrilotris(methylenephosphonic acid)[NTPO];
ethylidenediphosphonic acid;
1-hydroxyethylidene-1,1'-diphosphonic acid [HEDPO];
1-hydroxypropylidene-1,1'-diphosphonic acid; and
1-hydroxybutylidene-1,1'-diphosphonic acid.

7. The cleaning agent according to Claim 1, wherein the organic acid is an organic acid having 2 or 3 carboxyl groups.

8. The cleaning agent according to Claim 1, wherein the organic acid is a dicarboxylic acid or an oxycarboxylic acid.

9. The cleaning agent according to Claim 8, wherein the oxycarboxylic acid is an oxydicarboxylic acid or an oxytricarboxylic acid.

10. The cleaning agent according to Claim 8, wherein the dicarboxylic acid is one selected from the group consisting of an oxalic acid, a malonic acid, a succinic acid, a glutaric acid, an adipic acid, a pimelic acid, a maleic acid, a fumaric acid and a phthalic acid.

11. The cleaning agent according to Claim 8, wherein the oxycarboxylic acid is a malic acid, a tartaric acid, or a citric acid.

12. The cleaning agent according to Claim 1, wherein the organic acid is a dicarboxylic acid or an oxycarboxylic acid; the complexing agent is one selected from the group consisting of nitrogen-containing polyphosphonic acids having 1 to 6 nitrogen atoms and 1 to 8 phosphonic acid groups in a molecule, alkane polyphosphonic acids which may have a hydroxyl group, and an ammonium salt or an alkali metal salt thereof; and the organic solvent is one selected from the group consisting of methanol, ethanol, isopropyl alcohol, 2-methoxyethanol, 2-(2-butoxyethoxy) ethanol, ethylene glycol,

diethylene glycol, diethylene glycol monomethyl ether, acetone and acetonitrile.

13. Use of a cleaning agent according to Claim 1 for cleaning a semiconductor substrate, a substrate with metallic wiring provided thereon or a substrate treated with a slurry containing benzotriazole or a derivative thereof.

14. Use of a cleaning agent according to Claim 13, wherein the metallic wiring is a copper wiring.

15. A cleaning method for a surface of substrate, which comprises treating the surface of substrate with the cleaning agent according to Claim 1 by dipping the surface of substrate in the cleaning agent according to Claim 1 or spraying said cleaning agent on the surface of substrate.

16. The cleaning method according to Claim 15, wherein physical cleaning is further used in combination.

17. The cleaning method according to Claim 15, wherein the substrate is one after subjecting to a chemical mechanical polishing process.

18. The cleaning method according to Claim 15, wherein the substrate is a semiconductor.

19. The cleaning method according to Claim 15, wherein the substrate is one with metallic wiring provided thereon.

20. The cleaning method according to Claim 19, wherein the metallic wiring is a copper wiring.

21. The cleaning method according to Claim 15, wherein the substrate is one after subjecting to the treatment process

with a slurry containing benzotriazole or a derivative thereof.