We claim:

1. A cleaning composition for semiconductor substrates comprising:

(i) an alkanolamine having two or more or more than two alkanol groups;

(ii) an alpha hydroxy acid; and

(iii) water.

2. The cleaning composition of claim 1 comprising two or more alkanolamines, wherein two of the alkanolamines have two or more than two alkanol groups.

3. The cleaning composition of claim 1 comprising two or more alkanolamines, wherein a first of the alkanolamines has two or more or more than two alkanol groups and a second of the alkanolamines has one alkanol group.

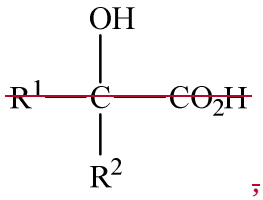
4. The cleaning composition of claims 2 or 3 having three alkanolamines.

5. The cleaning composition of any of the preceding claims wherein the alkanolamine having two or more alkanol groups is selected from, N-methyl diethanolamine, N-ethyl diethanolamine, diethanolamine, triethanol amine (TEA), tertiarybutyldiethanol amine, and mixtures thereof.

6. The cleaning composition of claim 3, wherein the alkanolamine having one alkanol group is selected from monoethanolamine (MEA), N-methyl ethanolamine, N-ethyl ethanolamine, N, N-dimethylethanolamine, N, N-diethylethanolamine, 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.

7. The cleaning composition of any of the preceding claims wherein the α-hydroxy carboxylic acid comprises one or more than one acid group (-COOH).

8. The cleaning composition of any of the preceding claims wherein the α-hydroxy carboxylic acid has the following structure:



,

wherein R^1 and R^2 can independently be H, an aromatic or non-aromatic and/or saturated or unsaturated carbon ring; or a straight-chain, branched or cyclic alkyl.

9. The cleaning composition of any of the preceding claims, wherein the α-hydroxy carboxylic acid is selected from citric acid, tartronic acid, saccharic acid, tartaric acid, dihydroxymalonic acid and mixtures thereof.

10. The cleaning composition of any of the preceding claims wherein the α-hydroxy carboxylic acid is selected from glycolic acid, lactic acid, malic acid, gluconic acid, glyceric acid, mandelic acid and mixtures thereof.

11. The cleaning composition of any of the preceding claims further comprising a corrosion inhibitor.

12. The cleaning composition of claim 11, wherein the corrosion inhibitor is selected from a phenol or derivatives of phenol, triazole or derivatives of triazole, polyfunctional organic acids or amino acids or mixtures thereof.

13. A cleaning composition for semiconductor substrates consisting essentially of:

(i) an alkanolamine having two or more or more than two alkanol groups;

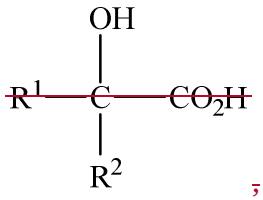
(ii) an alpha hydroxy acid; and

(iii) water.

14. The cleaning composition of claim 13, wherein the alkanolamine having two or more alkanol groups is selected from, N-methyl diethanolamine, N-ethyl diethanolamine, diethanolamine, triethanol amine (TEA), tertiarybutyldiethanol amine, and mixtures thereof.

15. The cleaning composition of any of claims 13 or 14, wherein the α-hydroxy carboxylic acid comprises one or more than one acid group (-COOH).

16. The cleaning composition of any of claims 13 or 14, wherein the α-hydroxy carboxylic acid has the following structure:



;

wherein R^1 and R^2 can independently be H, an aromatic or non-aromatic and/or saturated or unsaturated carbon ring; or a straight-chain, branched or cyclic alkyl.

17. The cleaning composition of any of claims 13 or 14, wherein the α-hydroxy carboxylic acid is selected from citric acid, tartronic acid, saccharic acid, tartaric acid, dihydroxymalonic acid and mixtures thereof.

18. The cleaning composition of any of claims 13 or 14, wherein the α-hydroxy carboxylic acid is selected from glycolic acid, lactic acid, malic acid, gluconic acid, glyceric acid, mandelic acid and mixtures thereof.

19. A cleaning composition for semiconductor substrates consisting of:

(i) an alkanolamine having two or more or more than two alkanol groups;

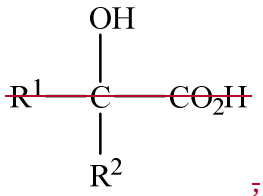
(ii) an alpha hydroxy acid; and

(iii) water.

20. The cleaning composition of claim 19, wherein the alkanolamine having two or more alkanol groups is selected from, N-methyl diethanolamine, N-ethyl diethanolamine, diethanolamine, triethanol amine (TEA), tertiarybutyldiethanol amine, and mixtures thereof.

21. The cleaning composition of any of claims 19 or 20, wherein the α-hydroxy carboxylic acid comprises one or more than one acid group (-COOH).

22. The cleaning composition of any of claims 19 or 20, wherein the α-hydroxy carboxylic acid has the following structure:



;

wherein R^1 and R^2 can independently be H, an aromatic or non-aromatic and/or saturated or unsaturated carbon ring; or a straight-chain, branched or cyclic alkyl.

23. The cleaning composition of any of claims 19 or 20, wherein the α-hydroxy carboxylic acid is selected from citric acid, tartronic acid, saccharic acid, tartaric acid, dihydroxymalonic acid and mixtures thereof.

24. The cleaning composition of any of claims 19 or 20, wherein the α-hydroxy carboxylic acid is selected from glycolic acid, lactic acid, malic acid, gluconic acid, glyceric acid, mandelic acid and mixtures thereof.

25. The composition of any of claims 19 or 20, wherein the alpha hydroxy acid comprises gluconic acid.

26. A cleaning composition for semiconductor substrates consisting essentially of:

(i) an alkanolamine having two or more or more than two alkanol groups;

(ii) an alpha hydroxy acid;

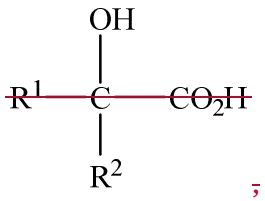
(iii) water; and

(iv) a corrosion inhibitor.

27. The cleaning composition of claim 26, wherein the alkanolamine having two or more alkanol groups is selected from, N-methyl diethanolamine, N-ethyl diethanolamine, diethanolamine, triethanol amine (TEA), tertiarybutyldiethanol amine, and mixtures thereof.

28. The cleaning composition of any of claims 26 or 27, wherein the α-hydroxy carboxylic acid comprises one or more than one acid group (-COOH).

29. The cleaning composition of any of claims 26 or 27, wherein the α-hydroxy carboxylic acid has the following structure:



;

wherein R^1 and R^2 can independently be H, an aromatic or non-aromatic and/or saturated or unsaturated carbon ring; or a straight-chain, branched or cyclic alkyl.

30. The cleaning composition of any of claims 26 or 27, wherein the α-hydroxy carboxylic acid is selected from citric acid, tartronic acid, saccharic acid, tartaric acid, dihydroxymalonic acid and mixtures thereof.

31. The cleaning composition of any of claims 26 or 27, wherein the α-hydroxy carboxylic acid is selected from glycolic acid, lactic acid, malic acid, gluconic acid, glyceric acid, mandelic acid and mixtures thereof.

32. The cleaning composition of any of claims 26 or 27, wherein the corrosion inhibitor is selected from a phenol or derivatives of phenol, triazole or derivatives of triazole, polyfunctional organic acids or amino acids or mixtures thereof.

33. A cleaning composition for semiconductor substrates consisting essentially of:

(i) an alkanolamine having two or more or more than two alkanol groups;

(ii) an alpha hydroxy acid;

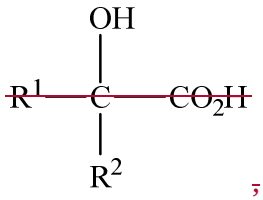
(iii) water; and

(iv) a corrosion inhibitor.

~~**34.** The cleaning composition of claim 33, wherein the alkanolamine having two or more alkanol groups is selected from, N-methyl diethanolamine, N-ethyl diethanolamine, diethanolamine, triethanol amine (TEA), tertiarybutyldiethanol amine, and mixtures thereof.~~

~~**35.** The cleaning composition of any of claims 33 or 34, wherein the α hydroxy carboxylic acid comprises one or more than one acid group (-COOH).~~

~~**36.** The cleaning composition of any of claims 33 or 34, wherein the α-hydroxy carboxylic acid has the following structure:~~



~~,~~

~~wherein R^1 and R^2 can independently be H, an aromatic or non-aromatic and/or saturated or unsaturated carbon ring; or a straight-chain, branched or cyclic alkyl.~~

~~**37.** The cleaning composition of any of claims 33 or 34, wherein the α-hydroxy carboxylic acid is selected from citric acid, tartronic acid, saccharic acid, tartaric acid, dihydroxymalonic acid and mixtures thereof.~~

~~**38.** The cleaning composition of any of claims 33 or 34, wherein the α hydroxy carboxylic acid is selected from glycolic acid, lactic acid, malic acid, gluconic acid, glyceric acid, mandelic acid and mixtures thereof.~~

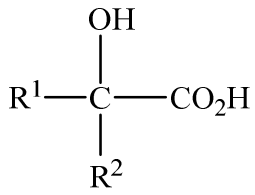
~~**39.** The cleaning composition of any of claims 33 or 34, wherein the corrosion inhibitor is selected from a phenol or derivatives of phenol, triazole or derivatives of triazole, polyfunctional organic acids or amino acids or mixtures thereof.~~

~~40~~1. A cleaning composition for semiconductor substrates comprising:

(i) between approximately 5% by weight and approximately 50% weight of an alkanolamine having two or more or more than two alkanol groups;

(ii) between 25% by weight and approximately 70% by weight of an alkanolamine~~s~~ having one alkanol group;

(iii) an alpha hydroxy acid having the following structure:



; and

(iv) water.

~~41. The composition of claim 40, further comprising (v) catechol.~~

~~42. The composition of claim 40, further comprising (vi) gallic acid.~~

~~43~~2. The composition of claim ~~40~~1, further comprising one or both of (v) catechol and (vi) gallic acid.

~~44~~3. The composition of ~~claim 40~~claim 1, further comprising (vii) a corrosion inhibitor.

~~45~~4. The composition of ~~claim 40~~claim 1, wherein the alkanolamine having two or more or more than two alkanol groups comprises triethanolamine.

~~46. The composition of claim 40, wherein the alkanolamine having two or more or more than two alkanol groups consists essentially of triethanolamine.~~

~~47. The composition of claim 40, wherein the alkanolamine having two or more or more than two alkanol groups consists of triethanolamine.~~

~~48~~5. The composition of ~~claim 40~~ claim 1, wherein the alkanolamine having one alkanol group~~s~~ comprises one or more of monoethanolamine, 2-(2-Aminoethoxy)ethanol, N-methylethanolamine and monoisopropylamine.

~~49~~6. The composition of ~~claim 40~~ claim 1, wherein the alkanolamine having one alkanol group~~s~~ comprises monoethanolamine.

~~50. The composition of claim 40, wherein the alkanolamine having one alkanol groups consists essentially of monoethanolamine.~~

~~51. The composition of claim 40, wherein the alkanolamine having one alkanol groups consists of monoethanolamine.~~

~~52~~7. The composition of ~~claim 40~~ claim 1, wherein the alpha hydroxy acid is selected from the group of glycolic acid, lactic acid, tartaric acid, citric acid, malic acid, gluconic acid, glyceric acid, mandelic acid, tartronic acid, saccharic acid and dihydroxymalonic acid and mixtures thereof.

~~53~~8. The composition of ~~claim 40~~ claim 1, wherein the alpha hydroxy acid comprises gluconic acid.

~~54. The composition of claim 40, wherein the alpha hydroxy acid consists essentially of gluconic acid.~~

~~55. The composition of claim 40, wherein the alpha hydroxy acid consists of gluconic acid.~~

~~56. The composition of claim 40, wherein the composition comprises between approximately 10% by weight and approximately 40% weight of triethanolamine.~~

~~**57.** The composition of claim 40, wherein the composition comprises between approximately 20% by weight and approximately 30% weight of triethanolamine.~~

~~**58.** The composition of claim 40, wherein the composition comprises approximately 20% by weight of triethanolamine.~~

~~**59.** The composition of claim 40, wherein the composition comprises between approximately 20% by weight and approximately 50% weight of monoethanolamine.~~

~~**60.** The composition of claim 40, wherein the composition comprises between approximately 35% by weight and approximately 50% weight of monoethanolamine.~~

~~**61.** The composition of claim 40, wherein the composition comprises between approximately 35% by weight and approximately 45% weight of monoethanolamine.~~

~~**62.** The composition of claim 40, wherein the composition comprises approximately 35% by weight of monoethanolamine.~~

~~63~~9. The composition of ~~claim 40~~ claim 1, wherein the composition comprises between approximately 2.5% by weight and approximately 25% weight of the alpha hydroxy acid.

~~**64.** The composition of claim 40, wherein the composition comprises between approximately 5% by weight and approximately 20% weight of the alpha hydroxy acid.~~

~~**65.** The composition of claim 40, wherein the composition comprises between approximately 10% by weight and approximately 15% weight of the alpha hydroxy acid.~~

~~**66.** The composition of claim 40, wherein the composition comprises approximately 15% weight of the alpha hydroxy acid.~~

~~67~~10. The composition of ~~claim 40~~ claim 1, wherein the composition comprises approximately 10% weight of the alpha hydroxy acid.

~~68~~11. The composition of ~~claim 40~~ claim 1, wherein the composition comprises between approximately 2.5% by weight and approximately 25% weight of gluconic acid.

~~**69.** The composition of claim 40, wherein the composition comprises between approximately 5% by weight and approximately 20% weight of gluconic acid.~~

~~**70.** The composition of claim 40, wherein the composition comprises between approximately 10% by weight and approximately 15% weight of gluconic acid.~~

~~**71.** The composition of claim 40, wherein the composition comprises approximately 15% weight of gluconic acid.~~

~~72~~12. The composition of ~~claim 40~~ claim 1, wherein the composition comprises approximately 10% weight of gluconic acid.

~~73~~13. The composition of ~~claim 40~~ claim 1, wherein the composition comprises approximately 6% weight of catechol.

~~**74.** The composition of claim 40, wherein the composition comprises approximately 2% weight of gallic acid.~~

~~75~~14. The composition of ~~claim 40~~ claim 1, wherein the composition comprises approximately 3% weight of gallic acid.

~~76~~15. The composition of ~~claim 40~~ claim 1, wherein the composition comprises between approximately 5% by weight and ~~10~~15% by weight in combination of catechol and gallic acid.

~~**77.** The composition of claim 40, wherein the composition comprises approximately 5% by weight in combination of catechol and gallic acid.~~

~~**78.** The composition of claim 40, wherein the composition comprises approximately 6% by weight in combination of catechol and gallic acid.~~

~~**79.** The composition of claim 40, wherein the composition comprises approximately 7% by weight in combination of catechol and gallic acid.~~

~~**80.** The composition of claim 40, wherein the composition comprises approximately 8% by weight in combination of catechol and gallic acid.~~

~~**81.** The composition of claim 40, wherein the composition comprises approximately 9% by weight in combination of catechol and gallic acid.~~

~~82~~16. The composition of ~~claim 40~~ claim 1, wherein the composition comprises approximately 10% by weight in combination of catechol and gallic acid.

~~83~~17. The composition of ~~claim 40~~ claim 1, wherein the composition comprises (i) approximately 20% by weight of triethanolamine and (ii) between approximately 35% by weight and approximately 45% weight of monoethanolamine.

~~84~~18. The composition of ~~claim 40~~ claim 1, wherein the composition comprises (i) approximately 20% by weight of triethanolamine, (ii) between approximately 35% by weight and approximately 45% weight of monoethanolamine and (iii) approximately 10% weight of gluconic acid.

~~85~~19. The composition of ~~claim 40~~ claim 1, wherein the composition comprises (i) approximately 20% by weight of triethanolamine, (ii) between approximately 35% by weight and approximately

45% weight of monoethanolamine, (iii) approximately 10% weight of gluconic acid and (iv) approximately 9% by weight in combination of catechol and gallic acid.

~~86~~20. A method of removing residues from a microelectronic device or semiconductor substrate comprising the step of contacting ~~a~~ the device or substrate with the cleaning composition of ~~any of claims 1 to 85~~ claim 1.