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CLAIMS*What is claimed is:*

1. A method of electrodepositing a metal onto a semiconductor substrate having a plurality of through-mask recessed features, the method comprising:

10 (a) electrodepositing a first metal into the recessed through-mask features of the semiconductor substrate, without fully filling the recessed through-mask features, in a first electroplating cell using a first lipseal, wherein the first lipseal contacts the semiconductor substrate at a periphery of the semiconductor substrate, and wherein an innermost point of contact between the first lipseal and the semiconductor substrate is located at a first distance from an edge of the semiconductor substrate; and

15 (b) electrodepositing a second metal into the recessed through-mask features of the semiconductor substrate after (a), in a second electroplating cell using a second lipseal, wherein the second lipseal contacts the semiconductor substrate at a periphery of the semiconductor substrate, wherein an innermost point of contact between the second lipseal and the semiconductor substrate is located at a second distance from the edge of the semiconductor substrate, and wherein the second distance is greater than the first distance.

25 2. The method of claim 1, wherein the second distance is greater than the first distance by about 0.1 – 0.5 mm.

3. The method of claim 1, wherein the second distance is greater than the first distance by about 0.15 – 0.25 mm.

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4. The method of claim 1, wherein the first lipseal and the second lipseal contact a photoresist material on the semiconductor substrate.

35 5. The method as in any of claims 1-4, wherein the first metal is electrodeposited in a plating bath having a temperature of greater than 25 °C.

5 6. The method as in any of claims 1-4, wherein the first metal is electrodeposited in a plating bath having a temperature of greater than 40 °C.

 7. The method as in any of claims 1-4, wherein the first metal is nickel, wherein the nickel is electrodeposited using a plating bath having a temperature of greater than 25 °C.
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 8. The method as in any of claims 1-4, wherein the first metal is nickel, wherein the nickel is electrodeposited using a plating bath having a temperature of greater than 40 °C.

 9. The method as in any of claims 1-4, wherein the first metal is nickel, and the
15 second metal is tin or a combination of tin and silver.

 10. The method as in any of claims 1-4, wherein the first metal is nickel, the second metal is tin or a combination of tin and silver, wherein the method further comprises electrodepositing copper into the recessed through-mask features prior to electrodeposition of
20 nickel.

 11. The method as in any of claims 1-4, wherein electrodeposition in (b) does not result in protrusion of the electrodeposited second metal above a level of a mask material.

25 12. The method as in any of claims 1-4, wherein the first lipseal and the second lipseal are different lipseals, wherein the second lipseal has a smaller diameter than the first lipseal.

 13. The method as in any of claims 1-4, wherein the first lipseal and the second
30 lipseal is the same lipseal that is configured to be adjusted to contact the substrate at different positions.

 14. The method as in any of claims 1-4, wherein the semiconductor substrate is a partially fabricated high bandwidth memory (HBM) device.
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5 15. The method as in any of claims 1-4, further comprising releasing the semiconductor substrate from contact with the first lipseal after (a), and leaving the semiconductor substrate without contact with a lipseal for at least one hour prior to (b).

10 16. The method as in any of claims 1-4, further comprising the steps of:
applying photoresist to the semiconductor substrate;
exposing the photoresist to light;
patterning the photoresist and transferring the pattern to the semiconductor substrate;
and selectively removing the photoresist from the semiconductor substrate.

15 17. 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;

20 (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 smaller diameter than the first lipseal; and

 (c) a controller comprising program instructions configured to cause the steps of:

25 i. electroplating the first metal in the first electroplating apparatus to partially fill through-mask recessed features on the semiconductor substrate; and
 ii. electroplating the second metal in the second electroplating apparatus after the first metal has been electroplated.
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 18. 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 from a heated electrolyte, the first electroplating apparatus comprising a substrate holder having a first lipseal; and
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5 (b) a second electroplating apparatus configured for electrodepositing a second metal onto the semiconductor substrate from an unheated electrolyte, the second electroplating apparatus comprising a substrate holder having a second lipseal, wherein the second lipseal has a smaller diameter than the first lipseal.

10 19. The system of claim 18, wherein a difference between a radius of the first lipseal and a radius of the second lipseal is about 0.1 – 0.5 mm.

20. The method of claim 1, wherein a difference between a radius of the first lipseal and a radius of the second lipseal is about 0.15 – 0.25 mm.

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