CLAIMS

I claim:

1. A microelectronic substrate, comprising:

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

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, wherein the conductive material has a first hardness; 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, wherein the fill material has a second hardness greater than the first hardness, and wherein the first fill portion extends partially into the aperture to form a tapered end spaced apart from the first conductive portion in the aperture.

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 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. The microelectronic substrate of claim 1 wherein the fill material contacts the conductive material in the aperture.

8. The microelectronic substrate of claim 1 wherein the first portion of the conductive material and the first portion of the fill material are exposed at the aperture and are substantially flush with the substrate material plane.

9. The microelectronic substrate of claim 1 wherein the first fill portion is configured to be removed from the first conductive portion in the aperture to form a container.

10. 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 in contact with a portion of the conductive material in the aperture, the fill material including a material configured to at least reduce smearing the conductive material into the aperture while polishing the substrate material, wherein the fill material is conductive and has a second hardness greater than the first hardness of the conductive material, and wherein the fill material extends partially into the aperture to form an end in the aperture spaced apart from the conductive material.

11. The microelectronic substrate of claim 10 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.

12. The microelectronic substrate of claim 10 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.

13. The microelectronic substrate of claim 10 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.

14. The microelectronic substrate of claim 10 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.

15. The microelectronic substrate of claim 10 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.

16. The microelectronic substrate of claim 10 wherein:

the substrate material includes a substrate material plane, the aperture extending into the substrate material from the substrate material plane; and

the fill material includes an exposed portion at least substantially flush with the substrate material plane.

17. The microelectronic substrate of claim 10 wherein the fill material is configured to be removed from the conductive material aperture using a wet etch procedure.

18. 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.

19. The method of claim 18 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.

20. The method of claim 18 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.

21. The method of claim 18 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.

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

23. The method of claim 18 wherein disposing a fill material includes disposing a fill material that has an internal strain that compresses the conductive material.

24. 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.

25. The method of claim 24 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.

26. The method of claim 24 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.

27. The method of claim 24 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.

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

29. The method of claim 24, further comprising removing the fill material from the aperture using a wet etch procedure.

30. The method of claim 24, 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.

31. The method of claim 24, 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.

32. The method of claim 24, further comprising removing a portion of the conductive material and a portion of the fill material external to the aperture without etching.

CLAIMS

1. A microelectronic substrate, comprising:

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

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, wherein the conductive material has a first hardness; 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, wherein the fill material has a second hardness greater than the first hardness, and wherein the first fill portion extends partially into the aperture to form a tapered end spaced apart from the first conductive portion in the aperture.

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 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. The microelectronic substrate of claim 1 wherein the fill material contacts the conductive material in the aperture.

8. The microelectronic substrate of claim 1 wherein the first portion of the conductive material and the first portion of the fill material are exposed at the aperture and are substantially flush with the substrate material plane.

9. The microelectronic substrate of claim 1 wherein the first fill portion is configured to be removed from the first conductive portion in the aperture to form a container.

10. 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 in contact with a portion of the conductive material in the aperture, the fill material including a material configured to at least reduce smearing the conductive material into the aperture while polishing the substrate

material, wherein the fill material is conductive and has a second hardness greater than the first hardness of the conductive material, and wherein the fill material extends partially into the aperture to form an end in the aperture spaced apart from the conductive material.

11. The microelectronic substrate of claim 10 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.

12. The microelectronic substrate of claim 10 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.

13. The microelectronic substrate of claim 10 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.

14. The microelectronic substrate of claim 10 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.

15. The microelectronic substrate of claim 10 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.

16. The microelectronic substrate of claim 10 wherein:

the substrate material includes a substrate material plane, the aperture extending into the substrate material from the substrate material plane; and

the fill material includes an exposed portion at least substantially flush with the substrate material plane.

17. The microelectronic substrate of claim 10 wherein the fill material is configured to be removed from the conductive material aperture using a wet etch procedure.

18. 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 including a material selected from the group consisting of titanium, titanium nitride, and titanium oxide, wherein the fill material has

a first fill portion in the aperture and proximate to the first conductive portion, wherein the first fill portion extends partially into the aperture to form a tapered end, and wherein at least a portion of the first fill portion spans a width of the aperture, and

a second fill portion external of the aperture and on the second conductive portion, and

forming an electrical feature in the aperture.

19. The method of claim 18 wherein the conductive material includes platinum, and wherein disposing the fill material includes disposing the fill material in the aperture without completely filling the aperture, wherein the first fill portion extends for a distance of at least about 1000 angstroms, and the second fill portion has a thickness of about 100 angstroms to about 250 angstroms.

20. The method of claim 18 wherein the conductive material includes platinum.

21. The method of claim 18 wherein disposing the conductive material includes platinum, and wherein:

forming the aperture includes forming the aperture into the substrate material from a substrate material plane; and

disposing the fill material includes disposing the fill material such that the first fill portion is substantially flush with the substrate material plane.

22. The method of claim 18 wherein the fill material has a hardness greater than about 30 GPa.

23. The method of claim 18 wherein the fill material has an internal strain that compresses the conductive material.

24. 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 without completely filling the aperture, wherein a portion of the fill material extends partially into the aperture to form a tapered end, and wherein at least a portion of the fill material spans a width of 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.

25. The method of claim 24 wherein the conductive material includes platinum, and wherein the fill material is selected to prevent smearing the conductive material into the aperture during polishing the substrate material.

26. The method of claim 24 wherein the conductive material 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.

27. The method of claim 24 wherein the conductive material includes platinum, and wherein polishing the substrate material includes compressing the conductive material with the fill material while polishing the substrate material.

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

29. The method of claim 24, further comprising removing the fill material from the aperture using a wet etch procedure.

30. The method of claim 24, 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.

31. The method of claim 24, 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.

32. The method of claim 24, further comprising removing a portion of the conductive material and a portion of the fill material external to the aperture without etching.