~~What is c~~Claim~~ed is~~:

1. A deposition solution to form a metal on a substrate, the solution comprising metal ions and a pH adjustor, the pH adjustor comprising a functional group having a general formula

$(R_1R_2N)(R_3R_4N)C=N-R_5$

where:

N is nitrogen;

C is carbon; and

R_1, R_2, R_3, R_4, and R_5 are the same or different and represent hydrogen, alkyl group, aryl group, or alkylaryl group so as to effect a pH from 4.5 to 14 for the deposition solution; and the deposition solution being alkali-metal free.

2. The deposition solution of claim 1, wherein the alkyl group comprises a general formula C_nH_{2n+1} and where the aryl group and the alkylaryl group are selected from the group consisting of benzyl and benzylalkyl of formulas C_6H_5 and C_6H_5-C_nH_{2n+1}, respectively.

3. The deposition solution of claim 1, wherein the pH adjustor comprises guanidine, guanidine derivative, or mixtures thereof.

4. The deposition solution of claim 1, wherein the pH adjustor comprises tetramethylguanidine, triazabicyclodecene, or mixtures thereof.

5. The deposition solution of claim 1, ~~wherein the pH adjustor effects a pH from 4.5 to 14 for the deposition solution.~~

~~6. The deposition solution of claim 1,~~ wherein the pH adjustor effects a pH from 8 to 11.5 for the deposition solution.

~~7.~~6. The deposition solution of claim 1, wherein the metal ions comprise antimony, arsenic, cadmium, chromium, copper, gold, indium, iridium, iron, lead, manganese,

molybdenum, osmium, palladium, platinum, rhodium, ruthenium, silver, tin, tungsten, zinc, or mixtures thereof.

~~8.~~7. The deposition solution of claim 1, wherein the metal ions comprise ions of cobalt and/or nickel.

~~9.~~8. The deposition solution of claim 1, wherein the metal ions are introduced into the deposition solution as dissolved metal ion salt selected from the group consisting of a metal sulfate, a metal chloride, a metal hydroxide, and mixtures thereof.

~~10.~~9. The deposition solution of claim 1, further comprising a reducing agent to form the metal by electroless deposition.

~~11.~~10. The deposition solution of claim 1, further comprising a reducing agent to form the metal by electroless deposition, the reducing agent comprising at least one of alkyl, dialkyl and trialkyl amine boranes of the general formula $R_1R_2R_3NH_{3-n}BH_3$, where R_1, R_2, and R_3 comprise the same or different alkyl groups and n is the number of alkyl groups attached to the amine boranes, where n can be 0, 1, 2, and 3.

~~12.~~11. The deposition solution of claim 1, further comprising a reducing agent to form the metal by electroless deposition, the reducing agent comprising at least one of hypophosphite, hydrazine, and dimethylamine borane.

~~13.~~12. The deposition solution of claim 1, further comprising a reducing agent to form the metal by electroless deposition, the reducing agent comprising hypophosphite introduced into the deposition solution in the form of a compound selected from the group consisting of hypophosphorous acid, an alkali-metal-free salt of hypophosphorous acid, and a complex of a hypophosphorous acid.

~~14.~~13. The deposition solution of claim 1, further comprising a reducing agent to form the metal by electroless deposition, the reducing agent comprising hypophosphite dimethylamine borane.

~~15.~~14. The deposition solution of claim 1, further comprising a reducing agent to form the metal by electroless deposition, the reducing agent comprising one or more metal ion reducing agents.

~~16.~~15. The deposition solution of claim 1, further comprising at least one complexing agent selected from the group consisting of citrate, tartrate, glycine, pyro-phosphate, and ethylenediaminetetraacetic acid, the complexing agent being introduced into the deposition solution as acid.

~~17.~~16. The deposition solution of claim 1, further comprising at least one complexing agent being introduced into the deposition solution as citric acid, tartaric acid, pyrophosphoric acid, or mixtures thereof.

~~18.~~17. The deposition solution of claim 1, wherein the metal ions comprise first ions and second-metal ions, the first metal ions and second metal ions are dissimilar, the second metal ions are introduced into the deposition solution as tungsten oxides, tungsten phosphoric acids, tungstic acid, or mixtures thereof.

~~19.~~18. The deposition solution of claim 1, wherein the metal ions comprise first metal ions and second metal ions, the first metal ions and second metal ions are dissimilar, the second metal ions are selected from the 4^{th} period of the periodic table, the 5^{th} period of the periodic table, and 6^{th} period of the periodic table.

~~20.~~19. The deposition solution of claim 1, wherein the metal ions comprise first metal ions and second metal ions, the first metal ions and second metal ions being dissimilar, the second metal ions being selected from a group consisting of chromium, nickel, copper, zinc, molybdenum, ruthenium, rhodium, palladium, silver, cadmium, indium, tin, antimony, tungsten, rhenium, osmium, iridium, platinum, gold, thallium, and bismuth.

~~21.~~20. The deposition solution of claim 1, further comprising a buffering agent.

~~22.~~21. The deposition solution of claim 1, further comprising a buffering agent comprising a boric acid solution for maintaining pH of the deposition solution within the range of 8 to 10.

~~23.~~22. The electroless deposition solution of claim 1, wherein the metal is a cobalt tungsten phosphorous alloy film having a phosphorous content of 2% to 14% and a tungsten content of 0.5% to 5%, the electroless deposition solution comprising: cobalt ions, tungsten ions, a hypophosphite reducing agent for the cobalt and the tungsten ions, a citric acid as a complexing agent for the cobalt and the tungsten ions, and a buffering agent.

~~24.~~23. The deposition solution of claim 1, wherein the metal comprises a barrier layer for the formation of copper interconnects in integrated circuits of semiconductor devices and is formed from a material selected from the group consisting of $Co_{0.9}W_{0.02}P_{0.08}$, $Co_{0.9}P_{0.1}$, $Co_{0.96}W_{0.0436}B_{0.004}$, and $Co_{0.9}Mo_{0.03}P_{0.08}$.

~~25.~~24. The electroless deposition solution of claim 1,

further comprising one or more reducing agents;
optionally comprising one or more complexing agents;
optionally comprising one or more buffering agents; and
optionally comprising one or more surfactants.

~~26.~~25. The electroless deposition solution of claim 1,

optionally comprising one or more complexing agents;
optionally comprising one or more buffering agents; and
optionally comprising one or more surfactants.

~~27.~~26. The electroless deposition solution of claim 1, further comprising one or more reducing agents, one or more complexing agents, one or more buffering agents, and one or more surfactants.

~~28.~~27. The electroless deposition solution of claim 1, further comprising one or more complexing agents, one or more buffering agents, and one or more surfactants.

~~29.~~28. The deposition solution of claim 1,

further comprising a reducing agent to form the metal by electroless deposition, the reducing agent comprising:

alkyl, dialkyl and trialkyl amine boranes of the general formula $R_1R_2R_3NH_{3-n}BH_3$, where R_1, R_2, and R_3 comprise the same or different alkyl groups and n is the number of alkyl groups attached to the amine boranes, where n can be 0, 1, 2, and 3;

hypophosphite;

hydrazine;

hypophosphite dimethylamine borane;

metal ion reducing agents selected from the group consisting of Titanium~~(III)~~(III), Manganese~~(II)~~(II), Copper~~(I)~~(I), and Cobalt~~(II)~~(II); ~~or~~and

mixtures thereof;

further comprising at least one complexing agent selected from the group consisting of citrate, tartrate, glycine, pyrophosphate, and ethylenediaminetetraacetic acid, the complexing agents being introduced into the deposition solution as acids;

further comprising a buffering agent.

wherein the pH is from 4.5 to 14 including all ranges, subranges, and values subsumed therein; and

wherein the metal ions are introduced into the deposition solution as dissolved metal ion salt comprising:

a metal sulfate,

a metal chloride, or

a metal hydroxide.

~~30.~~29. The deposition solution of claim 1,

further comprising at least one complexing agent selected from the group consisting of citrate, tartrate, glycine, pyrophosphate, and

ethylenediaminetetraacetic acid, the complexing agents being introduced into the deposition solution as acids;

further comprising a buffering agent~~.~~,

wherein the pH is from 4.5 to 14 including all ranges, subranges, and values subsumed therein; and

wherein the metal ions are introduced into the deposition solution as dissolved metal ion salt comprising:

a metal sulfate,

a metal chloride, or

a metal hydroxide.

~~31.~~30. An electroless deposition solution to form a metal on a substrate, the electroless deposition solution comprising metal ions, at least one reducing agent, and a pH adjustor comprising guanidine, tetramethylguanidine, triazabicyclodecene, or mixtures thereof so as to effect a pH from 4.5 to 14; the electroless deposition solution being alkali-metal free.