~~WHAT IS~~ CLAIM~~ED I~~S:

1. An etching composition, comprising:

1) an oxidizing agent;

2) a hydroxylcarboxylic acid comprising at least two carboxyl groups;

3) an anionic surfactant, the anionic surfactant being an alkyl ethoxylated carboxylic acid or a salt thereof; and

4) water;

wherein the composition is free of an abrasive and has a pH of from ~~about~~ 7 to ~~about~~ 10.

2. The composition of claim 1, wherein the composition has a pH from ~~about~~ 7 to ~~about~~ 9.5.

3. The composition of claim 1, wherein the oxidizing agent comprises a peroxide, a persulfonic acid or a salt thereof, ozone, a peroxycarboxylic acid or a salt thereof, a perphosphoric acid or a salt thereof, a persulfuric acid or a salt thereof, a perchloric acid or a salt thereof, or a periodic acid or a salt thereof.

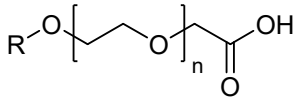
4. The composition of claim 1, wherein the oxidizing agent comprises hydrogen peroxide or persulfuric acid.

5. The composition of claim 1, wherein the oxidizing agent is in an amount of from ~~about~~ 10% by weight to ~~about~~ 30% by weight of the composition.

6. The composition of claim 1, wherein the hydroxylcarboxylic acid is citric acid or tartaric acid.

7. The composition of claim 1, wherein the ~~at~~ hydroxylcarboxylic acid is in an amount of from ~~about~~ 1% by weight to ~~about~~ 10% by weight of the composition.

~~8. The composition of claim 1, wherein the anionic surfactant is an alkyl ethoxylated carboxylic acid or a salt thereof.~~

~~9~~8. The composition of claim 1, wherein the anionic surfactant is a compound of formula (I):  (I) or a salt thereof, in which R is C_1-C_{14} alkyl and n is an integer ranging from 1 to 14.

~~10~~9. The composition of claim 1, wherein the anionic surfactant is in an amount of from ~~about~~ 0.001% by weight to ~~about~~ 5% by weight of the composition.

~~11~~10. The composition of claim 1, wherein the water is in an amount of from ~~about~~ 50% by weight to ~~about~~ 90% by weight of the composition.

~~12~~11. The composition of claim 1, further comprising a metal corrosion inhibitor.

~~13~~12. The composition of claim ~~12~~11, wherein the metal corrosion inhibitor comprises an azole or a salt thereof.

~~14~~13. The composition of claim ~~12~~11, wherein the metal corrosion inhibitor comprises 1,2,3-triazole, 1,2,4-triazole, 4-amino-1,2,4-triazole, 3-amino-1,2,4-triazole-5-thiol, 1H-benzotriazole, 5-methyl-1H-benzotriazole, 1H-benzotriazole-1-methanol, 5,6-dimethyl-1H-benzotriazole, 2-amino-1,3,4-thiadiazole, 1H-tetrazole, 5-phenyl-1H-tetrazole, 5-amino-1H-tetrazole, or a combination thereof.

~~15~~14. The composition of claim ~~12~~11, wherein the metal corrosion inhibitor is in an amount of from ~~about~~ 0.01% by weight to ~~about~~ 10% by weight of the composition.

~~16~~15. The composition of claim 1, further comprising a chelating agent.

~~17~~16. The composition of claim ~~16~~15, wherein the chelating agent is a phosphonic acid or a salt thereof.

~~18~~17. The composition of claim ~~16~~15, wherein the chelating agent is hexamethylenediamine tetra(methylenephosphonic acid), 1-hydroxyethane-1,1-diphosphonic acid, aminotris(methylenephosphonic acid), ethylenediamine tetra(methylenephosphonic acid), tetramethylenediamine tetra(methylenephosphonic acid), diethylenetriamine penta(methylenephosphonic acid), or a salt thereof.

~~19~~18. The composition of claim ~~16~~15, wherein the chelating agent comprises a polyaminopolycarboxylic acid.

~~20~~19. The composition of claim ~~16~~15, wherein the chelating agent comprises butylenediaminetetraacetic acid, diethylenetriaminepentaacetic acid, ethylenediaminetetrapropionic acid, triethylenetetraminehexaacetic acid, l,3-diamino-2-hydroxypropane-N,N,N',N'-tetraacetic acid, propylenediaminetetraacetic acid, ethylenediaminetetraacetic acid, trans-1,2-diaminocyclohexane tetraacetic acid, ethylendiamine diacetic acid, ethylendiamine dipropionic acid, 1,6-hexamethylene-diamine-N,N,N',N'-tetraacetic acid, N,N-bis(2-hydroxybenzyl)ethylenediamine-N,N-diacetic acid, diaminopropane tetraacetic acid, 1,4,7,10-tetraazacyclododecane-tetraacetic acid, diaminopropanol tetraacetic acid, or (hydroxyethyl)ethylenediaminetriacetic acid.

~~21~~20. The composition of claim ~~16~~15, wherein the chelating agent is in an amount of from ~~about~~ 0.01% by weight to ~~about~~ 10% by weight of the composition.

~~22~~21. The composition of claim 1, further comprising a pH adjusting agent.

~~23~~22. The composition of claim ~~22~~21, wherein the pH adjusting agent comprises a base or an acid.

2423. The composition of claim 2322, wherein the base is alkali hydroxide or ammonium hydroxide.

2524. The composition of claim 2021, wherein the pH adjusting agent is in an amount of from about 1% by weight to about 10% by weight of the composition.

2625. The composition of claim 1, further comprising a quaternary ammonium salt.

2726. The composition of claim 2625, wherein the quaternary ammonium salt is (lauryldimethylammonio)acetate, dodecyltrimethylammonium chloride, or benzyldodecyldimethylammonium bromide.

2827. The composition of claim 2625, wherein the quaternary ammonium salt is in an amount of from about 0.01% by weight to about 1% by weight of the composition.

2928. An etching composition, comprising:

1) an oxidizing agent;

2) a hydroxylcarboxylic acid comprising at least two carboxyl groups; and

3) water;

wherein the composition is free of a phosphonic acid, a fluoride-containing compound, and an abrasive and has a pH of from about 7.5 to about 10.

3029. A method, comprising:

contacting a semiconductor substrate containing a TaN feature with a composition of claim 1 to remove at least a portion of the TaN feature.

3130. The method of claim 3029, further comprising rinsing the semiconductor substrate with a rinse solvent after the contacting step.

3231. The method of claim 3130, further comprising drying the semiconductor substrate after the rinsing step.

~~33~~32. The method of claim ~~30~~29, wherein the method ~~does not substantially~~ removes copper in the semiconductor substrate at a lower rate than the TaN feature is removed.

~~34~~33. An article formed by the method of claim ~~30~~29, wherein the article is a semiconductor device.

~~35~~34. The article of claim ~~34~~33, wherein the semiconductor device is an integrated circuit.