What is claimed is:

1. A method of filling a via in an electronic device with copper comprising: providing an acidic copper electroplating bath comprising a source of copper ions, an acid electrolyte, a source of halide ions, an accelerator, a leveler, and a suppressor, wherein the copper electroplating bath has a dynamic surface tension of ≤ 40 mN/m; providing as a cathode an electronic device substrate having one or more vias to be filled with copper and having a conductive surface; contacting the electronic device substrate with the copper electroplating bath; and applying a potential for a period of time sufficient to fill the vias with a copper deposit; wherein the copper deposit in the vias is substantially void-free and substantially free of surface defects.

2. The method of claim 1 wherein the electronic device is a wafer or a die.

3. The method of claim 1 wherein the suppressor comprises ethylene oxide as polymerized units.

4. The method of claim 3 wherein the suppressor further comprises an end group formed from a secondary alcohol.

5. The method of claim 1 wherein the copper electroplating bath has a pH of ≤ 2.

6. The method of claim 1 wherein the conductive surface is a seed layer.

7. The method of claim 6 wherein the seed layer is a copper seed layer.

8. A copper electroplating bath composition comprising: a source of copper ions; an acid electrolyte; a source of halide ions; an accelerator; a leveler; and a suppressor; wherein the copper electroplating bath has a surface tension of ≤ 40 mN/m; and wherein the copper electroplating is acidic.

9. The composition of claim 8 wherein the suppressor comprises ethylene oxide as polymerized units.

10. The composition of claim 9 wherein the suppressor further comprises an end group formed from a secondary alcohol.

11. The composition of claim 8 wherein the suppressor is present in an amount of from 0.5 to 500 ppm.

Claims

1. A method of filling a via in an electronic device with copper comprising: providing an acidic copper electroplating bath comprising a source of copper ions, an acid electrolyte, a source of halide ions, an accelerator, a leveler, and a suppressor, wherein the copper electroplating bath has a dynamic surface tension of ≤40 mN/m; providing as a cathode an electronic device substrate having one or more vias to be filled with copper and having a conductive surface; contacting the electronic device substrate with the copper electroplating bath; and applying a potential for a period of time sufficient to fill the vias with a copper deposit; wherein the copper deposit in the vias is substantially void-free and substantially free of surface defects; and wherein the suppressor comprises ethylene oxide as polymerized units and an end group formed from a branched secondary alcohol.

2. The method of claim 1 wherein the electronic device is a wafer or a die.

3. The method of claim 1 wherein the suppressor has the formula RO—$[(CH_2CH_2O)_n(CHXCHYO)_m]$-H wherein R is a branched secondary aliphatic alcohol; X and Y are independently hydrogen, methyl or ethyl and where at least one of X and Y is methyl or ethyl; n is an integer from 3 to 500; and m is an integer from 0 to 300.

4. The method of claim 3 wherein m = 0 and n is 3 to 50.

5. The method of claim 1 wherein the copper electroplating bath has a pH of ≤ 2.

6. The method of claim 1 wherein the conductive surface is a seed layer.

7. The method of claim 6 wherein the seed layer is a copper seed layer.

8. A copper electroplating bath composition comprising: a source of copper ions; an acid electrolyte; a source of halide ions; an accelerator; a leveler; and a suppressor; wherein the copper electroplating bath has a surface tension of ≤40 mN/m; wherein the copper electroplating is acidic; and wherein the suppressor comprises ethylene oxide as polymerized units and an end group formed from a branched secondary alcohol.

9. The composition of claim 8 wherein the suppressor has the formula RO—$[(CH_2CH_2O)_n(CHXCHYO)_m]$-H wherein R is a branched secondary aliphatic alcohol; X and Y are independently hydrogen, methyl or ethyl and where at least one of X and Y is methyl or ethyl; n is an integer from 3 to 500; and m is an integer from 0 to 300.

10. The composition of claim 9 wherein m = 0 and n is 3 to 50.

11. The composition of claim 8 wherein the suppressor is present in an amount of from 0.5 to 500 ppm.