CLAIMS

I claim:

1. A microelectronic substrate, comprising:

a substrate material having an aperture extending into the substrate material;

a conductive material on the substrate material, the conductive material having a first conductive portion in the aperture and a second conductive portion external of the aperture; and

a fill material having a first fill portion in the aperture and proximate to the first conductive portion and a second fill portion external of the aperture and on the second conductive portion, the fill material including a material selected from the group consisting of titanium, titanium nitride, and titanium oxide.

2. The microelectronic substrate of claim 1 wherein the conductive material includes platinum, and wherein the fill material includes titanium nitride, and wherein the first fill portion has a thickness of about 100 angstroms to about 250 angstroms, and further wherein the first fill portion has a tapered end and extends into the aperture for a distance of at least about 1000 angstroms without completely filling the aperture.

3. The microelectronic substrate of claim 1 wherein the conductive material includes platinum, and wherein the fill material includes titanium nitride, and further wherein the first fill portion of the fill material extends into the aperture from the substrate material plane and substantially completely fills the aperture.

4. The microelectronic substrate of claim 1 wherein the conductive material includes platinum, and wherein the fill material includes titanium nitride, and further wherein the first fill portion extends into the aperture and is substantially flush with the substrate material plane.

5. The microelectronic substrate of claim 1 wherein the fill material has a hardness greater than about 30 GPa.

6. The microelectronic substrate of claim 1 wherein the fill material has an internal strain that compresses the conductive material.

7. A microelectronic substrate, comprising:

a substrate material having an aperture;

a conductive material on the substrate material, the conductive material having a first hardness; and

a fill material in the aperture and proximate to the conductive material, the fill material including a material configured to at least reduce smearing the conductive material into the aperture during polishing the substrate material.

8. The microelectronic substrate of claim 7 wherein the fill material has a second hardness greater than the first hardness of the conductive material.

9. The microelectronic substrate of claim 7 wherein the conductive material includes platinum or a platinum alloy, and wherein the fill material includes a material selected from the group consisting of titanium, titanium nitride, titanium oxide, tungsten, nickel, molybdenum, and cobalt.

10. The microelectronic substrate of claim 7 wherein the conductive material includes a material selected from the group consisting of platinum, gold, silver, tantalum, palladium, and rhodium, and wherein the fill material includes a material selected from the group consisting of titanium, titanium nitride, titanium oxide, tungsten, nickel, molybdenum, and cobalt.

11. The microelectronic substrate of claim 7 wherein the conductive material includes an alloy of a material selected from the group consisting of platinum, gold, silver, tantalum, palladium, and rhodium, and wherein the fill material includes a material selected from the group consisting of titanium, titanium nitride, titanium oxide, tungsten, nickel, molybdenum, and cobalt.

12. The microelectronic substrate of claim 7 wherein the conductive material includes noble metal, and wherein the fill material includes a material selected from the group consisting of titanium, titanium nitride, titanium oxide, tungsten, nickel, molybdenum, and cobalt.

13. The microelectronic substrate of claim 7 wherein the conductive material includes a material selected from Group VIII of the periodic table, and wherein the fill material includes a material selected from the group consisting of titanium, titanium nitride, titanium oxide, tungsten, nickel, molybdenum, and cobalt.

14. A method for forming microelectronic structures, comprising:

forming an aperture in a substrate material;

disposing a conductive material on the substrate material, the conductive material having a first conductive portion in the aperture and a second conductive portion external of the aperture;

disposing a fill material on the conductive material, the fill material having a first fill portion in the aperture and proximate to the first conductive portion and a second fill portion external of the aperture and on the second conductive portion, the fill material including a material selected from the group consisting of titanium, titanium nitride, and titanium oxide; and

forming an electrical feature in the aperture.

15. The method of claim 14 wherein disposing a conductive material includes disposing a conductive material that includes platinum, and wherein disposing a fill material includes disposing a fill material in the aperture without completely filling the aperture, the fill material including a first fill portion with a tapered end and extending into the aperture from the substrate material plane for a distance of at least about 1000 angstroms and a second fill portion with a thickness of about 100 angstroms to about 250 angstroms.

16. The method of claim 14 wherein disposing a conductive material includes disposing a conductive material that includes platinum, and further wherein disposing a fill

material includes disposing a fill material that includes a first fill portion extending into the aperture from the substrate material plane and substantially completely fills the aperture.

17. The method of claim 14 wherein disposing a conductive material includes disposing a conductive material that includes platinum, and wherein disposing a fill material includes disposing a fill material that includes a first fill portion extending into the aperture and is substantially flush with the substrate material plane.

18. The method of claim 14 wherein disposing a fill material includes disposing a fill material that has a hardness greater than about 30 GPa.

19. The method of claim 14 wherein disposing a fill material includes disposing a fill material that has an internal strain that compresses the conductive material.

20. A method for forming microelectronic structures, comprising:

forming an aperture in a substrate material;

disposing a conductive material on the substrate material and in the aperture;

disposing a fill material on the conductive material, the fill material at least partially filling the aperture; and

polishing the substrate material to remove at least a portion of the conductive material and the fill material external to the aperture, wherein the fill material at least substantially prevents the conductive material from smearing into the aperture during polishing the substrate material.

21. The method of claim 20 wherein disposing a conductive material includes disposing a conductive material that includes platinum, and wherein disposing a fill material includes disposing a fill material that includes a material selected to prevent smearing the conductive material into the aperture during polishing the substrate material.

22. The method of claim 20 wherein disposing a conductive material includes disposing a conductive material that includes platinum, and wherein polishing the substrate

material includes removing at least a portion of the conductive material and the fill material external to the aperture in one chemical-mechanical polishing procedure.

23. The method of claim 20 wherein disposing a conductive material includes disposing a conductive material that includes platinum, and wherein polishing the substrate material includes compressing the conductive material with the fill material while polishing the substrate material.

24. The method of claim 20 wherein polishing the substrate material includes preventing the conductive material from spreading into the aperture.

25. The method of claim 20, further comprising removing the fill material from the aperture using a wet etch procedure.

26. The method of claim 20, further comprising:
removing the fill material from the aperture using a wet etch procedure; and
forming a capacitor in the aperture after removing the fill material from the aperture.

27. The method of claim 20, further comprising removing a portion of the conductive material and a portion of the fill material external to the aperture in a single polishing operation.

28. The method of claim 20, further comprising removing a portion of the conductive material and a portion of the fill material external to the aperture without etching.

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a fill material having a first fill portion in the aperture and proximate to the first conductive portion and a second fill portion external of the aperture and on the second conductive portion, the fill material including a material selected from the group consisting of titanium, titanium nitride, and titanium oxide.