CLAIMS

1. A method of electrodepositing a metal onto a semiconductor substrate having a plurality of through-mask recessed features, while preventing or reducing deposition of the metal on a lipseal of an electroplating apparatus, the method comprising:

(a) electrodepositing a first metal into the through-mask recessed features of the semiconductor substrate in a first electroplating cell using a first lipseal; and

(b) electrodepositing a second metal into the through-mask recessed features after (a), in a second electroplating cell using a second lipseal having a larger inner diameter than the first lipseal, wherein the semiconductor substrate comprises a selected zone shielded from exposure to an electrolyte by the first lipseal but not by the second lipseal, such that the first metal is not electrodeposited in the selected zone and such that the second metal is allowed to be electrodeposited in the selected zone.

2. The method of claim 1, wherein electrodeposition of the second metal in the selected zone in (b) does not result in electrodeposition above a plane of the mask.

3. The method of claim 1, wherein electrodeposition of the second metal in the selected zone in (b) does not result in contact of the electrodeposited second metal with the second lipseal.

4. The method of claim 1, wherein (b) results in electrodeposition of the second metal above a plane of the mask outside of the selected zone.

5. The method of claim 1, wherein (b) results in electrodeposition of the second metal above a plane of the mask outside of the selected zone, and in electrodeposition below the plane of the mask in the selected zone.

6. The method of claim 1, wherein the first metal is copper and the second metal is a combination of tin and silver.

7. The method of claim 1, wherein the first metal is a combination of tin and silver, and the second metal is a combination of tin and silver.

8. The method of claim 1, wherein the width of the selected zone is between about 0.05 – 1 mm.

9. The method of claim 1, wherein the width of the selected zone is about 0.25 mm.

10. The method of claim 1, wherein the mask is photoresist and the second lipseal is in direct contact with the photoresist during the course of electroplating.

11. The method of claim 1, whererin the through-mask recessed features have widths of between about 10 – 50 μm.

12. The method of claim 1, wherein the mask has a thickness of between about 10 – 100 μm.

13. The method of claim 1, wherein the first and second lipseals are made from an elastomeric material, wherein a width of the selected zone is equal to a difference between an inner radius of the second lipseal and an inner radius of the first lipseal, and wherein the selected zone has an annular shape.

14. A system for electroplating a metal onto the semiconductor substrate, the system comprising:

(a) a first electroplating apparatus configured for electrodepositing a first metal onto the semiconductor substrate, the first electroplating apparatus comprising a substrate holder having a first lipseal; and

(b) a second electroplating apparatus configured for electrodepositing a second metal onto the semiconductor substrate, the second electroplating apparatus comprising a substrate holder having a second lipseal, wherein the second lipseal has a greater inner diameter than the first lipseal.

15. The system of claim 14, wherein a difference between an inner radius of the second lipseal and an inner radius of the first lipseal is less than about 1 mm.

16. The system of claim 14, wherein a difference between an inner radius of the second lipseal and an inner radius of the first lipseal is between about 0.05 – 1 mm.

17. The system of claim 14, wherein a difference between an inner radius of the second lipseal and an inner radius of the first lipseal is about 0.25 mm.

18. The system of claim 14, wherein the first and the second lipseals comprise elastomeric material.

19. The system of claim 14, wherein the first and second metals are different, and wherein the first electroplating apparatus comprises a copper anode, and the second electroplating apparatus comprises a tin anode.

20. The system of claim 14, wherein the first metal and the second metal are both a combination of tin and silver, and wherein the first electroplating apparatus and the second electroplating apparatus both comprise tin anodes.

21. The system of claim 14, further comprising a mechanism configured for transferring the semiconductor substrate from the first electroplating apparatus to the second electroplating apparatus.

22. The system of claim 14, wherein at least one of the first and second electroplating apparatuses is configured for electrodeposition of a combination of tin and silver, and includes a membrane separating an anode chamber and a cathode chamber, wherein the membrane substatially prevents silver ions from moving across the membrane.

23. The system of claim 22, wherein the first electroplating apparatus is configured for electrodeposition of copper, and the second apparatus is configured for electrodeposition of a combination of tin and silver.

24. The system of claim 14, further comprising a controller comprising program instructions for causing:

(i) electroplating of a first metal in the first electroplating apparatus to partially fill through-mask recessed features on the semiconductor substrate;

(ii) transfer of the semiconductor substrate to the second electroplating apparatus; and

(iii) electroplating of a second metal in the second electroplating apparatus over the first metal, such that the second lipseal does not come into contact with the electroplated second metal during the course of electroplating, and such that at least some of the through-mask recessed features are filled above a plane of the mask.

25. A method of electrodepositing a metal onto a semiconductor substrate, while preventing or reducing deposition of the metal on a lipseal of an electroplating apparatus of the system of claim 14, the method comprising:

(a) providing a semiconductor substrate into a substrate holder of the electroplating apparatus of claim 14, wherein the substrate holder comprises a lipseal positioned such that at least a portion of the lipseal contacts an electrolyte during electroplating; and

(b) electroplating the metal onto the semiconductor substrate, while preventing or reducing ionic current flow directed to the lipseal.