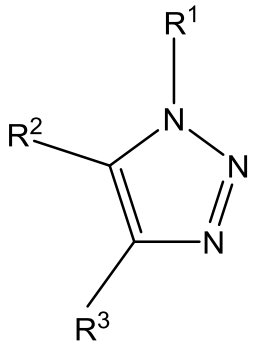
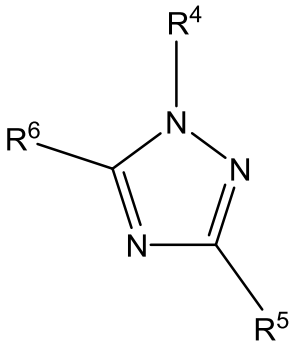
Claims

1. An electroplating composition comprising
   (i) at least one source of gold ions, and
   (ii) at least one mercapto-triazole or a salt thereof, wherein the at least one mercapto-triazole has the following general formulae (I) or (II):




Formula (I)




Formula (II)

wherein $R^1$, $R^4$ are independently of each other hydrogen, linear or branched, saturated or unsaturated ($C_1$-$C_{20}$) hydrocarbon chain, ($C_8$-$C_{20}$) aralkyl group; substituted or unsubstituted phenyl group, naphthyl group or carboxyl group; and

$R^2$, $R^3$, $R^5$, $R^6$ are independently of each other –S-X, hydrogen, linear or branched, saturated or unsaturated ($C_1$-$C_{20}$) hydrocarbon chain, ($C_8$-$C_{20}$) aralkyl group; substituted or unsubstituted phenyl group, naphthyl group or carboxyl group; and

X is hydrogen, ($C_1$-$C_4$) alkyl group or a counter-ion selected from alkali metal ions, calcium ion, ammonium ion and quaternary amines, and

at least one of $R^2$ and $R^3$ is –S-X, and at least one of $R^5$ and $R^6$ is –S-X.

2. The composition according to claim 1, wherein the at least one mercapto-triazole has the general formulae (I) or (II),

wherein $R^1$, $R^4$ are independently of each other hydrogen or a linear ($C_1$ - $C_4$) alkyl group, and

$R^2$, $R^3$, $R^5$, $R^6$ are independently of each other –S-X, hydrogen or a linear ($C_1$ - $C_4$) alkyl group; and
X is hydrogen, a methyl group, an ethyl group, or a counter-ion selected from sodium ion and potassium ion; and
at least one of $R^2$ and $R^3$ is –S-X, and at least one of $R^5$ and $R^6$ is –S-X.

3. The composition according to claims 1 or 2, wherein the at least one mercapto-triazole has a concentration ranging from 1 mg/l to 1 g/l.

4. The composition according to any of the foregoing claims, further comprising at least one source of alloying metal ions, wherein the metal of the alloying metal ions is selected from cobalt, nickel and iron.

5. The composition according to any of the foregoing claims, further comprising complexing agents for gold ions.

6. The composition according to any of the foregoing claims, further comprising at least one brightening agent selected from pyridine and quinoline compounds.

7. The composition according to any of the foregoing claims, having a pH value between 1 – 6.

8. A method comprising:
   (i) providing an electroplating composition according to claims 1 to 7;
   (ii) contacting a substrate with the composition; and
   (iii) applying an electrical current between the substrate and at least one anode and thereby depositing a gold or gold alloy onto the substrate.

9. The method according to claim 8, wherein the substrate is iron, nickel, copper or an alloy thereof.

10. The method according to claims 8 or 9, wherein the substrate is an electrical connector.

11. A method comprising:
    (i) providing a used gold or gold alloy electroplating composition;
    (ii) adding a mercapto-triazole to the used gold or gold alloy electroplating composition for regenerating, wherein the mercapto-triazole is as defined in claims 1 to 2, and
    (iii) contacting a substrate with the composition; and
    (iv) applying an electrical current between the substrate and at least one anode and thereby depositing a gold or gold alloy onto the substrate.

12. Use of a mercapto-triazole, wherein the mercapto-triazole is as defined in claims 1 to 2, as anti-immersion additive in electrodeposition compositions for gold containing layers.