CLAIMS

1. A composition useful for removing residue and photoresist from a semiconductor substrate comprising:

from about 5 to about 60% by wt. of water;

from about 10 to about 90% by wt. at least one water-miscible organic solvent selected from pyrrolidones, sulfonyl-containing solvents, acetamides, glycol ethers, polyols, cyclic alcohols, and mixtures thereof;

from about 5 to about 90% by wt. of at least one alkanolamine;

from about 0.05 to about 20% by wt. of at least one polyfunctional organic acid; and

from about 0.1 to about 10% by wt. of at least one phenol-type corrosion inhibitor,

wherein the composition is substantially free of hydroxylamine.

2. The composition of claim 1 comprising from about 10 to about 60% by wt.~~, or from about 30 to about 50% by wt.~~ of said at least one water-miscible organic solvent.

3. The composition of ~~any of the preceding claims~~claim 1 comprising from about 10 to about 50% by wt.~~, or from about 35 to about 50% by wt.~~ of said at least one alkanolamine.

4. The composition of ~~any of the preceding claims~~claim 1 comprising from about ~~0.1 to about 20 or from about~~ 0.1 to about 5% by wt. of said at least one polyfunctional organic acid.

5. The composition of ~~any of the preceding claims~~claim 1 comprising from about 1 to about 7% by wt. of said at least one phenol-type corrosion inhibitor.

6. The composition of ~~any of the preceding claims~~claim 1 comprising from ~~about 5 to about 30% by wt., or from~~ about 5 to about 15% by wt. of said water.

7. The composition of ~~any of the preceding claims~~claim 1, wherein said water miscible solvent is selected from N-methyl pyrrolidone (NMP), sulfolane,

dimethylsulfoxide (DMSO), dimethylacetamide (DMAC), diproylene glycol monomethyl ether (DPGME), diethylene glycol monomethyl ether (DEGME), butyl digycol (BDG), 3-methoxyl methyl butanol (MMB), tripropylene glycol methyl ether, propylene glycol propyl ether, diethylene gycol n-butyl ether, ethylene glycol, propylene glycol, 1,4-butanediol, glycerol, tetrahydrofurfuryl alcohol and benzyl alcohol, and mixtures thereof.

8. The composition of ~~any of the preceding claim~~claim 1, wherein said at least one water-miscible organic solvent is selected from N-methyl pyrrolidone (NMP), dimethylacetamide (DMSO), dimethylacetamide (DMAC), diproylene glycol monomethyl ether (DPGME), ethylene glycol, propylene glycol (PG), and mixures thereof.

9. The composition of ~~the preceding claims~~claim 1, wherein the at least one alkanolamine is selected from N-methylethanolamine (NMEA), monoethanolamine (MEA), diethanolamine, mono-, di- and triisopropanolamine, 2-(2-aminoethylamino)ethanol, 2-(2-aminoethoxy)ethanol, triethanolamine, N-ethyl ethanolamine, N,N-dimethylethanolamine, N,N-diethyl ethanolamine, N-methyl diethanolamine, N-ethyl diethanolamine, cyclohexylaminediethanol, and mixtures thereof.

10. The composition of ~~any of the preceding claims~~claim 1, wherein the alkanolamine comprises N-methylethanolamine.

11. The composition of ~~any of the preceding claims~~claim 1, wherein the alkanolamine comprises monoethanolamine.

12. The composition of ~~any of the preceding claims~~claim 1, wherein said at least one phenol-type corrosion inhibitor is selected from t-butyl catechol, catechol, 2,3-dihydroxybenzoic acid, gallic acid, resorcinol, and mixtures thereof.

13. The composition of ~~any of the preceding claims~~claim 1, wherein the at least one polyfunctional organic acid is selected from citric acid, malonic acid, malic acid, tartaric acid, oxalic acid, phthalic acid, maleic acid, ethylenedinitrilo)tetraacetic acid (EDTA), butylenediaminetetraacetic acid, (1,2-cyclohexylenedinitrilo-)tetraacetic acid (CyDTA),

diethylenetriaminepentaacetic acid (DETPA), ethylenediaminetetrapropionic acid, (hydroxyethyl)ethylenediaminetriacetic acid (HEDTA) and mixtures thereof.

14. The composition of ~~any of the preceding claims~~claim 1, wherein the at least one polyfunctional organic acid comprises citric acid.

15. The composition of ~~any of the preceding claims~~claim 1, wherein the at least one water-miscible organic solvent comprises NMP.

16. The composition of ~~any of the preceding claims~~claim 1, wherein the at least one water-miscible organic solvent comprises DMSO.

17. The composition of ~~any of the preceding claims~~claim 1 further comprising at least one chelating agent, wherein said at least one chelating agent differs from said at least one corrosion inhibitor and said at least one polyfunctional acid.

18. The composition of claim 17, wherein said at least one chelating agent is present in said composition in an amount from about 0.1 to about 2 wt %.

19. The composition of claim 17, ~~and 18~~ wherein said at least one chelating agent is selected from (ethylenedinitrilo)tetraacetic acid (EDTA), butylenediaminetetraacetic acid, (1,2-cyclohexylenedinitrilo-)tetraacetic acid (CyDTA), diethylenetriaminepentaacetic acid (DETPA), ethylenediaminetetrapropionic acid, (hydroxyethyl)ethylenediaminetriacetic acid (HEDTA), N, N,N', N'-ethylenediaminetetra(methylenephosphonic) acid (EDTMP), triethylenetetraaminehexaacetic acid (TTHA), 1,3-diamino-2-hydroxypropane-N,N,N',N'-tetraacetic acid (DHPTA), isomers or salts thereof, and mixtures thereof.

20. The composition of ~~any of the preceding claims~~claim 1 having a pH value from 9 to 13~~, or 10 to 12~~.

21. A method for removing residue or photoresist from a substrate comprising at least one of aluminum-copper alloy, aluminum nitride and tungsten; the method comprising the steps of:

contacting the substrate with a cleaning composition of ~~any of the preceding claims~~claim 1; and

rinsing the substrate with water.

22. The method of claim 21 wherein the temperature of the cleaning composition during the contacting step is from about 25° C to about 85° C~~, or from 45° C to about 65° C~~.

23. The method of claim 21 ~~or 22~~ further comprising, prior to the step of rinsing the substrate with water, a step of rinsing the substrate with an organic solvent.

~~24. The method of either of claims 21 or 23 wherein the substrate is a semiconductor substrate.~~

~~25~~24. The method of ~~any of claims 21 through 24~~claim 21, wherein the ~~substrate comprises aluminum copper alloy and the method provides an~~ etch rate ~~of the aluminum copper alloy when measured after the water rinsing step of less than 2 Å/min or preferably~~is less than about 1 Å /min when the temperature of cleaning composition during the contacting step is less than or equal to about 60°C.

~~26. The method of any of claims 21 through 25 wherein the substrate comprises tungsten and the method provides an etch rate of the tungsten when measured after the water rinsing step of less than 2 Å/min or preferably less than 1 Å /min when the temperature of cleaning composition during the contacting step is less than or equal to 60°C.~~

~~27. The method of any of claims 21 through 26, wherein the substrate further comprises aluminum nitride, and wherein the method provides an etch rate of the aluminum nitride measured after the water rinsing step of less than 4 Å/min when the temperature of cleaning composition during the contacting step is less than or equal to 60°C, or an etch rate of less than 1 Å/min when the temperature of cleaning composition during the contacting step is less than or equal to 50°C.~~

~~28. The method of any of claims 21 through 27 further comprising the step of drying the substrate after said water rinsing step.~~