

CLAIMS

What is claimed is:

1. A filter material comprising a polyol ligand having three or more hydroxyl groups, wherein the filter material is configured to be used in conjunction with a microelectronic fabrication system for providing a metal- or metal ion-depleted liquid composition.
2. The filter material of claim 1, wherein the polyol ligand has 4 or 5 hydroxyl groups.
3. The filter material of claim 1 or 2, wherein the polyol ligand is an amino polyol ligand.
4. The filter material of claim 3, wherein the amino polyol ligand is selected from the group consisting of 1-aminopentane-1,2,3,4,5-pentol, 1-(methylamino)hexane-1,2,3,4,6-pentol, 5-(methylamino)hexane-1,2,3,4,6-pentol, 6-aminoheptane-1,2,3,4,5-pentol, 5-(methylamino)hexane-1,2,3,4,6-pentol, 6-(methylamino)hexane-1,2,3,4,5-pentol (n-methylglucamine), 1-deoxy-1-(methylamino)-D-glucitol, and 6-(butylamino)hexane-1,2,3,4,5-pentol.
5. The filter material of claim 1, wherein the filter material further comprises a polyphosphonic acid ligand.
6. The filter material of claim 5, wherein the polyphosphonic acid ligand is an amino polyphosphonic acid ligand or an amino diphosphonic acid ligand.
7. The filter material any preceding claim, wherein the filter material is a porous polymeric filter membrane comprising a polymeric material selected from the group consisting of a polyamide, a polyimide, a polysulfone, a polyether-sulfone, a polyolefin, a halogenated polymer, and a combination thereof.
8. A method of removing one or more metal(s) or metal ion(s) from a liquid composition, the method comprising:

contacting a filter material with a liquid composition comprising one or more metal or metal ions, the filter material comprising a polyol ligand having three or more hydroxyl groups, and

reducing an amount of the one or more metal or metal ions in the liquid composition.

9. The method of claim 8, wherein the polyol ligand has 4 or 5 hydroxyl groups.
10. The method of claim 8 or 9, wherein the polyol ligand is an amino polyol ligand.
11. The method of claim 10, wherein the amino polyol ligand is selected from the group consisting of 1-aminopentane-1,2,3,4,5-pentol, 1-(methylamino)hexane-1,2,3,4,6-pentol, 5-(methylamino)hexane-1,2,3,4,6-pentol, 6-aminoheptane-1,2,3,4,5-pentol, 5-(methylamino)hexane-1,2,3,4,6-pentol, 6-(methylamino)hexane-1,2,3,4,5-pentol (n-methylglucamine), 1-deoxy-1-(methylamino)-D-glucitol, and 6-(butylamino)hexane-1,2,3,4,5-pentol.
12. The method of claim 8, wherein the filter material further comprises a polyphosphonic acid ligand.
13. The method of claim 12, wherein the polyphosphonic acid ligand is an amino polyphosphonic acid ligand or an amino diphosphonic acid ligand.
14. The method of any of claims 8-13, wherein the filter material is a porous polymeric filter membrane comprising a polymeric material selected from the group consisting of a polyamide, a polyimide, a polysulfone, a polyether-sulfone, a polyolefin, a halogenated polymer, and a combination thereof.
15. The method of any of claims 8-14, wherein the liquid composition is an aqueous basic composition having a pH in a range of about 10 to about 14.

16. The method of any of claims 8-14, wherein the liquid composition comprises TMAH, TBAH, ammonium hydroxide, or concentrated HCl having an HCl concentration of greater than 10%.
17. A composite membrane comprising:
a first filter material and a second filter material, an output facing surface of the first filter material in contact with an input facing surface of the second filter material,
wherein the first filter material or the second filter material comprises a polyol ligand having three or more hydroxyl groups and the second filter material is different from the first filter material, and
wherein the composite membrane is configured to be used in conjunction with a microelectronic fabrication system for providing a metal- or metal ion-depleted liquid composition.
18. The composite membrane of claim 17, wherein a) the first filter material comprises the polyol ligand having three or more hydroxyl groups and the second filter material comprises a polyphosphonic acid ligand, or b) the first filter material comprises the polyphosphonic acid ligand and the second filter material has the polyol ligand comprising three or more hydroxyl groups.
19. The composite membrane of claim 17, wherein the first filter material, the second filter material, or both are a porous polymeric filter membrane comprising a polymeric material selected from the group consisting of a polyamide, a polyimide, a polysulfone, a polyether-sulfone, a polyolefin, a halogenated polymer, and a combination thereof.
20. The composite membrane of any of claims 17-19, wherein the first filter material is a porous polymeric filter membrane and the second filter material is polymeric resin particles.
21. A filter material comprising a polyphosphonic acid ligand, wherein the filter material is configured to be used in conjunction with a microelectronic fabrication system for providing a metal- or metal ion-depleted liquid composition.

22. The filter material of claim 21, wherein the filter material is configured to provide a metal- or metal ion-depleted organic solvent liquid composition.
23. The filter material of claim 21 or 22, wherein the filter material is configured to provide a metal- or metal ion-depleted aqueous acidic liquid composition having a pH of about 3 or lower.
24. A method of removing one or more metal(s) or metal ion(s) from a liquid composition, the method comprising:
- contacting a filter material with a liquid composition comprising one or more metal or metal ions, the filter material comprising a polyphosphonic acid ligand, and
 - reducing an amount of the one or more metal or metal ions in the liquid composition.