Claims

1. A method for processing a substrate, comprising:

plating a metal layer upon a substrate;

rinsing the substrate substantially solely with a chemically non-reactive fluid to remove and/or dilute a plating deposition fluid residing thereon used for the step of plating the metal layer, wherein the method is void of steps for treating the substrate between the step of plating the metal layer upon the substrate and the step of rinsing the substrate with the chemically non-reactive fluid; and

exposing the substrate topography rinsed with the chemically non-reactive fluid to a solution which is absent of an oxidizing agent and comprises a non-metal pH adjusting agent in sufficient concentration such that the solution has a pH between approximately 7.5 and approximately 12.0, wherein the solution further comprises a means for binding metal ions via:

a chelating agent having at least one non-amine or non-imine functional group; and/or

at least two different types of complexing agents each offering a single point of attachment for binding metal ions via respectively different functional groups, wherein at least one of the two different complexing agents has at least one non-amine or non-imine functional group.

2. The method of claim 1, wherein the chelating agent and the different types of complexing agents are selected from a group consisting of amino acid, ammonia, citrate ions, methylamine, dimethylamine, and carboxylate ions.

3. The method of claim 1, wherein the non-metal pH adjusting agent is selected from a group consisting of ammonia, amines and imines.

4. The method of claim 1, wherein the solution further comprises an antioxidizing agent.

5. The method of claim 1, wherein the step of rinsing the substrate comprises introducing the chemically non-reactive fluid to the substrate at a temperature less than approximately 50° C.

6. The method of claim 1, wherein the step of exposing the substrate topography to the solution comprises introducing the solution to the substrate at a temperature less than approximately 50° C.

7. The method of claim 1, wherein the step of exposing the substrate topography to the solution comprises introducing the non-metal pH adjusting agent and the means for binding metal ions into a flow of the chemically non-reactive fluid being supplied to the substrate.

8. The method of claim 1, further comprising rinsing the substrate topography with a chemically non-reactive fluid subsequent to the step of exposing the substrate topography to the solution.

9. The method of claim 1, wherein the step of plating the metal layer comprises electrolessly plating the metal layer.

10. The method of claim 1, further comprising introducing a purge gas substantially free of oxygen into a process chamber comprising the substrate prior to and/or during the step of exposing the substrate topography to the solution.

11. A method for processing a substrate, comprising:

plating a metal layer upon a substrate; and

exposing the substrate and a plating deposition fluid residing thereon used for the step of plating the metal layer to a solution for preventing formation of metal particulate matter on the substrate, wherein the solution is absent of an oxidizing agent and comprises:

a non-metal pH adjusting agent in sufficient concentration such that the solution has a pH between approximately 7.5 and approximately 12.0;

an antioxidizing agent; and

a means for binding metal ions via:

a chelating agent having at least one non-amine or non-imine functional group; and/or

at least two different types of complexing agents each offering a single point of attachment for binding metal ions via respectively different functional groups, wherein at least one of the two different complexing agents has at least one non-amine or non-imine functional group.

12. The method of claim 11, wherein the chelating agent and the different types of complexing agents are selected from a group consisting of amino acid, ammonia, citrate ions, methylamine, dimethylamine, and carboxylate ions.

13. The method of claim 11, wherein the non-metal pH adjusting agent is selected from a group consisting of ammonia, amines and imines.

14. The method of claim 11, wherein the step of plating the metal layer comprises introducing the plating deposition fluid to the substrate at a temperature greater than approximately 70° C., and wherein the step of exposing the substrate and the plating deposition fluid residing thereon to the solution comprises introducing the solution to the substrate at a temperature less than approximately 50° C.

15. The method of claim 14, wherein the step of exposing the substrate and the plating deposition fluid residing thereon to the solution comprises introducing the solution to the substrate at a temperature less than approximately 30° C.

16. The method of claim 11, wherein the step of plating the metal layer comprises electrolessly plating the metal layer.

17. The method of claim 11, wherein the step of exposing the substrate and the plating deposition fluid residing thereon to the solution comprises supplying the non-metal pH adjusting agent, the antioxidizing agent and the means for binding metal ions into a flow of a chemically non-reactive fluid being supplied to the substrate.

18. The method of claim 17, further comprising terminating the supply of the non-metal pH adjusting agent, the antioxidizing agent and the means for binding metal ions into the flow of the chemically non-reactive fluid such that the substrate is rinsed with the chemically non-reactive fluid subsequent to the step of exposing the substrate and the plating deposition fluid residing thereon to the solution.

19. The method of claim 11, further comprising introducing a purge gas substantially free of oxygen into a process chamber comprising the substrate prior to and/or during the step of exposing the substrate and the plating deposition fluid residing thereon to the solution.

20. The method of claim 11, further comprising rinsing the substrate substantially solely with a chemically non-reactive fluid to dilute the plating deposition fluid residing on the substrate prior to exposing the substrate to the solution.

21. A method for processing a substrate, comprising:

introducing a plating deposition fluid to a substrate at a temperature greater than approximately 70° C.;

plating a metal layer upon a substrate via the plating deposition fluid; and

exposing the plated metal layer and surrounding surfaces of the substrate to a solution for preventing formation of metal particulate matter on the substrate, wherein the step of exposing the plated metal layer and surrounding surfaces of the substrate comprises introducing the solution to the substrate at a temperature less than approximately 50° C., and wherein the solution is absent of an oxidizing agent and comprises:

a non-metal pH adjusting agent in sufficient concentration such that the solution has a pH between approximately 7.5 and approximately 12.0; and

a means for binding metal ions via:

a chelating agent having at least one non-amine or non-imine functional group; and/or

at least two different types of complexing agents each offering a single point of attachment for binding metal ions via respectively different functional groups, wherein at least one of the two different complexing agents has at least one non-amine or non-imine functional group.

22. The method of claim 21, wherein the rinse solution further comprises an antioxidizing agent.

23. The method of claim 21, further comprising rinsing the plated metal layer and surrounding surfaces of the substrate substantially solely with a chemically non-reactive fluid prior to exposing the plated metal layer and the surrounding surfaces of the substrate to the solution.

WHAT IS CLAIMED IS:

1. An aqueous solution, comprising:

at least two different types of complexing agents each offering a single point of attachment for binding metal ions via respectively different functional groups, wherein at least one of the two different types of complexing agents comprises a non-amine or non-imine functional group; and

a non-metal pH adjusting agent in sufficient concentration such that the aqueous solution has a pH between approximately 7.5 and approximately 12.0, wherein the aqueous solution is free of an oxidizing agent.

2. The aqueous solution of claim 1, wherein a collective concentration of the different types of complexing agents is between approximately 0.1 g/L and approximately 5.0 g/L.

3. The aqueous solution of claim 1, wherein at least one of the two different types of complexing agents is derived from dissolving a single compound having multiple complexing agents into deionized water.

4. The aqueous solution of claim 3, wherein the single compound is selected from a group consisting of ammonium citrate, methylamine citrate, dimethylamine citrate, and serine.

5. The aqueous solution of claim 1, further comprising a chelating agent.

6. The aqueous solution of claim 1, wherein the non-metal pH adjusting agent is selected from a group consisting of ammonia, amines, and imines.

7. The aqueous solution of claim 1, further comprising an antioxidizing agent.

8. A method for processing a substrate, comprising:

plating a metal layer upon a substrate; and

subsequently exposing the metal layer to a solution which is absent of an oxidizing agent and comprises a non-metal pH adjusting agent in sufficient concentration such that the solution has a pH between approximately 7.5 and approximately 12.0, wherein the solution further comprises a means for binding metal ions via:

a chelating agent having at least one non-amine or non-imine functional group; and/or

at least two different types of complexing agents each presenting a single point of attachment for binding metal ions via respectively different functional groups, wherein at least one of the two different complexing agents has at least one non-amine or non-imine functional group.

9. The method of claim 8, wherein the chelating agent and the different types of complexing agents are selected from a group consisting of amino acid, ammonia, citrate ions, methylamine, dimethylamine, and carboxylate ions.

10. The method of claim 8, further comprising introducing a purge gas substantially free of oxygen into a process chamber comprising the substrate prior to and/or during the step of subsequently exposing the metal layer to the solution.

11. The method of claim 8, wherein the step of subsequently exposing the metal layer to the solution comprises introducing the solution to the substrate at a temperature less than approximately 50°C.

12. The method of claim 8, further comprising rinsing the substrate comprising the metal layer with a chemically non-reactive fluid prior to and/or subsequent to the step of exposing the metal layer to the solution.

13. The method of claim 8, wherein the step of subsequently exposing the metal layer to the solution comprises introducing the solution into a flow of the chemically non-reactive fluid while rinsing the substrate.