CLAIMS

1. A chemical-mechanical polishing composition for polishing a substrate comprising:

(a) 0.05 wt.% to 10 wt.% abrasive,

(b) 0.05 wt.% to 4 wt.% iodate ion,

(c) 0.01 wt.% to 1 wt.% nitrogen-containing compound selected from the group consisting of a nitrogen-containing C_{4-20} heterocycle and a Ci -2_0 alkylamine, and

(d) a liquid carrier comprising water,

wherein the pH of the polishing composition is 1 to 5.

2. The polishing composition of claim 1, wherein the nitrogen-containing compound is selected from the group consisting of lH-l,2,3-benzotriazole, 1H-1,2,3-benzotriazole-5-carboxylic acid, 1,2,4-triazole, 5-methyl-lH-benzotriazole, 4-amino- 1,2,4-triazole, lH-benzotriazole-1-carboxaldehyde, 3-amino-l,2,4,-triazole-5-carboxylic acid, pyrazole, 2-pyrazinecarboxylic acid, 2,6-pyridinecarboxylic acid, 4-pyridylacetic acid, IH-l,2,3-triazolo[4,5-b]pyridine, methylamine, trimethylamine, salts thereof, and combinations thereof.

3. The polishing composition of claim 2, wherein the nitrogen-containing compound is lH-l,2,3-benzotriazole.

4. The polishing composition of claim 1, wherein the iodate ion is present in an amount of 0.05 wt.% to 2 wt.%.

5. The polishing composition of claim 4, wherein the iodate ion is present in an amount of 0.05 wt.% to 0.4 wt.%.

6. The polishing composition of claim 1, wherein the nitrogen-containing compound is present in an amount of 0.05 wt.% to 0.5 wt.%.

7. The polishing composition of claim 6, wherein the nitrogen-containing compound is present in an amount of 0.1 wt.% to 0.25 wt.%.

8. The polishing composition of claim 1, wherein the abrasive is present in an amount of 0.1 wt.% to 2 wt.%.

9. The polishing composition of claim 8, wherein the abrasive is present in an amount of 0.25 wt.% to 0.5 wt.%.

10. The polishing composition of claim 1, wherein the abrasive is selected from the group consisting of colloidal silica, fumed silica, fumed alumina, alpha alumina, and ceria.

11. The polishing composition of claim 10, wherein the abrasive is colloidal silica.

12. The polishing composition of claim 1, wherein the pH of the polishing composition is 2 to 4.

13. A method of chemically-mechanically polishing a substrate, which method comprises:

(a) providing a substrate,

(b) contacting the substrate with a polishing pad and a chemical-mechanical polishing composition of any one of claims 1 to 12;

(c) moving the polishing pad relative to the substrate with the chemical-mechanical polishing composition therebetween, and

(d) abrading at least a portion of the substrate to polish the substrate.

14. The method of claim 13, wherein the substrate comprises a metal layer.

15. The method of claim 14, wherein the metal layer comprises tantalum.

16. The method of claim 15, wherein the metal layer further comprises copper.

CLAIMS

1. A chemical-mechanical polishing composition for polishing a substrate comprising:

(a) about 0.25 wt. % to about 0.75 wt. % colloidal silica abrasive having an average particle size of about 25 nm to about 80 nm,

(b) about 0.05 wt. % to about 0.1 wt. % iodate ion,

(c) about 0.05 wt. % to about 0.1 wt. % 1H-1,2,3-benzotriazole, and

(d) a liquid carrier comprising water, wherein the pH of the polishing composition is 2.4-2.8.

2. The polishing composition of claim **1**, wherein the silica abrasive is present in an amount of about 0.25 wt. % to about 0.5 wt. %.

3. A method of chemically-mechanically polishing a substrate, which method comprises:

(a) providing a substrate,

(b) contacting the substrate with a polishing pad and a chemical-mechanical polishing composition comprising:

(i) about 0.25 wt. % to about 0.75 wt. % colloidal silica abrasive having an average particle size of about 25 nm to about 80 nm,

(ii) about 0.05 wt. % to about 0.1 wt. % iodate ion,

(iii) about 0.05 wt. % to about 0.1 wt. % 1H-1,2,3-benzotriazole, and

(iv) a liquid carrier comprising water, wherein the pH of the polishing composition is 2.4-2.8,

(c) moving the polishing pad relative to the substrate with the chemical-mechanical polishing composition there between, and

(d) abrading at least a portion of the substrate to polish the substrate.

4. The method of claim **3**, wherein the silica abrasive is present in an amount of about 0.25 wt. % to about 0.5 wt. %.

5. The method of claim **3**, wherein the substrate comprises a metal layer.

6. The method of claim **5**, wherein the metal layer comprises tantalum.

7. The method of claim **6**, wherein the metal layer further comprises copper.