Claims

1. A method of manufacturing an array of planar wafer level metal posts comprising:

plating an array of posts within a photoresist (PR) pattern mold on a substrate of a first wafer;

stripping the PR pattern mold from the substrate and array of posts;

after the step of stripping the PR pattern mold, applying a PR layer around each of the posts;

after the step of applying a PR layer, etching a metal seed layer on the substrate to singulate the array of posts;

applying an oxide layer, at a temperature of below 150 degrees Celsius, over a surface of the first wafer and around the array of posts extending from the surface; and

applying chemical-mechanical polishing (CMP) to planarize the oxide layer and the array of posts.

2. The method of Claim 1 further comprising, after the step of stripping the pattern mold, applying a PR layer around each of the posts.

3. The method of Claim 2 further comprising, after the step of applying a PR layer, etching a metal seed layer on the substrate to singulate the array of posts.

4. The method of Claim 3 further comprising, after the step of etching a metal seed layer, stripping the PR layer.

5. The method of Claim 2 further comprising, after the step of applying CMP, protecting exposed surfaces of the array of posts with a second PR layer.

6. The method of Claim 5 further comprising, after the step of protecting exposed surfaces of the array of posts, cleaning a surface of the oxide layer.

7. The method of Claim 6 wherein in the step of cleaning a surface of the oxide layer, the surface is cleaned by applying HCl.

8. The method of Claim 1 wherein in the step of applying an oxide layer, the oxide layer is applied at a temperature of between 127 degrees Celsius and 147 degrees Celsius.

9. The method of Claim 1 wherein in the step of applying an oxide layer, the oxide layer is applied at a temperature of between 135 degrees Celsius and 139 degrees Celsius.

10. The method of Claim 1 wherein the posts are comprised of Indium.

11. A method of manufacturing a bonded wafer assembly with Indium interconnections comprising:

a) providing a first wafer with a substrate layer, an insulating layer, and a metal seed layer, the metal seed layer connected to the substrate layer by vias extending through a first plurality of holes in the insulating layer;

b) applying a photoresist (PR) pattern mold over the metal seed layer such that a second plurality of holes through the PR pattern mold align with the vias;

c) plating Indium within the second plurality of holes in the PR pattern mold to form an array of Indium posts on the first wafer;

d) stripping the PR pattern mold;

e) etching a portion of the metal seed layer to singulate the array of Indium posts;

f) applying an oxide layer, at a temperature below 150 degrees Celsius, over a surface of the first wafer;

g) applying chemical-mechanical polishing (CMP) to form a planar surface, the planar surface including the array of Indium posts and the oxide layer;

h) performing steps a)-g) to create a second wafer;

i) aligning the Indium posts of the first and second wafers; and

j) bonding the first wafer and the second wafer together to form the bonded wafer assembly.

12. The method of Claim 11 wherein in step (j), the bonding is done through a low temperature annealing process.

13. The method of Claim 11 further comprising, after step (d) and before step (e), placing a PR layer around each of the Indium posts.

14. The method of Claim 13 further comprising, after step (e) and before step (f), stripping the PR layer.

15. The method of Claim 13 further comprising, after step (g), placing a second PR layer over exposed surfaces of the array of Indium posts.

16. The method of Claim 15 further comprising, after the step of placing a second PR layer, cleaning an exposed surface of the oxide layer.

17. The method of Claim 16 wherein cleaning an exposed surface of the oxide layer is done by applying HCl.

18. The method of Claim 11 wherein in the step (f), the oxide layer is applied at a temperature of between 127 degrees Celsius and 147 degrees Celsius.

19. The method of Claim 11 wherein in the step (f), the oxide layer is applied at a temperature of between 135 degrees Celsius and 139 degrees Celsius.