WHAT IS CLAIMED IS:

1. A copper electroplating solution comprising:

   a) a copper salt;

   b) a source of halide ions; and

   c) a suppressor, wherein the suppressor comprises a reaction product of a reactant with 2,3-epoxy-1-propanol, wherein the reactant comprises at least one of an amine and a sulfur-containing compound;

   wherein the copper electrolyte is capable of depositing copper, wherein the copper deposit exhibits greater than about 80% nanotwinned columnar copper grains.

2. The copper electroplating solution according to claim 1, wherein the copper salt is copper sulfate.
3. The copper electroplating solution according to claim 1 or 2, further comprising an acid, wherein the acid comprises sulfuric acid or methane sulfonic acid.
4. The copper electroplating solution according to claim any of claims 1-3, wherein the copper electroplating composition comprises one or more of:

   (i) an accelerator, wherein the accelerator comprises an organic sulfur compound; and

   (ii) a leveler, wherein the leveler comprises a polymeric quaternary nitrogen species.

5. The copper electroplating solution according to any of claims 1-4, wherein the reactant comprises an amine compound selected from the group consisting of ethanolamine, diethanolamine, triethanolamine, propanolamine, isopropanolamine, diisopropanolamine, triisopropanolamine, N-methyl diethanolamine, N-ethyl diethanolamine, N-propyl diethanolamine, methyl monoethanolamine, N,N-dimethyl ethanolamine, N,N-diethyl ethanolamine, N-propyl monoethanolamine, N-propyl diethanolamine, N-butyl ethanolamine, N-butyl diethanolamine, N,N-dibutyl ethanolamine, hydroxy ethyl morpholine, 2-piperidino ethanol, diethanol isopropanolamine, N-(2-hydroxyethyl) pyrrolidine, 4-pyridinemethanol, 4-pyridineethanol, 4-pyridinepropanol, 2-hydroxy-4-methylpyridine, 2-hydroxymethyl-1-methylimidazole, 4-hydroxymethyl-5-methylimidazole, choline chloride, b-methylcholine chloride, bis(2-

hydroxyethyl)dimethylammonium chloride, tris(2-hydroxyethyl)methylammonium chloride, carnitine chloride, (2-hydroxyethyl)dimethyl(3-sulfopropyl)ammonium chloride, 1-(2-hydroxyethyl)-3-methylimidazolium chloride, bis(2-hydroxyethyl)dimethyl ammonium chloride, and combinations of the foregoing.

6. The copper electroplating solution according to any of claims 1-4, wherein the reactant comprises a sulfur containing compound selected from the group consisting of 2,2'-thiodiethanol, thioglycolic acid, thiomalic acid, sodium hydrogen sulfide, thiodiglycolic acid, thiodiethylene glycol, thiourea, N,N,N'N'-tetramethylthiourea, 2-mercaptoethanol, 3-mercaptopropanol, 2-mercaptoimidazole, 2-mercaptopyridine, 4-mercaptopyridine, 4-mercaptophenol, 3-mercapto-1-propanesulfonic acid, 3,6-dithia-1,8-octanediol, 2,2'-thiodiethanethiol, 2-hydroxyethyldisulfide, 3,3'-thiodipropanol, 2,2'-(ethylenedioxy)diethanethiol, and combinations of one or more of the foregoing.
7. The copper electroplating solution according to claim 6, wherein the sulfur containing compound comprises 2,2'-thiodiethanol.
8. The copper electroplating solution according to claim 4, wherein the accelerator is present and is selected from the group consisting of bis-(3-sulfopropyl)-disulfide, 3-mercapto-1-propanesulfonic acid, 3-(benzothizolyl-2-mercapto)-propylsulfonic acid, N,N-dimethyldithiocarbamylpropyl sulfonic acid, 3-S-isothiuronium propyl sulfonate, and (O-ethyldithiocarbonato)-S-(3-sulfopropyl)ester.
9. The copper electroplating solution according to claim 4, wherein both the accelerator and the leveler are present in the composition.
10. The copper electroplating solution according to any of claims 1-4, wherein the suppressor comprises 90.0-99.9 wt.% of the 2,3-epoxy-1-propanol reacted with 0.1 to 10.0 wt.% of the reactant(s) or wherein the suppressor comprises 95.0-99.5 wt.% of the 2,3-epoxy-1-propanol reacted with 0.5 to 5.0 wt.% of the reactant(s), or wherein the suppressor comprises 97.0 to 99.0 wt.% of the 2,3-epoxy-1-propanol reacted with 2.0 to 3.0 wt.% of the reactant(s).
11. The copper electroplating solution according to claim 1, wherein the copper electroplating solution comprises:
    a. about 40 to about 60 g/L copper ions;
    b. about 80 to about 140 g/L sulfuric acid;

c. about 30 to about 120 mg/L chloride ions;
d. about 300 to about 600 mg/L of a reaction product of an amine or sulfur-containing compound with a 2,3-epoxy-1-propanol.

12. The copper electroplating solution according to claim 1, wherein the copper electroplating solution comprises:
    a. about 5 to about 50 g/L copper ions;
    b. about 8 to about 15 g/L sulfuric acid;
    c. about 30 to about 120 mg/L chloride ions;
    d. about 300 to about 600 mg/L of a reaction product of an amine or sulfur-containing compound with 2,3-epoxy-1-propanol.
13. The copper electroplating solution according to claim 12, further comprising:
    a. about 0.01 to about 10 mg/L of the leveler, the leveler comprising a polymer quaternary nitrogen species; or
    b. about 0.1 to about 50 mg/L of the accelerator.
14. The copper electroplating solution according to claim 1, wherein the copper electroplating solution is at least substantially free of any accelerator, brightener, carrier, wetter, or leveler or any compound that can function as an accelerator, brightener, carrier, wetter, or leveler.
15. A method of electrodepositing copper on a substrate, the method comprising the steps of:
    a. contacting a surface of the substrate and at least one anode with the copper electrolyte of any of claims 1-4; and
    b. applying an electric voltage between the surface of the substrate and the at least one anode such that cathodic polarity is imposed upon the substrate relative to the at least one anode;

    wherein a copper deposit having a high density of nanotwinned columnar copper grains is initiated on the substrate.
16. The method according to claim 15, wherein the nanotwinned copper deposit is in a (111) orientation.
17. The method according to claim 15 or 16, wherein the copper deposit comprises greater than 90% nanotwinned columnar copper grains.

18. The method according to claim 15, wherein the substrate is a non-(111) oriented copper substrate.
19. The method according to claim 18, wherein the substrate is selected from the group consisting of polycrystalline copper seed, stainless steel, and PVD ruthenium.
20. The method according to claim 18 or 19, wherein the nanotwinned copper deposit is in a (111) orientation.
21. A method of electrodepositing >80% nanotwinned copper on a non-(111) oriented copper substrate using an aqueous copper electrolyte solution as described in any of claims 1-4, the method comprising the steps of:

    a) contacting the non-(111) oriented copper substrate and at least one anode with the aqueous copper electrolyte solution; and
    b) applying an electric voltage between the surface of the copper substrate and the at least one anode such that cathodic polarity is imposed upon the substrate relative to the at least one anode;

    wherein the nanotwinned copper deposit is initiated on the non-(111) oriented copper substrate.
22. The method according to claim 15, wherein electric voltage is applied at a current density between about 1 to about 8 ASD, more preferably between about 1 to about 3 ASD.