CLAIMS

1. A method for chip on wafer bonding, comprising:

forming a plurality of posts on at least one of a chip and a wafer, and a like plurality of contacts on the other of the chip and the wafer;

planarizing a contact surface of each post, the planarized contact surface having a surface roughness height;

applying, to at least one of the chip and the wafer, a bonding material of a thickness no greater than the surface roughness height;

temporarily bonding the posts to the contacts using the bonding material to stabilize a position of the chip relative to the wafer for permanent diffusion bonding of the chip to the wafer.

2. The method of claim 1 further comprising permanently bonding the chip to the wafer by diffusion of the posts and contacts into each other.

3. The method of claim 1 or 2 wherein the applying step comprises applying insufficient bonding material to permanently bond the chip to the wafer through forming of an intermetallic compound.

4. The method of any preceding claim, wherein each of the plurality of contacts comprises a pad.

5. The method of claim 4, wherein the pads are formed by a physical vapour deposition process.

6. The method of any one of claims 1 to 3, wherein each of the plurality of contacts comprises a post.

7. The method of any preceding claim, further comprising the step of de-oxidising the contact surface of each post before the applying step.

8. The method of any preceding claim, wherein bonding material is applied to one of the chip and wafer which, during the temporary bonding step, is held at a lower temperature than the other of the chip or wafer.

9. The method of claim 8, wherein the lower temperature is a temperature at which the plurality of contacts does not oxidise.

10. The method of claim 8 or 9, wherein the lower temperature is a temperature at which the bonding material does not diffuse into the plurality of contacts.

11. The method of any one of claims 8 to 10, wherein the lower temperature is about room temperature.

12. The method of any preceding claim, wherein the permanent bonding step is performed at a temperature below the melting temperature of the bonding material.

13. The method of any preceding claim, wherein the temporarily bonding step comprises temporarily bonding the posts to the contacts in a flip chip bonder.

14. The method of claim 13, further comprising cooling the flip chip bonder, after the temporary bonding step, to solidify the bonding material.

15. The method of any preceding claim, wherein the bonding material is applied using electroplating.

16. The method of any one of claims 1 to 14, wherein the bonding material comprises a solvent applied by electroless deposition to the plurality of posts.

17. The method of claim 16, wherein the temporary bonding step bonds the posts and contacts with the solvent reacting with the posts and contacts to form a low melting point metal.

18. The method of any preceding claim, wherein the bonding material forms a layer having a thickness of less than 1 micron.