Claims

1. A composition comprising a source of metal ions and at least one polyaminoamide, said polyaminoamide comprising amide and amine functional groups in the polymeric backbone and at least one aromatic moiety being attached to or located within said polymeric backbone.

2. The composition according to claim 1, wherein the at least one aromatic moiety is located between two nitrogen atoms within the polymeric backbone.

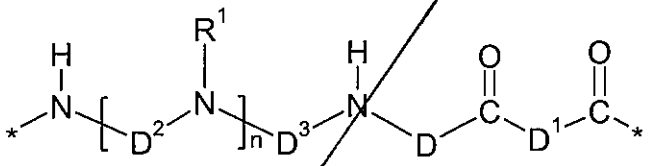
3. The composition according to claim 1 or 2, wherein the polyaminoamide comprises the structural unit represented by formula I

$$[A]_p[B]_q[D]_r \qquad (I)$$

or derivatives thereof obtainable by complete or partial protonation, N-functionalization, or N-quaternization,

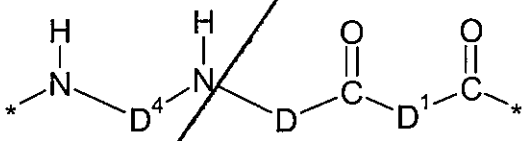
wherein

A is a diradical selected from



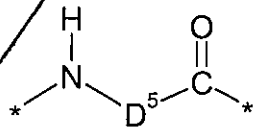
(Ia)

B is a diradical selected from a chemical bond or



(Ib)

D is a chemical bond or a divalent group selected from



(Ic)

D^1 is, for each repeating unit 1 to p independently, selected from a chemical bond or a divalent group selected from a saturated or unsaturated C_1 to C_{20} organic radical,

D^2, D^3 are independently selected from straight chain or branched C_1 to C_{10} alkanediyl,

which may optionally be substituted by heteroatoms selected from N and O.

D^4 is selected from straight chain or branched C_2 to C_6 alkanediyl, a C_6 to C_{10} aryl or heteroaryl diradical, C_8 to C_{20} arylalkanediyl, C_8 to C_{20} heteroarylalkanediyl,

D^5 is selected from straight chain or branched C_1- to C_7-alkanediyl, which may optionally be substituted by heteroatoms.

R^1 is, for each repeating unit 1 to n independently, selected from H, C_1-C_{20}-alkyl and C_5-C_{20}-aryl or C_5-C_{20}-heteroaryl, which may optionally be substituted by hydroxyl, alkoxy or alkoxycarbonyl,

n is an integer from 2 to 250,

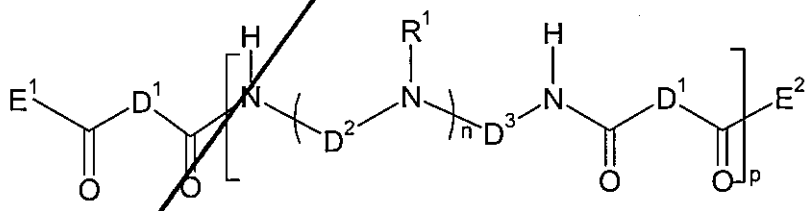
p is an integer from 2 to 150,

q is an integer from 0 to 150,

r is an integer from 0 to 150,

and wherein either at least one of D^4 or R^1 comprises a C_5 to C_{20} aromatic moiety or the polyaminoamide is functionalized and/or quaternized with a C_5 to C_{20} aromatic moiety.

4. The composition according to claim 3, wherein the polyaminoamide is represented by formulae II



(II)

wherein D^1, D^2, D^3, R^1, n and p have the prescribed meanings, and

E^1, E^2 are independently selected from

(a) a nucleophilically displaceable leaving group,
(b) NH-(C_1-C_{20}-alkyl) or NH-(C_1-C_{20}-alkenyl) or NH-aryl,
(c) H-{NH-[D^2-NR^1]$_n$-D^3-NH}
(d) (C_1-C_{20}-alkyl)-CO-{NH-[D^2-NR^2]$_n$-D^3-NH}, and
(e) (C_1-C_{20}-alkenyl)-CO-{NH-[D^2-NR^2]$_n$-D^3-NH},
(f) (C_1-C_{20}-aryl)-CO-{NH-[D^2-NR^2]$_n$-D^3-NH},

and wherein at least one of D^1 or R^1 comprises a C_5 to C_{20} aromatic moiety.

5. The composition according to claim 3 or 4, wherein D^1 is selected from a C_1- C_{20} alkanediyl group.

6. The composition according to anyone of claims 3 to 5, wherein D^2 and D^3 are independently selected from D^2 and D^3 are independetly selected from $(CH_2)_2$ and $(CH_2)_3$.

7. The composition according to anyone of claims 3 to 6, wherein R^1 is hydrogen or methyl.

8. The composition according to anyone of claims 3 to 6, wherein R^1 is selected from a C_5 to C_{20} aryl, C_5 to C_{20} heteroaryl, C_5 to C_{20} arylalkyl C_5 to C_{20} heteroarylalkyl.

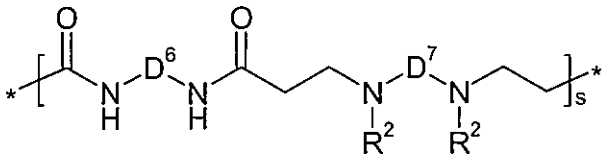
9. The composition according to anyone of claims 8, wherein the polyaminoamide is functionalized and/or quaternized with a C_5- C_{20} aromatic or heteroaromatic moiety.

10. The composition according to anyone of the preceding claims, wherein said polyaminoamide is obtainable by reacting at least one polyalkylenepolyamine with at least one dicarboxylic acid.

11. The composition according to claim 10, wherein the at least one polyalkylenepolyamine is selected from diethylenetriamine, triethylenetetramine, tetraethylenpentamine, pentaethylenehexamine, diaminopropylethylenediamine, ethylenepropylenetriamine, 3-(2-aminoethyl)aminopropylamine, dipropylenetriamine, polyethyleneimines, and etheramines selected from H_2N-$(CH_2)_2$-O-$(CH_2)_2$-NH_2 or H_2N- $(CH_2)_2$-O-$(CH_2)_2$-O-$(CH_2)_2$-NH_2, and mixtures thereof.

12. The composition according to claim 10 or 11, wherein the at least one dicarboxylic acid is selected from oxalic acid, malonic acid, succinic acid, tartaric acid, maleic acid, itaconic acid, glutaric acid, adipic acid, suberic acid, sebacic acid, iminodiacetic acid, aspartic acid, glutamic acid, and mixtures thereof.

13. The composition according to claim 1, wherein the polyaminoamide comprises the group represented by formula III



(III)

or derivatives of a polyaminoamide of formula III obtainable by complete or partial protonation, N-functionalization, or N-quaternization

wherein

D^6 is, for each repeating unit 1 to s independently, a divalent group selected from a saturated, unsaturated or aromatic C_1-C_{20} organic radical,

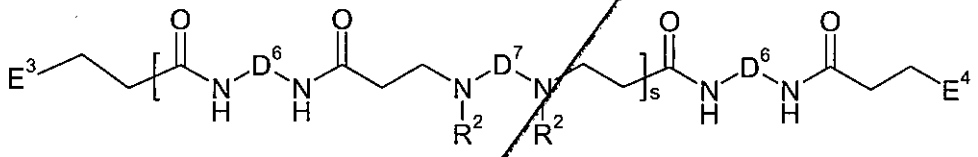
D^7 is selected from straight chain or branched C_2-C_6 alkanediyl, C_6-C_{10} aryldiradical, C_8-C_{20} arylalkanediyl,

R^2 is, for each repeating unit 1 to s independently, selected from H, C_1-C_{20} alkyl, C_1-C_{20} alkenyl, which may optionally be substituted by hydroxyl, alkoxy or alkoxycarbonyl, or aryl, and wherein two R^2 may together form a ring system, and

s is an integer from 1 to 250,

and wherein either at least one of D^6, D^7 or R^2 comprises a C_5-C_{20} aromatic moiety or the polyaminoamide is functionalized and/or quaternized with a C_5-C_{20} aromatic moiety.

14. The polyaminoamide according to claim 13 being represented by formula IV



(IV)

wherein D^6, D^7, R^3, and s have the prescribed meanings and

E^3, E^4 are independently selected from

(a) NH-C_1-C_{20}-alkyl or NH-C_1-C_{20}-alkenyl or NH-aryl,

(b) N-(C_1-C_{20}-alkyl)$_2$ or N-(C_1-C_{20}-alkenyl)$_2$ or N-(aryl)$_2$ or N-(C_1-C_{20}-alkyl)(C_1-C_{20}-alkenyl) or N-(C_1-C_{20}-alkyl)(aryl) or N-(C_1-C_{20}-alkenyl)(aryl),

(c) NR^2-D^7-NR^2H, or

(d) NR^2-D^7-NR^2-CH_2-CH_2-CO-NH-(C_1-C_{20}-alkyl) or NR^2-D^7-NR^2-CH_2-CH_2-CO-NH-(C_1-C_{20}-alkenyl) or NR^2-D^7-NR^2-CH_2-CH_2-CO-NH-aryl,

and wherein at least one of D^6 or R^2 comprises a C_5 to C_{20} aromatic moiety.

15. The composition according to anyone of the preceding claims, wherein the metal ions comprise copper ion.

16. The composition according to anyone of the preceding claims, further comprising an accelerating agent.

17. The composition according to anyone of the preceding claims, further comprising a

suppressing agent.

18. Use of a polyaminoamide as defined in anyone of claims 1 to 17 in a bath for depositing metal containing layers.

19. A process for depositing a metal layer on a substrate by
a) contacting a metal plating bath comprising a composition according to any of claims 1 to 17 with the substrate, and
b) applying a current density to the substrate for a time sufficient to deposit a metal layer onto the substrate.

20. The process according to claim 19, wherein the substrate comprises micrometer sized features and the deposition is performed to fill the micrometer sized features.

21. The process according to claim 20, wherein the micrometer sized features have a size of from 1 to 500 micrometer and/or an aspect ratio of 4 or more.

Claims

1. An invention not claimed in any divisional application.