CLAIMS

What is claimed is:

1. A method of fabricating an interconnect structure comprising:

providing a dielectric material having a dielectric constant of about 3.0 or less and at least one conductive material embedded therein, the at least one conductive material has an upper surface that is coplanar with an upper surface of the dielectric material; and

forming a noble metal-containing cap directly on the upper surface of the at least one conductive material, wherein said forming the noble metal-containing cap comprises forming a continuous noble metal-containing cap across the entire upper surface of the at least one conductive material utilizing a deposition temperature of about 200° C. or less, and selectively removing portions of the continuous noble metal-containing cap to form the discontinuous or non-uniform noble metal-containing cap, wherein selectively removing includes a touch-up chemical mechanical polishing process.

2. The method of claim 1 wherein said forming said noble metal-containing cap is selected from the group consisting of chemical vapor deposition (CVD), plasma enhanced chemical vapor deposition (PECVD), atomic layer deposition (ALD), electroless plating and electroplating.

3. The method of claim 2 wherein said forming the noble metal-containing cap includes one of CVD, PECVD and ALD.

4. The method of claim 3 wherein said deposition is performed at a deposition time of less than 3 minutes.

5. The method of claim 3 wherein said deposition is performed at a deposition pressure of 50 mTorr or less.

6. The method of claim 3 wherein said deposition is performed at a deposition time of less than 3 minutes, and a deposition pressure of 50 mTorr or less.

7. The method of claim 3 wherein said deposition is performed at a temperature from 150° C. to 200° C. and a pressure from 5 mTorr to 20 mTorr for a duration of less than 1 minute.

8. The method of claim 1 further comprising forming a dielectric capping layer atop located atop the dielectric material and the noble metal-containing cap.

9. The method of claim 1 wherein said noble metal-containing cap is discontinuous.

10. The method of claim 1 wherein said forming the noble metal-containing cap includes selecting a metal from the group consisting of Ru, Ir, Rh, Pt, Co, and W.

11. The method of claim 10 wherein said metal further includes one of W, B and P.

12. The method of claim 1 wherein said forming the noble metal-containing cap comprises a plating technique that is performed for a duration of less than 3 minutes.

13. The method of claim 1 wherein said forming the noble metal-containing cap includes deposition of a metal at a deposition rate that is from 0.1 to 1.2 Angstroms/second.

14. The method of claim 1 wherein said noble metal-containing cap has sidewall edges that are coincident to sidewall surfaces of said at least one conductive material.

15. The method of claim 1 wherein said deposition is performed at a deposition pressure of 50 mTorr or less.

Claims

What is claimed is:

1. A method of fabricating an interconnect structure comprising:

providing a dielectric material having a dielectric constant of about 3.0 or less and at least one conductive material embedded therein, the at least one conductive material has an upper surface that is coplanar with an upper surface of the dielectric material; and

forming a noble metal-containing cap directly on the upper surface of the at least one conductive material, wherein the noble metal cap is discontinuous or non-uniform.

2. The method of Claim 1 wherein said forming said noble metal-containing cap is selected from the group consisting of chemical vapor deposition (CVD), plasma enhanced chemical vapor deposition (PECVD), atomic layer deposition (ALD), electroless plating and electroplating.

3. The method of Claim 2 wherein said forming the noble metal-containing cap includes one of CVD, PECVD and ALD.

4. The method of Claim 3 wherein said deposition is performed at a deposition time of less than 3 minutes.

5. The method of Claim 3 wherein said deposition is performed at a deposition pressure of 50 mTorr or less.

6. The method of Claim 3 wherein said deposition is performed at a deposition temperature of 300°C or less.

7. The method of Claim 3 wherein said deposition is performed at: a deposition time of less than 3 minutes, a deposition pressure of 50 mTorr or less, and a deposition temperature of 300°C or less.

8. The method of Claim 3 wherein said deposition is performed at a temperature from 150°C to 200°C and a pressure from 5 mTorr to 20 mTorr for a duration of less than 1 minute.

9. The method of Claim 1 wherein said forming the noble metal-containing cap includes first forming a continuous noble metal-containing cap across the entire upper surface of the at least one conductive material utilizing a chemical deposition temperature of about 200°C or less; and selectively removing portions of the continuous noble metal-containing cap to form the discontinuous noble metal-containing cap.

10. The method of Claim 9 wherein said selectively removing includes providing a patterned mask or block mask and etching.

11. The method of Claim 9 wherein said selectively removing includes a touch-up chemical mechanical polishing process.

12. The method of Claim 1 further comprising forming a dielectric capping layer atop located atop the dielectric material and the noble metal-containing cap.

13. The method of Claim 1 wherein said noble metal-containing cap is discontinuous.

14. The method of Claim 1 wherein said forming the noble metal-containing cap includes selecting a metal from the group consisting of Ru, Ir, Rh, Pt, Co, and W.

15. The method of Claim 14 wherein said metal further includes one of W, B and P.

16. The method of Claim 1 wherein said forming the noble metal-containing cap comprises a plating technique that is performed for a duration of less than 3 minutes.

17. The method of Claim 1 wherein said forming the noble metal-containing cap includes deposition of a metal at a deposition rate that is from 0.1 to 1.2 Angstroms/second.

18. The method of Claim 1 wherein said noble metal-containing cap has sidewall edges that are coincident to sidewall surfaces of said at least one conductive material.