Claims

What is claimed:

1. A method of making a semiconductor device, comprising:

providing a semiconductor wafer including a plurality of semiconductor die;

forming an insulating layer over the semiconductor wafer;

removing a portion of the insulating layer along a surface edge of the semiconductor die;

forming a conductive layer over the semiconductor wafer;

singulating the semiconductor wafer into the plurality of semiconductor die;

depositing an encapsulant over the semiconductor die to cover a side of the semiconductor die and the surface edge of the semiconductor die after singulating the semiconductor wafer; and

forming a conductive bump on the conductive layer after depositing the encapsulant.

2. The method of claim 1, further including:

providing a carrier;

disposing the semiconductor die over the carrier with the surface edge of the semiconductor die offset from the carrier;

depositing the encapsulant over the semiconductor die and carrier to cover the side of the semiconductor die and the surface edge of the semiconductor die; and

removing the carrier.

3. The method of claim 1, further including depositing the encapsulant after forming the insulating layer.

4. The method of claim 1, further including removing the portion of the insulating layer by laser direct ablation.

5. A method of making a semiconductor device, comprising:
providing a semiconductor die;
forming an insulating layer over the semiconductor die;
removing a portion of the insulating layer along a surface edge of the semiconductor die; and
depositing an encapsulant over the semiconductor die to cover a side of the semiconductor die and the surface edge of the semiconductor die.

6. The method of claim 5, further including:
providing a carrier;
disposing the semiconductor die over the carrier with the surface of the semiconductor die offset from the carrier;
depositing the encapsulant over the semiconductor die and carrier to cover the side and surface edge of the semiconductor die; and
removing the carrier.

7. The method of claim 5, further including forming the insulating layer over the semiconductor die at a wafer level.

8. The method of claim 5, further including forming a conductive layer over the semiconductor die.

9. The method of claim 8, further including forming an interconnect structure over the conductive layer.

10. The method of claim 8, further including depositing the encapsulant over the semiconductor die after forming the conductive layer.

11. The method of claim 5, further including removing the portion of the insulating layer by laser direct ablation.

12. A method of making a semiconductor device, comprising:
providing a substrate;
disposing a semiconductor die over the substrate;
depositing a mold underfill material between the semiconductor die and substrate; and
depositing an encapsulant over a side surface of the semiconductor die and a side surface of the substrate.

13. The method of claim 12, wherein the substrate includes conductive traces for vertical and lateral interconnect.

14. The method of claim 12, further including disposing a conductive bump over the substrate after depositing the encapsulant.

15. The method of claim 12, further including removing a portion of the encapsulant by laser direct ablation (LDA).

16. A method of making a semiconductor device, comprising:
providing a semiconductor die;

forming an insulating layer over the semiconductor die;

forming a conductive layer over the semiconductor die;

depositing an encapsulant over the semiconductor die to cover a side of the semiconductor die after forming the conductive layer; and

disposing a conductive bump directly on the conductive layer after depositing the encapsulant.

17. The method of claim 16, further including:

providing a carrier;

disposing the semiconductor die over the carrier with a surface of the semiconductor die offset from the carrier;

depositing the encapsulant over the semiconductor die and carrier to cover the side of the semiconductor die and a portion of the surface of the semiconductor die; and

removing the carrier.

18. The method of claim 16, further including forming the insulating layer over the semiconductor die at a wafer level.

19. The method of claim 16, further including removing a portion of the insulating layer along a surface edge of the semiconductor die.

20. The method of claim 19, further including removing the portion of the insulating layer prior to depositing the encapsulant.

21. A method of making a semiconductor device, comprising:

providing a semiconductor die;

forming an under bump metallization (UBM) over the semiconductor die;

depositing an encapsulant over a side of the semiconductor die after forming the UBM; and

forming a conductive bump over the UBM after depositing the encapsulant.

22. The method of claim 21, further including:

providing a carrier;

disposing the semiconductor die over the carrier with a surface of the semiconductor die offset from the carrier;

depositing the encapsulant over the semiconductor die and carrier; and

removing the carrier.

23. The method of claim 21, further including forming:

an insulating layer over the semiconductor die; and

removing a portion of the insulating layer along a surface edge of the semiconductor die.