WHAT IS CLAIMED IS:

1. A cleaning composition, comprising:

1) at least one redox agent;

2) at least one alkylsulfonic acid or a salt thereof, the alkylsulfonic acid comprising an alkyl group substituted by OH or NH_2;

3) at least one aminoalcohol;

4) at least one corrosion inhibitor;

5) at least one organic solvent;

6) water; and

7) optionally, at least one pH adjusting agent.

2. The composition of claim 1, wherein the composition has a pH from about 8 to about 11.

3. The composition of claim 1, wherein the at least one alkylsulfonic acid comprises an alkylsulfonic acid of formula (I):

$$R\text{-}SO_3H \text{ (I)},$$

in which R is C_1-C_{10} alkyl substituted by at least one substituent selected from the group consisting of OH and NH_2.

4. The composition of claim 3, wherein R is C_1-C_4 alkyl substituted by at least one OH.

5. The composition of claim 1, wherein the at least one alkylsulfonic acid or a salt thereof comprises $HO(CH_2)_2SO_3H$ or $HO(CH_2)_2SO_3NH_4$.

6. The composition of claim 1, wherein the at least one alkylsulfonic acid or a salt thereof is from about 0.3% by weight to about 5% by weight of the composition.

7. The composition of claim 1, wherein the at least one redox agent comprises hydroxylamine.

8. The composition of claim 1, wherein the at least one redox agent is from about 6% by weight to about 15% by weight of the composition.

9. The composition of claim 1, wherein the at least one aminoalcohol comprises ethanolamine or 2-(2-aminoethoxy)ethanol.

10. The composition of claim 1, wherein the at least one aminoalcohol is from about 5% by weight to about 10% by weight of the composition.

11. The composition of claim 1, wherein the at least one corrosion inhibitor comprises benzotriazole optionally substituted by at least one substituent selected from the group consisting of alkyl groups, aryl groups, halogen groups, amino groups, nitro groups, alkoxy groups, and hydroxyl groups.

12. The composition of claim 1, wherein the at least one corrosion inhibitor comprises a compound selected from the group consisting of benzotriazole, 5-aminotetrazole, 1-hydroxybenzotriazole, 5-phenylthiol-benzotriazole, 5-chlorobenzotriazole, 4-chlorobenzotriazole, 5-bromobenzotriazole, 4-bromobenzotriazole, 5-fluorobenzotriazole, 4-fluorobenzotriazole, naphthotriazole, tolyltriazole, 5-phenyl-benzotriazole, 5-nitrobenzotriazole, 4-nitrobenzotriazole, 3-amino-5-mercapto-1,2,4-triazole, 2-(5-amino-pentyl)-benzotriazole, 1-amino-benzotriazole, 5-methylbenzotriazole, benzotriazole-5-carboxylic acid, 4-methylbenzotriazole, 4-ethylbenzotriazole, 5-ethylbenzotriazole, 4-propylbenzotriazole, 5-propylbenzotriazole, 4-isopropylbenzotriazole, 5-isopropylbenzotriazole, 4-n-butylbenzotriazole, 5-n-butylbenzotriazole, 4-isobutylbenzotriazole, 5-isobutylbenzotriazole, 4-

pentylbenzotriazole, 5-pentylbenzotriazole, 4-hexylbenzotriazole, 5-hexylbenzotriazole, 5-methoxybenzotriazole, 5-hydroxybenzotriazole, dihydroxypropylbenzotriazole, 1-[N,N-bis(2-ethylhexyl)aminomethyl]-benzotriazole, 5-t-butyl benzotriazole, 5-(1',1'-diimethylpropyl)-benzotriazole, 5-(1',1',3'-trimethylbutyl)benzotriazole, 5-n-octyl benzotriazole, and 5-(1',1',3',3'-tetramethylbutyl)benzotriazole.

13. The composition of claim 1, wherein the at least one corrosion inhibitor is from about 0.1% by weight to about 2% by weight of the composition.

14. The composition of claim 1, wherein the composition comprises the at least one pH adjusting agent and the at least one pH adjusting agent comprises an acid.

15. The composition of claim 1, wherein the composition comprises the at least one pH adjusting agent and the at least one pH adjusting agent is from about 1% by weight to about 10% by weight of the composition.

16. The composition of claim 1, wherein the at least one organic solvent comprises a solvent selected from the group consisting of water soluble alcohols, water soluble ketones, water soluble esters, and water soluble ethers.

17. The composition of claim 1, wherein the at least one organic solvent comprises a solvent selected from the group consisting of alkylene glycols and alkylene glycol ethers.

18. The composition of claim 1, wherein the at least one organic solvent is from about 30% by weight to about 50% by weight of the composition.

~~19. The composition of claim 1, wherein water is from about 20% by weight to about 50% by weight of the composition.~~

~~20. A method, comprising:~~

~~contacting a semiconductor substrate containing post etch residues or post ashing residues with a cleaning composition of any of claims 1-19.~~

~~21. The method of claim 20, wherein the semiconductor substrate further comprises at least one material selected from the group consisting of Cu, Co, W, AlOx, AlN, AlOxNy, Ti, TiN, Ta, TaN, TiOx, ZrOx, HfOx, and TaOx.~~

~~22. The method of claim 20, further comprising rinsing the semiconductor substrate with a rinse solvent after the contacting step.~~

~~23. The method of claim 22, further comprising drying the semiconductor substrate after the rinsing step.~~

~~24. The method of claim 20, further comprising forming a semiconductor device from the semiconductor substrate.~~

1. A cleaning composition, comprising:

1) hydroxylamine in an amount of at most about 15% by weight of the composition;

2) an aminoalcohol comprising at least two amino groups and at least one hydroxyl group, the aminoalcohol being in an amount of at most about 8% by weight of the composition;

3) hexylene glycol in an amount of at most about 50% by weight of the composition; and

4) water;

wherein the pH of the composition is from about 8 to about 11.

2. The composition of claim 1, wherein the hydroxylamine is at least about 6% by weight of the composition.

3. The composition of claim 1, wherein the hexylene glycol is at most about 30% by weight of the composition.

4. The composition of claim 1, wherein the water is at least about 20% by weight of the composition.

5. The composition of claim 1, wherein the water is at least about 40% by weight of the composition.

6. The composition of claim 1, wherein the water is at most about 50% by weight of the composition.

7. The composition of claim 1, further comprising at least one corrosion inhibitor.

8. The composition of claim 7, wherein the at least one corrosion inhibitor comprises benzotriazole optionally substituted by at least one substituent selected from the group consisting of alkyl groups, aryl groups, halogen groups, amino groups, nitro groups, alkoxy groups, and hydroxyl groups.

9. The composition of claim 7, wherein the at least one corrosion inhibitor comprises a compound selected from the group consisting of benzotriazole, 5-aminotetrazole, 1-hydroxybenzotriazole, 5-phenylthiol-benzotriazole, 5-chlorobenzotriazole, 4-chlorobenzotriazole, 5-bromobenzotriazole, 4-bromobenzotriazole, 5-fluorobenzotriazole, 4-fluorobenzotriazole, naphthotriazole, tolyltriazole, 5-phenyl-benzotriazole, 5-

nitrobenzotriazole, 4-nitrobenzotriazole, 3-amino-5-mercapto-1,2,4-triazole, 2-(5-amino-pentyl)-benzotriazole, 1-amino-benzotriazole, 5-methylbenzotriazole, benzotriazole-5-carboxylic acid, 4-methylbenzotriazole, 4-ethylbenzotriazole, 5-ethylbenzotriazole, 4-propylbenzotriazole, 5-propylbenzotriazole, 4-isopropylbenzotriazole, 5-isopropylbenzotriazole, 4-n-butylbenzotriazole, 5-n-butylbenzotriazole, 4-isobutylbenzotriazole, 5-isobutylbenzotriazole, 4-pentylbenzotriazole, 5-pentylbenzotriazole, 4-hexylbenzotriazole, 5-hexylbenzotriazole, 5-methoxybenzotriazole, 5-hydroxybenzotriazole, dihydroxypropylbenzotriazole, 1-[N,N-bis(2-ethylhexyl)aminomethyl]-benzotriazole, 5-t-butyl benzotriazole, 5-(1',1'- dimethylpropyl)-benzotriazole, 5-(1',1',3'-trimethylbutyl)benzotriazole, 5-n-octyl benzotriazole, and 5-(1',1',3',3'-tetramethylbutyl)benzotriazole.

10. The composition of claim 7, wherein the at least one corrosion inhibitor is from about 0.1% by weight to about 2% by weight of the composition.

11. The composition of claim 1, further comprising at least one pH adjusting agent, wherein the at least one pH adjusting agent comprises an acid.

12. The composition of claim 11, wherein the at least one pH adjusting agent is from about 1% by weight to about 10% by weight of the composition.

13. The composition of claim 1, wherein

the hydroxylamine is in an amount of from about 6% by weight to about 15% by weight of the composition;

the hexylene glycol is in an amount of at most about 30% by weight of the composition; and

the water is at least about 20% by weight of the composition.

14. The composition of claim 1, wherein the composition is free of a metal halide.

15. A method, comprising:

contacting a semiconductor substrate containing post etch residues or post ashing residues with a cleaning composition of claim 1.

16. The method of claim 15, wherein the semiconductor substrate further comprises at least one material selected from the group consisting of Cu, Co, W, AlOx, AlN, AlOxNy, Ti, TiN, Ta, TaN, TiOx, ZrOx, HfOx, and TaOx.

17. The method of claim 15, further comprising rinsing the semiconductor substrate with a rinse solvent after the contacting step.

18. The method of claim 17, further comprising drying the semiconductor substrate after the rinsing step.

19. The method of claim 15, further comprising forming a semiconductor device from the semiconductor substrate.