CLAIMS

What is claimed is:

1. A semiconductor apparatus comprising:

a semiconductive die embedded in a bumpless build-up layer (BBUL) structure; and

a laminated-core structure abutting the BBUL structure, wherein the laminated-core structure and the BBUL structure are electrically coupled by an electrically conductive body that is integral to both.

2. The apparatus of claim 1, wherein the electrically conductive body is a hollow cylinder that is closed on one end thereof.

3. The apparatus of claim 1, wherein the electrically conductive body is a hollow cylinder that is closed on one end thereof, wherein the laminated-core structure includes a copper plated through hole, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the electrically conductive body is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

4. The apparatus of claim 1, wherein the electrically conductive body is a hollow cylinder that is closed on one end thereof, wherein the laminated-core structure includes a copper plated through hole (PTH) having a width in a range from 100 μm to 120 μm and a thickness in a range from 400 μm to 1,400 μm, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the electrically conductive body is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

5. The apparatus of claim 1, wherein the electrically conductive body is fused to a plated through hole in the laminated-core structure and to a subsequent bond pad on the BBUL structure.

6. The apparatus of claim 1, wherein the semiconductor die is a first die, the apparatus further including a subsequent die embedded in the BBUL structure.

7. The apparatus of claim 1, wherein the BBUL structure includes a die side, the apparatus further including a die-side contact pad.

8. The apparatus of claim 1, wherein the BBUL structure includes a die side, the apparatus further including:

a die-side contact pad; and

a package-on-package apparatus mounted on the BBUL structure at the die side and electrically coupled at the die-side contact pad.

9. The apparatus of claim 1, further including a foundation substrate, wherein the laminated core structure is mounted to the foundation substrate.

10. A semiconductive device comprising:

a die embedded in a bumpless build-up layer (BBUL), wherein the die includes an active surface and a backside surface, the BBUL including:

a dielectric first film and a first contact disposed in the dielectric first film and making contact with the die at the active surface; and

a dielectric subsequent film and a subsequent contact disposed in the dielectric subsequent film, wherein the subsequent contact is coupled to the first contact and further including a subsequent contact pad;

a laminated-core structure assembled at the subsequent contact pad, the laminated core further including:

a plated through hole (PTH) upon a PTH wall;

a reinforcement plating that is fused to the PTH and the subsequent contact pad; and

a land-side structure including:

land-side contact pads that are coupled to the PTH at laminated-core land-interface bond pads.

11. The device of claim 10, further including a foundation substrate assembled at the land-side contact pads.

12. The apparatus of claim 10, wherein the reinforcement plating is a hollow cylinder that is closed on one end thereof.

13. The apparatus of claim 10, wherein the reinforcement plating is a hollow cylinder that is closed on one end thereof, wherein the laminated-core structure includes a copper plated through hole, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the electrically conductive body is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

14. The apparatus of claim 10, wherein the reinforcement plating is a hollow cylinder that is closed on one end thereof, wherein the laminated-core structure includes a copper plated through hole (PTH) having a width in a range from 100 μm to 350 μm and a thickness in a range from 400 μm to 1,400 μm, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the electrically conductive body is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

15. The apparatus of claim 10, wherein the semiconductor die is a first die, the apparatus further including a subsequent die embedded in the BBUL structure.

16. The apparatus of claim 10, wherein the BBUL structure includes a die side, the apparatus further including a die-side contact pad.

17. The apparatus of claim 10, wherein the BBUL structure includes a die side, the apparatus further including:

a die-side contact pad; and

a package-on-package apparatus mounted on the BBUL structure at the die side and electrically coupled at the die-side contact pad.

18. A process comprising:

embedding a semiconductor device in a bumpless build-up (BBUL) structure;

assembling the BBUL structure to a laminated-core structure; and

fusing the BBUL structure at a bond pad thereof to the laminated-core structure a plated though hole thereof, wherein fusing achieves a partially closed cylindrical reinforcement plating.

19. The process of claim 18, wherein fusing the BBUL structure and the laminated-core structure is achieved by electroless plating a copper material to form the reinforcement plating.

20. The process of claim 18, further including assembling a land-side structure to the laminated-core structure.

21. The process of claim 18, further including filling the PTH with a filler material that includes an organic material and an inorganic particulate.

22. The process of claim 18, wherein the BBUL structure includes a die side, the process further including assembling a die-side contact pad at the die side.

23. The process of claim 18, further including:

assembling a land-side structure to the laminated-core structure; and

assembling the apparatus to a foundation substrate at the land-side structure.

CLAIMS

What is claimed is:

1. A semiconductor apparatus comprising:
a semiconductive die embedded in a bumpless build-up layer (BBUL) structure; and

a laminated-core structure abutting the BBUL structure, wherein the laminated-core structure and the BBUL structure are electrically coupled by an electrically conductive body that is integral to both, wherein the electrically conductive body is a hollow cylinder that is closed on one end thereof.

2. The apparatus of claim 1, wherein the laminated-core structure includes a copper plated through hole, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the electrically conductive body is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

3. The apparatus of claim 1, wherein the laminated-core structure includes a copper plated through hole (PTH) having a width in a range from 100 μm to 120 μm and a thickness in a range from 400 μm to 1,400 μm, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the electrically conductive body is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

4. The apparatus of claim 1, wherein the electrically conductive body is fused to a plated through hole in the laminated-core structure and to a subsequent bond pad on the BBUL structure.

5. The apparatus of claim 1, wherein the semiconductor die is a first die, the apparatus further including a subsequent die embedded in the BBUL structure.

6. The apparatus of claim 1, wherein the BBUL structure includes a die side, the apparatus further including a die-side contact pad.

7. The apparatus of claim 1, wherein the BBUL structure includes a die side, the apparatus further including:
a die-side contact pad; and

a package-on-package apparatus mounted on the BBUL structure at the die side and electrically coupled at the die-side contact pad.

8. The apparatus of claim 1, further including a foundation substrate, wherein the laminated core structure is mounted to the foundation substrate.

9. A semiconductive device comprising:
a die embedded in a bumpless build-up layer (BBUL), wherein the die includes an active surface and a backside surface, the BBUL including:
a dielectric first film and a first contact disposed in the dielectric first film and making contact with the die at the active surface; and

a dielectric subsequent film and a subsequent contact disposed in the dielectric subsequent film, wherein the subsequent contact is coupled to the first contact and further including a subsequent contact pad;

a laminated-core structure assembled at the subsequent contact pad, the laminated core further including: a plated through hole (PTH) upon a PTH wall;

a reinforcement plating that is fused to the PTH and the subsequent contact pad, wherein the reinforcement plating is a hollow cylinder that is closed on one end thereof; and

a land-side structure including:
land-side contact pads that are coupled to the PTH at laminated-core land-interface bond pads.

10. The device of claim 9, further including a foundation substrate assembled at the land-side contact pads.

11. The device of claim 9, wherein the laminated-core structure includes a copper plated through hole, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the reinforcement plating is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

12. The device of claim 9, wherein the laminated-core structure includes a copper plated through hole (PTH) having a width in a range from 100 μm to 350 μm and a thickness in a range from 400 μm to 1,400 μm, wherein the BBUL structure includes a copper subsequent bond pad, and wherein the reinforcement plating is copper that is fused to the copper plated through hole and to the copper subsequent bond pad.

13. The device of claim 9, wherein the semiconductor die is a first die, the device further including a subsequent die embedded in the BBUL structure.

14. The device of claim 9, wherein the BBUL structure includes a die side, the device further including a die-side contact pad.

15. The device of claim 9, wherein the BBUL structure includes a die side, the device further including: a die-side contact pad; and

a package-on-package apparatus mounted on the BBUL structure at the die side and electrically coupled at the die-side contact pad.