# CLAIMS

1. A chemical mechanical polishing (CMP) method for planarizing a nickel phosphorus (NiP) substrate, the method comprising abrading a surface of the substrate with a CMP composition; the CMP composition comprising a particulate abrasive suspended in an aqueous carrier having a pH of less than 2, and containing an oxidizing agent, a metal ion catalyst capable of reversible oxidation and reduction in the presence of NiP and the oxidizer, a catalyst stabilizing agent, and optionally, a Ni complexing agent; wherein the stabilizing agent comprises two or three carboxylic acid substituents capable of chelating to the metal ion catalyst.

2. The method of claim 1 wherein the pH of the composition is less than 1.5.

3. The method of claim 1 wherein the metal ion catalyst comprises at least one ion selected from the group consisting of ions of iron, cobalt, copper, europium, manganese, rhenium, molybdenum, iridium and tungsten.

4. The method of claim 1 wherein the metal ion catalyst is an iron ion.

5. The method of claim 4 wherein the iron ion comprises $Fe^{3+}$.

6. The method of claim 1 wherein the catalyst stabilizing agent is selected from the group consisting of oxalic acid, citric acid, malonic acid, and a combination of two or more thereof.

7. The method of claim 1 wherein the catalyst stabilizing agent is selected from the group consisting of oxalic acid, citric acid, malonic acid, and a combination of two or more thereof; and the metal ion catalyst comprises $Fe^{3+}$.

8. The method of claim 1 wherein the catalyst stabilizing agent comprises malonic acid.

9. The method of claim 1wherein the particulate abrasive is colloidal silica.

10. The method of claim 9 wherein the colloidal silica is present in the CMP composition at a concentration of 1 to 20 percent by weight (wt%).

11. The method of claim 1 wherein the metal ion catalyst is present in the CMP composition at a concentration of 50 to 150 parts-per-million (ppm).

12. The method of claim 1 wherein the oxidizing agent is present in the CMP composition at a concentration of 0.3 to 1.8 wt%.

13. The method of claim 1 wherein the stabilizing agent is present in the CMP composition at a concentration of 0.04 to 0.2 wt%.

14. The method of claim 1 wherein the CMP composition includes a Ni complexing agent, and wherein the Ni complexing agent is selected from the group consisting of glycine, alanine, aspartic acid, histidine, nitriloacetic acid, iminodiacetic acid, acetic acid, tartaric acid, citric acid, oxalic acid, lactic acid, glutaric acid, maleic acid, gluconic acid, malonic acid, glycolic acid and mixtures thereof.

15. The method of claim 14 wherein the Ni complexing agent is glycine.

16. The method of claim 1 wherein Ni complexing agent is present in the CMP composition at a concentration of 0.3 to 1 wt%.

17. The method of claim 1 wherein the abrading is accomplished in conjunction with a polishing pad in a CMP polishing apparatus.

18. A chemical mechanical polishing (CMP) composition suitable for planarizing a NiP substrate, the composition comprising a particulate abrasive suspended in an aqueous carrier having a pH of less than 2, hydrogen peroxide, a metal ion catalyst capable of reversible oxidation and reduction in the presence of NiP and hydrogen peroxide, a catalyst stabilizing agent, and a Ni complexing agent; wherein the catalyst stabilizing agent comprises two or three carboxylic acid substituents.

19. The CMP composition of claim 18 wherein the pH of the composition is less than 1.5.

20. The CMP composition of claim 18 wherein the metal ion comprises at least one ion selected from the group consisting of ions of iron, cobalt, copper, europium, manganese, rhenium, molybdenum, iridium and tungsten.

21. The CMP composition of claim 20 wherein the metal ion comprises an iron ion.

22. The CMP composition of claim 21 wherein the iron ion is $Fe^{3+}$.

23. The CMP composition of claim 18 wherein the catalyst stabilizing agent is selected from the group consisting of oxalic acid, citric acid, malonic acid, and a combination of two or more thereof.

24. The CMP composition of claim 18 wherein the catalyst stabilizing agent comprises malonic acid.

25. The CMP composition of claim 18 wherein the colloidal silica is present in the CMP composition at a concentration of 1 to 50 wt%.

26. The CMP composition of claim 18 wherein the metal ion catalyst is present in the CMP composition at a concentration of 1 to 2500 ppm.

27. The CMP composition of claim 18 wherein the hydrogen peroxide is present in the CMP composition at a concentration of 0.3 to 7.5 wt%.

28. The CMP composition of claim 18 wherein the Ni complexing agent is present in the CMP composition at a concentration of 0.3 to 15 wt%.