Claims

What is claimed:

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

providing a reinforced insulating film comprising a glass cloth embedded in a polymeric material, wherein the reinforced insulating film includes a plurality of layers;

disposing a conductive layer over the reinforced insulating film, wherein the conductive layer directly physically contacts an uncured portion of the polymeric material;

providing a semiconductor die;

disposing the semiconductor die on a carrier;

disposing the reinforced insulating film over the semiconductor die and carrier after disposing the conductive layer in direct physical contact with the uncured portion of the polymeric material;

laminating the reinforced insulating film over the semiconductor die and carrier, wherein the uncured portion of the polymeric material covers a back surface and side surface of the semiconductor die;

curing the uncured portion of the polymeric material after laminating the reinforced insulating film over the semiconductor die and carrier;

removing the carrier to expose an active surface of the semiconductor die and a first surface of the reinforced insulating film;

forming an interconnect structure over the active surface of the semiconductor die and the first surface of the reinforced insulating film opposite the conductive layer; and

cutting through the reinforced insulating film, conductive

layer, and interconnect structure to singulate a semiconductor package including the semiconductor die, wherein the conductive layer extends continuously from a second surface of the reinforced insulating film to an outer surface of the semiconductor device and completely covers the second surface of the reinforced insulating film after singulation.

2. The method of claim 1, further including disposing the semiconductor die on the carrier with the active surface of the semiconductor die oriented toward the carrier.

3. The method of claim 2, wherein the first surface of the reinforced insulating film is coplanar with the active surface of the semiconductor die after laminating the reinforced insulating film over the semiconductor die and carrier.

4. The method of claim 1, wherein forming the interconnect structure includes:

forming a first insulating layer over the active surface of the semiconductor die and the first surface of the reinforced insulating film;

forming a second insulating layer over the first insulating layer;

forming a plurality of openings through the first insulating layer and second insulating layer to expose the semiconductor die; and

forming a second conductive layer within the openings of the first insulating layer and second insulating layer.

5. The method of claim 1, further including forming a conductive via through the reinforced insulating film, wherein

the semiconductor die is electrically connected to the conductive layer through the conductive via.

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

providing a reinforced insulating film comprising a woven glass cloth embedded in a first portion of a polymeric material, wherein an entirety of the polymeric material is completely uncured;

disposing a conductive layer over the reinforced insulating film directly physically contacting the first portion of the polymeric material, wherein the first portion of the polymeric material is uncured;

providing a semiconductor die;

disposing the semiconductor die on a carrier;

laminating the reinforced insulating film over the semiconductor die and carrier to embed the semiconductor die in a second portion of the polymeric material of the reinforced insulating film;

curing the first portion and the second portion of the polymeric material after laminating the reinforced insulating film over the semiconductor die and carrier; and

removing the carrier after curing the first portion and the second portion of the polymeric material, wherein the conductive layer remains fully covering a surface of the reinforced insulating film after removing the carrier.

7. The method of claim 6, wherein the reinforced insulating film is a multilayered reinforced film.

8. The method of claim 6, wherein the conductive layer is a copper foil.

9. The method of claim 6, further including laminating the reinforced insulating film using a thermocompression process.

10. The method of claim 6, further including forming a fan-out interconnect structure over the semiconductor die and reinforced insulating film.

11. The method of claim 6, wherein a surface of the reinforced insulating film is coplanar with an active surface of the semiconductor die.

12. The method of claim 6, further including cutting through the reinforced insulating film and conductive layer to singulate a semiconductor package including the semiconductor die.

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

providing a semiconductor die;

providing a first reinforced insulating film;

forming a conductive foil over the first reinforced insulating film, wherein the conductive foil physically contacts an uncured portion of the first reinforced insulating film;

laminating the first reinforced insulating film over the semiconductor die after forming the conductive foil;

curing the uncured portion of the first reinforced insulating film after laminating the first reinforced insulating film; and

cutting through the reinforced insulating film and conductive foil to singulate a semiconductor package including the semiconductor die.

14. The method of claim 13, further including forming an interconnect structure over the semiconductor die after laminating the first reinforced insulating film over the semiconductor die.

15. The method of claim 14, wherein the interconnect structure includes a redistribution layer.

16. The method of claim 13, wherein laminating the first reinforced insulating film over the semiconductor die includes:

providing a vacuum hot press over the semiconductor die;

embedding the semiconductor die within the first reinforced insulating film using the vacuum hot press; and

curing the uncured portion of the first insulating film with the semiconductor die embedded in the first reinforced insulating film.

17. The method of claim 13, wherein a surface of the first reinforced insulating film is coplanar with an active surface of the semiconductor die after laminating the first reinforced insulating film over the semiconductor die.

18. The method of claim 13, further including disposing a second reinforced insulating film over the first reinforced insulating film.

19. The method of claim 13, wherein the reinforced insulating film includes a plurality of layers.

20. The method of claim 13, further including:

disposing the semiconductor die on a carrier; and

removing the carrier after curing the uncured portion of the first reinforced insulating film.

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

providing a semiconductor die;

disposing the semiconductor die on a carrier;

providing a reinforced insulating film including a polymeric material and a woven glass cloth embedded in the polymeric material;

disposing a conductive layer over the reinforced insulating film, wherein the conductive layer completely covers a surface of the reinforced insulating film;

laminating the reinforced insulating film over the semiconductor die after disposing the conductive layer over the reinforced insulating film, wherein the semiconductor die is embedded in the polymeric material; and

removing the carrier after laminating the reinforced insulating film.

22. The method of claim 21, further including forming a redistribution layer over the semiconductor die after laminating the reinforced insulating film over the semiconductor die.

23. The method of claim 21, wherein the reinforced insulating film is prefabricated.

24. The method of claim 21, wherein the reinforced insulating film includes a plurality of layers.

25. The method of claim 21, further including:

disposing the conductive layer in direct physical contact with an uncured portion of the reinforced insulating film; and

curing the uncured portion after laminating the reinforced insulating film.