CLAIMS

What is claimed is

1. A composition for cleaning microelectronic devices or semiconductor substrates comprising:

(i) at least two alkanolamines;

(ii) at least one hydroxylamine or derivatives of hydroxylamine or mixtures thereof;

(iii) at least one polyfunctional organic acid with at least two carboxylic acid groups; and

(iv) from about 5% to about 45% by wt. of water,

wherein the composition is substantially free of fluorine-containing compounds and added ammonium salts.

2. The composition of claim 1, wherein the at least two alkanolamines comprise at least three alkanolamines.

3. The composition of claim 1, wherein the at least two alkanolamines are selected from monoethanolamine (MEA), aminoethoxyethanol, methanolamine, N-methyl ethanolamine, N-ethyl ethanolamine, N, N-dimethylethanolamine, N, N-diethylethanolamine, N-methyl diethanolamine, N-ethyl diethanolamine, diethanolamine, triethanol amine (TEA), tertiarybutyldiethanol amine, isopropanolamine, 2-amino- l-propanol, 3-amino-l-propanol, 2-amino-l-butanol, isobutanolamine, 2-amino-2-ethoxypropanol, 2-amino-2-ethoxyethanol and mixtures thereof.

4. The composition of claim 1, wherein the at least two alkanolamines are selected from aminoethoxyethanol, 2-amino-2-ethoxypropanol, 2-amino-2-ethoxyethanol, and mixtures thereof.

5. The composition of claim 1, wherein the at least two alkanolamines comprise monoethanolamine, isopropanolamine, 2-(2-aminoethoxy)ethanol.

6. The composition of claim 1, wherein the at least one hydroxylamine or derivatives of hydroxylamine or mixtures thereof comprises one or more of N-isopropylhydroxylamine, N-methylhydroxylamine, dimethylhydroxylamine, N-ethylhydroxylamine, diethylhydroxylamine, N-propylhydroxylamine, dipropylhydroxylamine, and N-tert-butyl-hydroxylamine, N,O-dimethylhydroxylamine, O-Methylhydroxylamine, O-Ethylhydroxylamine, O-Propylhydroxylamine, hydroxylamine sulfate, hydroxylamine nitrate, Hydroxylamine hydrochloride, N-tert-Butylhydroxylamine hydrochloride, hydroxylamine

phosphate, hydroxylamine acetate, N-(tert-Butyl)hydroxylamine acetate , hydroxylamine citrate, Hydroxylamine, and perchlorate, N-methylhydroxylamine hydrochloride.

7. The composition of claim 1, wherein the at least one hydroxylamine or derivatives of hydroxylamine or mixtures thereof comprises one or more of hydroxylamine, hydroxylamine sulfate and hydroxylamine phosphate.

8. The composition of claim 1, wherein the at least one hydroxylamine or derivatives of hydroxylamine or mixtures thereof comprises hydroxylamine.

9. The composition of claim 1, wherein the at least one hydroxylamine or derivatives of hydroxylamine or mixtures thereof comprises hydroxylamine sulfate.

10. The composition of claim 1, wherein the at least one polyfunctional organic acid is one or more of oxalic acid, malonic acid, malic acid, tartaric acid, succinic acid, citric acid, (ethylenedinitrilo)tetraacetic acid (EDTA), butylenediaminetetraacetic acid, (1,2-cyclohexylenedinitrilo-)tetraacetic acid (CyDTA), diethylenetriaminepentaacetic acid (DETPA), ethylenediaminetetrapropionic acid, (hydroxyethyl)ethylenediaminetriacetic acid (HEDTA), triethylenetetraminehexaacetic acid (TTHA), 1,3-diamino-2-hydroxypropane-N,N,N',N'-tetraacetic acid (DHPTA), methyliminodiacetic acid, propylenediaminetetraacetic acid, nitrolotriacetic acid (NTA), and phthalic acid.

11. The composition of claim 1, wherein the at least one polyfunctional organic acid is one or more of citric acid, EDTA and CyDTA.

12. The composition of claim 1, wherein the at least one polyfunctional organic comprises citric acid.

13. The composition of claim 1, wherein the at least one polyfunctional organic comprises EDTA.

14. The composition of claim 1, further comprising (v) at least one corrosion inhibitor.

15. The composition of claim 14, wherein the at least one corrosion inhibitor is one or more of selected from phenol or derivatives of phenol or mixtures thereof or triazoles or mixtures of triazoles or mixtures of phenols or derivatives of phenol and triazoles.

16. The composition of claim 14, wherein the at least one corrosion inhibitor comprises catechol and gallic acid.

17. The composition of claim 14, wherein the at least one corrosion inhibitor comprises catechol.

18. The composition of claim 14, wherein the at least one corrosion inhibitor comprises gallic acid.

19. The composition of claim 14, wherein

(a) the at least three alkanolamines (i) comprise monoethanolamine, isopropanolamine and 2-(2-aminoethoxy)ethanol;

(b) the at least one hydroxylamine or derivatives of hydroxylamine or mixtures thereof (ii) comprises one of hydroxylamine and hydroxylamine sulfate;

(c) the at least one polyfunctional organic acid with at least two carboxylic acid groups (iii) comprises citric acid; and

(d) the at least one corrosion inhibitor (v) comprises at least one of catechol and gallic acid.

20. The composition of claim 19, wherein the composition has a pH of between approximately 9.5 and approximately 10.6.