CLAIMS

1. A method comprising:

placing a plurality of die units with contact pads directly on a surface of a dielectric film;

curing the dielectric film after placing the plurality of die units with contact pads directly on the surface of the dielectric film such that the cured dielectric film is permanently attached to the plurality of die units around the contact pads;

encapsulating the plurality of die units on the cured dielectric film with an encapsulant; and

removing a portion of the cured dielectric film to expose each of the contact pads of the plurality of die units utilizing a mask-less patterning technique.

2. The method of claim 1, wherein placing the plurality of die units on the surface of the dielectric film comprises placing the plurality of die units on a surface of a semi-cured dielectric film.

3. The method of claim 2, wherein the semi-cured dielectric film comprises a B-stage cured epoxy.

4. The method of claim 1, wherein the mask-less patterning technique comprises laser ablation.

5. The method of claim 2, wherein encapsulating the plurality of die units on the cured dielectric film comprises compression molding.

6. The method of claim 2, wherein encapsulating the plurality of die units on the cured dielectric film comprises lamination.

7. The method of claim 6, wherein lamination comprises vacuum lamination.

8. The method of claim 7, wherein vacuum lamination comprises:

placing a semi-cured encapsulant film over the plurality of die units on the cured dielectric film; and

applying heat and pressure under vacuum to the semi-cured encapsulant film.

9. The method of claim 1, wherein the plurality of die units are placed on a surface of the dielectric film opposite a second surface which is laminated to a carrier substrate.

10. The method of claim 9, further comprising releasing the carrier substrate from the cured dielectric film after encapsulating the plurality of die units on the cured dielectric film, and prior to patterning the cured dielectric film.

11. The method of claim 1, further comprising:

applying a photoimageable polymer layer over the patterned cured dielectric film; and forming a plurality of openings in the photoimageable polymer layer using a photolithographic patterning technique.

12. The method of claim 11, further comprising:

cutting through the cured dielectric film and the encapsulant without cutting through the photoimageable polymer layer.

13. The method of claim 1, further comprising:

forming a seed layer on the patterned cured dielectric film;

forming a patterned photoresist layer over the seed layer; and

plating within openings of the patterned photoresist layer and the patterned cured dielectric film to form first level vias within the patterned cured dielectric film and redistribution layer (RDL) traces over the patterned cured dielectric film.

14. The method of claim 13, further comprising:

removing the patterned photoresist layer and a portion of the seed layer under the patterned photoresist layer after plating; and

forming a photoimageable polymer layer over the patterned cured dielectric film and RDL traces.

15. The method of claim 14, further comprising:

patterning the photoimageable polymer layer to expose the RDL traces.

16. The method of claim 15, further comprising:

singulating the plurality of die units.

17. A method comprising:

placing a plurality of die units on a surface of a dielectric film;

curing the dielectric film after placing the plurality of die units on the surface of the dielectric film to lock in place the plurality of die units;

encapsulating the locked in place plurality of die units on the cured dielectric film with an encapsulant; and

patterning the cured dielectric film to expose each of the plurality of die units utilizing a mask-less patterning technique.

18. The method of claim 17, wherein placing the plurality of die units on the surface of the dielectric film comprises placing the plurality of die units on a surface of a semi-cured dielectric film.

19. The method of claim 17, wherein the mask-less patterning technique comprises laser ablation.

20. The method of claim 18, wherein encapsulating the plurality of die units on the cured dielectric film comprises compression molding.

21. The method of claim 20, wherein vacuum lamination comprises:

placing a semi-cured encapsulant film over the plurality of die units on the cured dielectric film; and

applying heat and pressure under vacuum to the semi-cured encapsulant film.

22. The method of claim 17, wherein the plurality of die units are placed on a surface of the dielectric film opposite a second surface which is laminated to a carrier substrate.

23. The method of claim 22, further comprising releasing the carrier substrate from the cured dielectric film after encapsulating the plurality of die units on the cured dielectric film, and prior to patterning the cured dielectric film.

24. The method of claim 17, further comprising:

applying a photoimageable polymer layer over the patterned cured dielectric film; and

forming a plurality of openings in the photoimageable polymer layer using a photolithographic patterning technique.

25. The method of claim 24, further comprising:

cutting through the cured dielectric film and the encapsulant without cutting through the photoimageable polymer layer.

CLAIMS

1. A method comprising:

placing a first surface of a permanent dielectric film directly on a temporary carrier substrate;

placing a plurality of die units with contact pads directly on a second surface of the permanent dielectric film opposite the first surface of the permanent dielectric film with the plurality of die units disposed over the temporary carrier substrate;

curing the permanent dielectric film after placing the plurality of die units with contact pads directly on the surface of the permanent dielectric film such that the cured permanent dielectric film is permanently attached to the plurality of die units around the contact pads;

encapsulating the plurality of die units on the cured permanent dielectric film with an encapsulant while the temporary carrier substrate supports an entirety of the permanent dielectric film disposed between the temporary carrier substrate and the plurality of die units; and

removing a portion of the cured permanent dielectric film to expose each of the contact pads of the plurality of die units utilizing a mask-less patterning technique.

2. The method of claim 1, wherein placing the plurality of die units on the first surface of the permanent dielectric film comprises placing the plurality of die units on a surface of a semi-cured permanent dielectric film.

3. The method of claim 2, wherein the semi-cured permanent dielectric film comprises a B-stage cured epoxy.

4. The method of claim 1, wherein the mask-less patterning technique comprises laser ablation.

5. The method of claim 2, wherein encapsulating the plurality of die units on the cured permanent dielectric film comprises compression molding.

6. The method of claim 2, wherein encapsulating the plurality of die units on the cured permanent dielectric film comprises lamination.

7. The method of claim 6, wherein lamination comprises vacuum lamination.

8. The method of claim 7, wherein vacuum lamination comprises:

placing a semi-cured encapsulant film over the plurality of die units on the cured permanent dielectric film; and

applying heat and pressure under vacuum to the semi-cured encapsulant film.

9. The method of claim 1, wherein the plurality of die units are placed on the second surface of the permanent dielectric film opposite the first surface which is laminated to the temporary carrier substrate.

10. The method of claim 9, further comprising releasing the temporary carrier substrate from the cured permanent dielectric film after encapsulating the plurality of die units on the cured permanent dielectric film, and prior to patterning the cured permanent dielectric film.

11. The method of claim 1, further comprising:

applying a photoimageable polymer layer over the patterned cured permanent dielectric film; and

forming a plurality of openings in the photoimageable polymer layer using a photolithographic patterning technique.

12. The method of claim 11, further comprising:

cutting through the cured permanent dielectric film and the encapsulant without cutting through the photoimageable polymer layer.

13. The method of claim 1, further comprising:

forming a seed layer on the patterned cured permanent dielectric film;

forming a patterned photoresist layer over the seed layer; and

plating within openings of the patterned photoresist layer and the patterned cured permanent dielectric film to form first level vias within the patterned cured permanent dielectric film and redistribution layer (RDL) traces over the patterned cured permanent dielectric film.

14. The method of claim 13, further comprising:

removing the patterned photoresist layer and a portion of the seed layer under the patterned photoresist layer after plating; and

forming a photoimageable polymer layer over the patterned cured permanent dielectric film and RDL traces.

15. The method of claim 14, further comprising:

patterning the photoimageable polymer layer to expose the RDL traces.

16. The method of claim 15, further comprising:

singulating the plurality of die units.

17. A method comprising:

placing a dielectric film on a temporary carrier substrate;

placing a plurality of die units directly on a surface of the dielectric film;

curing the dielectric film after placing the plurality of die units on the surface of the dielectric film to lock in place the plurality of die units;

encapsulating the locked in place plurality of die units directly on the cured dielectric film with an encapsulant while the temporary carrier substrate supports an entirety of the cured dielectric film disposed between the temporary carrier substrate and the plurality of die units; and

patterning the cured dielectric film to expose each of the plurality of die units utilizing a mask-less patterning technique.

18. The method of claim 17, wherein placing the plurality of die units on the surface of the dielectric film comprises placing the plurality of die units on a surface of a semi-cured dielectric film.

19. The method of claim 17, wherein the mask-less patterning technique comprises laser ablation.

20. The method of claim 18, wherein encapsulating the plurality of die units on the cured dielectric film comprises compression molding.

21. The method of claim 20, wherein encapsulation the plurality of die units on the cured dielectric film comprises vacuum lamination, the vacuum lamination further comprising:

placing a semi-cured encapsulant film over the plurality of die units on the cured dielectric film; and

applying heat and pressure under vacuum to the semi-cured encapsulant film.

22. The method of claim 17, wherein the plurality of die units are placed on a surface of the dielectric film opposite a second surface which is laminated to a carrier substrate.

23. The method of claim 22, further comprising releasing the carrier substrate from the cured dielectric film after encapsulating the plurality of die units on the cured dielectric film, and prior to patterning the cured dielectric film.

24. The method of claim 17, further comprising:

applying a photoimageable polymer layer over the patterned cured dielectric film; and forming a plurality of openings in the photoimageable polymer layer using a photolithographic patterning technique.

25. The method of claim 24, further comprising:

cutting through the cured dielectric film and the encapsulant without cutting through the photoimageable polymer layer.