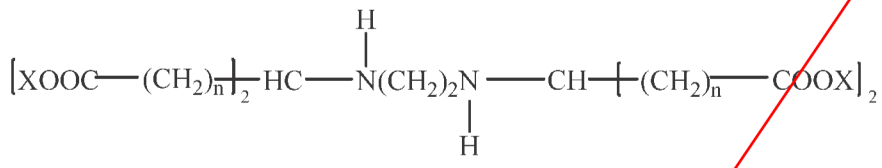
CLAIMS

1. A process for removing contaminating metal from an insulator or semiconductor substrate to improve electrical performance comprising:

exposing the substrate to an aqueous solution of at least one compound of the formula:



(I)

where n in each occurrence is independently an integer value between 0 and 6, and X is independently in each occurrence H, NR_4, Li, Na or K; where R in each occurrence is independently H or C_1-C_6 alkyl, to improve electrical performance of the substrate.

2. The process of claim 1 further comprising removing of a native oxide from the substrate prior to or concurrent with the exposing step.

3. The process of claim 1 or 2 wherein the compound of Formula I is present at between 5 and 1000 parts per million and at least one of X is NR_4.

4. The process of claim 3 wherein the compound of Formula I is ethylenediamine disuccinic and X in three occurrences is NR_4 and the compound is present at between 10 and 500 parts per million.

5. The process of claim 1 to 4 wherein said aqueous solution contains at least one of peroxide or mineral acid.

6. The process of claim 5 wherein said aqueous solution is SC1 or SC2.

7. The process of claim 5 wherein said mineral acid is hydrochloric, nitric, or hydrofluoric.

8. The process of claim 5 wherein said aqueous solution is a base.

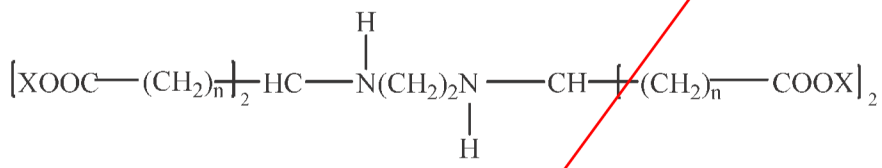
9. The process of claim 5 wherein said base is potassium hydroxide or ammonium hydroxide.

10. The process of claims 1 to 9 wherein the substrate is silicon and the contaminating metal is iron.

11. A process for removing contaminating metal from a silicon substrate comprising:

removing a native oxide from a native silicon substrate;

performing a bulk etch and surface roughening subsequent to the removing of the native oxide with an aqueous basic solution comprising at least one compound of the formula:



(I)

where n in each occurrence is independently an integer value between 0 and 6, and X is independently in each occurrence H, NR_4, Li, Na or K; where R in each occurrence is independently H or C_1-C_6 alkyl.

12. The process of claim 11 wherein the compound of Formula I is present at between 5 and 1000 parts per million.

13. The process of claim 11 or 12 wherein the compound of Formula I is ethylenediamine disuccinic and X in three occurrences is NR_4 and the compound is present at between 10 and 500 parts per million.

14. The process of claims 11 to 13 wherein said aqueous solution contains at least one of peroxide or mineral acid.

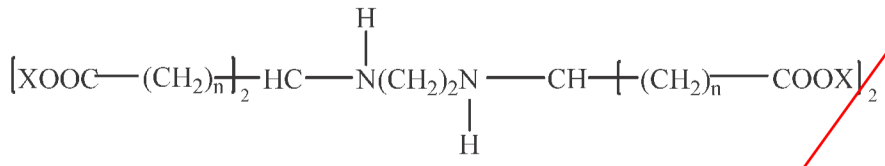
15. The process of claim 14 wherein said aqueous solution is SC1 or SC2.

16. The process of claim 14 wherein said mineral acid is hydrochloric, nitric, or hydrofluoric.

17. The process of claim 1 wherein said aqueous solution is a basic.

18. A kit for preparing a solution for removing contaminated metal from an insulator or semiconductor substrate to improve electrical performance comprising:

a 1 to 20 weight percent aqueous concentrate of at least one compound of the formula:



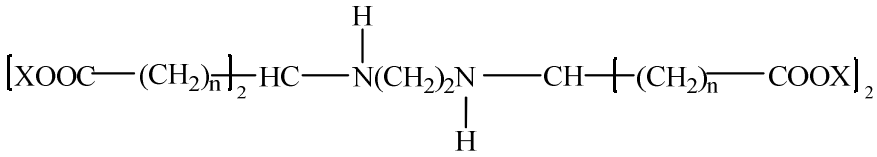
(I)

where n in each occurrence is independently an integer value between 0 and 6, and X is independently in each occurrence H, NR_4, Li or K, where R in each occurrence is independently H or C_1-C_6 alkyl;

together with instructions for the dilution of said concentrate to form the solution.

19. The kit of claim 18 wherein the compound of Formula I is present at between 5 and 1000 parts per million.

1. In order to improve electrical performance, it is how to remove a contaminated metal from an insulator or a semiconductor substrate, and it is formula (I). :



(I)

n is an integral value between 0 and 6 independently among [type at the time of each appearance, X is H, NR_4, Li, Na, or K independently at the time of each appearance, at least one of the X is NR_4, and R is H or $C_1 – C_6$ alkyl independently at the time of each appearance. How to remove a contaminated metal from an insulator or a semiconductor substrate which contains in an aqueous solution of at least 1 type of compounds of] a step which exposes a substrate in order to improve electrical performance of a substrate.

2. A method according to claim 1 of containing further a step which removes an oxide by birth from the aforementioned substrate in advance of the exposed aforementioned step simultaneously with the exposed aforementioned step.

3. A way according to claim 1 or 2 a compound of the aforementioned formula I exists among 5 to 1000 ppm.

4. A way according to claim 3 a compound of the aforementioned formula I is ethylenediamine disuccinic acid, X at the time of three appearances is NR_4, and a compound exists among 10 to 500 ppm.

5. A method of a description to 4 from Claim 1 in which the aforementioned aqueous solution contains at least 1 side of a peroxide or inorganic acid.

6. A way according to claim 5 the aforementioned aqueous solution is SC1 or SC2.

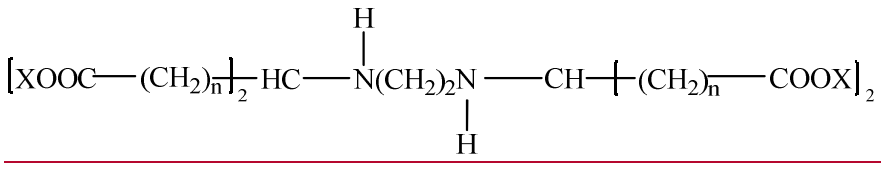
7. A way according to claim 5 the aforementioned inorganic acid is chloride, nitric acid, or hydrofluoric acid.

8. A way according to claim 5 the aforementioned aqueous solution is a base.

9. A way according to claim 5 the aforementioned base is a potassium hydrate or ammonium hydroxide.

10. A method of a description to 9 from Claim 1 whose aforementioned substrate is silicon and whose aforementioned contaminated metal is iron.

11. It is how to remove a contaminated metal from a silicon substrate, A step which removes an oxide by birth from a silicon substrate by birth, Removal of an oxide by birth is followed and it is formula (I).:



(I)

n is an integral value between 0 and 6 independently among [type at the time of each appearance, X is H, NR_4, Li, Na, or K independently at the time of each appearance, at least one of the X is NR4, and R is H or C1 - C6 alkyl independently at the time of each appearance. A step which carries out bulk etching and surface roughening using a basic aqueous solution containing at least 1 type of compounds of], ******, a method of removing a contaminated metal from a silicon substrate.

12. A way according to claim 11 a compound of the aforementioned formula I exists among 5 to 1000 ppm.

13. A way according to claim 11 or 12 a compound of the aforementioned formula I is ethylenediamine disuccinic acid, X at the time of three appearances is NR4, and the aforementioned compound exists among 10 to 500 ppm.

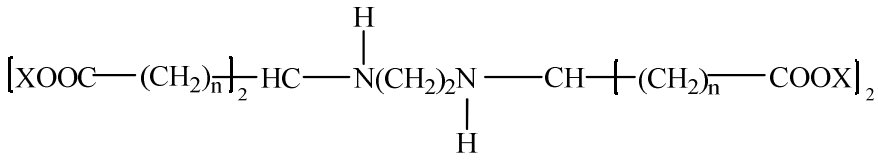
14. A method of a description to 13 from Claim 11 in which the aforementioned aqueous solution contains at least 1 side of a peroxide or inorganic acid.

15. A way according to claim 14 the aforementioned aqueous solution is SC1 or SC2.

16. A way according to claim 14 the aforementioned inorganic acid is chloride, nitric acid, or hydrofluoric acid.

17. A way according to claim 1 the aforementioned aqueous solution is a base.

18. In order to improve electrical performance, it is a kit which prepares a solution which removes a contaminated metal from an insulator or a semiconductor substrate, and it is formula (I).:



(I)

n is an integral value of Hazama of 0 to 6 independently among [type at the time of each appearance, X is H, NR4, Li, or K independently at the time of each appearance, at least one of the X is NR4, and R is H or C1 - C6 alkyl independently at the time of each appearance. A kit which prepares a solution which removes a contaminated metal from an insulator or a semiconductor substrate included together with a description for diluting the aforementioned concentrate for 1 to 20 mass-percent aquosity concentrate of at least 1 type of compounds of], and forming a solution.

19. The kit according to claim 18 in which a compound of the aforementioned formula I exists by 5 to 1000 ppm Hazama.