Claims

What is claimed is:

1. A stripper solution for removing photoresist from substrates comprising:

30 weight percent to 97 weight percent diethylene glycol butyl ether;

1 weight percent to 7 weight percent of quaternary ammonium hydroxide;

1 weight percent to 75 weight percent of alkanolamine or secondary solvent or alkanolamine and secondary solvent;

0.001 weight percent to 7 weight percent of corrosion inhibitor; and

0.1 weight percent to 20 weight percent water;

wherein the solution is essentially free of DMSO;

wherein the quaternary ammonium hydroxide includes at least one selected from the group consisting of tetramethylammonium hydroxide, tetraethylammonium hydroxide, ethyltrimethylammonium hydroxide, dimethyldipropylammonium hydroxide, and choline hydroxide; and

wherein the solution exhibits a freezing point below -15 degrees Celsius and a flashpoint above 97 degrees Celsius.

2. The solution of claim 1, wherein the quaternary ammonium hydroxide has substituents that are (C_1-C_8) alkyl, arylalkyl, benzyl, (C_1-C_5) alcohol, and combinations thereof.

3. The solution of claim 1, wherein the alkanolamine is present in the amount of 3 weight percent to 50 weight percent.

4. The solution of claim 3, wherein the alkanolamine includes monoethanolamine or (2-(2-aminoethoxy)ethanol).

5. The solution of claim 1, wherein the secondary solvent is present in the amount of 5 weight percent to 30 weight percent.

6. The solution of claim 5, wherein the secondary solvent includes 3-methoxy-3-methyl-1-butanol or propylene glycol.

7. The solution of claim 1,

wherein the diethylene glycol butyl ether is present in the amount of 50 weight percent to 97 weight percent;

wherein the quaternary ammonium hydroxide is present in the amount of 1 weight

percent to 6 weight percent;

wherein the alkanolamine is present in the amount of 3 weight percent to 40 weight percent;

wherein the water is present in the amount of 0.1 weight percent to 7 weight percent; and

wherein a first corrosion inhibitor is present in the amount of 0.001 weight percent to 3 weight percent.

8. The solution of claim 7, wherein the alkanolamine includes monoethanolamine or (2-(2-aminoethoxy)ethanol).

9. The solution of claim 8, wherein the first corrosion inhibitor is selected from the group consisting of resorcinol, glycerol, sorbitol, and copper (II) nitrate hemi(pentahydrate).

10. The solution of claim 9, wherein the first corrosion inhibitor is present in an amount between 0.001 weight percent to 0.1 weight percent.

11. The solution of claim 1, wherein the corrosion inhibitor includes a first corrosion inhibitor selected from the group consisting of resorcinol, glycerol, sorbitol, and copper (II) nitrate derivatives.

12. The solution of claim 11, further comprising 0.05 weight percent to 7 weight percent of a second corrosion inhibitor.

13. The solution of claim 12, wherein the second corrosion inhibitor is different from the first corrosion inhibitor and is selected from the group consisting of resorcinol, glycerol, sorbitol, and copper (II) nitrate hemi(pentahydrate).

14. The solution of claim 1, wherein the freezing point is below -19 degrees Celsius.

15. A stripper solution for removing photoresist from substrates comprising:

50 weight percent to 97 weight percent diethylene glycol butyl ether;

1 weight percent to 5 weight percent of quaternary ammonium hydroxide;

3 weight percent to 40 weight percent of alkanolamine;

0.001 weight percent to 1 weight percent of corrosion inhibitor; and

1 weight percent to 10 weight percent of water;

wherein a ratio of the amount of diethylene glycol butyl ether to the amount of water is greater than 5;

wherein the solution exhibits a flash point above 95 degrees Celsius;

wherein the solution is essentially free of DMSO; and

wherein the quaternary ammonium hydroxide includes at least one selected from the group consisting of tetramethylammonium hydroxide, tetraethylammonium hydroxide, ethyltrimethylammonium hydroxide, dimethyldipropylammonium hydroxide, and choline hydroxide.

16. A method of removing at least one photoresist layer comprising the steps of:

contacting a substrate comprising at least one photoresist layer with a stripper solution of any one of claims 1 to 15 at a temperature and for a time to at least partially remove said at least one photoresist layer; and

rinsing said substrate after said contacting step.

17. The solution of claim 4, wherein the alkanolamine comprises 2-(2-aminoethoxy)ethanol.

18. The solution of claim 8, wherein the alkanolamine comprises 2-(2-aminoethoxy)ethanol.