[0006] It would be desirable to provide methods that minimize these problems.

BRIEF DESCRIPTION

[0007] The present disclosure relates to methods of making cover lids for use in hermetic sealing of electronic packages. The cover lid is formed from a plate. A polymeric mask, for example a polyamide mask, is applied to a surface of the plate, thus defining a central area covered by the polymeric mask and a peripheral area not covered by the polymeric mask. The peripheral area and the sidewall of the plate are metallized to form a seal ring, and the polymeric mask is removed. As desired, the seal ring can be formed from additional metal sublayers. A solder preform can then be attached to the seal ring, for example by tack welding.

[0008] Disclosed herein are various methods of making a cover lid, comprising: applying a polymeric mask to a central area of a first surface of a plate and define a peripheral area on the first surface, wherein the plate has a first surface, a second surface, and a sidewall joining the first surface and second surface together; forming a seal ring by metallizing the peripheral area and the sidewall of the plate; and removing the polymeric mask to obtain the cover lid.

[0008a] Also disclosed herein are various methods of making a cover lid, comprising: applying a polymeric mask to a first surface of a plate, thus dividing the first surface of the plate into a central area covered by the polymeric mask and a peripheral area not covered by the polymeric mask, wherein the plate also has a second surface, and a sidewall joining the first surface and second surface together; forming a seal ring by metallizing the peripheral area of the first surface and the sidewall of the plate, wherein the seal ring is formed from at least two sublayers; and removing the polymeric mask to obtain the cover lid, wherein the central area of the first surface is not metallized.

[0008b] Also disclosed herein are cover lids, comprising: a plate comprising a first surface, a second surface, and a sidewall joining the first surface and second surface together; a seal ring on a peripheral area of the first surface and the sidewall of the plate, wherein the seal ring is formed from nickel and gold, and wherein a central area of the first surface of the plate is exposed; and a solder preform connected to the seal ring on the peripheral area.

[0009] The plate can be made from beryllium-copper, molybdenum, bronze, glass, an iron-nickel-cobalt alloy, or a ceramic selected from the group consisting of alumina (Al_2O_3), beryllia (BeO), aluminum nitride (AlN), zirconia toughened alumina (ZTA), SiC, and Si_3N_4. The plate may have a thickness of about 0.5 millimeter to about 1 millimeter. In some particular embodiments, the plate is formed from a non-magnetic material.

[0010] The peripheral area which is metallized may be from about 20% to about 35% of the surface area of the first surface of the plate.

[0011] In some embodiments, the seal ring is formed from a metal selected from the group consisting of silver, palladium, platinum, nickel, gold, and alloys thereof. Sometimes, the seal ring can be formed from a set of sublayers. In other embodiments, the seal ring can be formed from a non-magnetic metal.

[0012] The seal ring on the peripheral area may have a width of about 0.5 mm to about 1 mm. The seal ring on the peripheral area can have a thickness of about 1 micrometer (μm) to about 40 μm.

[0013] The plate can be in the shape of a disk or a rectangular prism. The sidewall may have a plurality of faces.

[0014] The methods may further comprise tack welding a solder preform to the seal ring on the peripheral area. The solder preform can have a melting temperature of from about 200°C to about 350°C. The solder preform may be formed from a gold-tin alloy, a lead-based alloy, or a lead-free alloy.

[0014A] The polymeric mask may be a polyamide.

[0014B] Also disclosed herein are cover lids produced by the method described above.

[0015] Also disclosed herein are cover lids, comprising: a plate comprising a first surface, a second surface, and a sidewall joining the first surface and second surface together; a seal ring on a peripheral area of the first surface and the sidewall of the plate; and a solder preform connected to the seal ring on the peripheral area.

[0016] The plate can be made from beryllium-copper, molybdenum, bronze, glass, an iron-nickel-cobalt alloy, or a ceramic selected from the group consisting of alumina (Al2O3), beryllia (BeO), aluminum nitride (AlN), zirconia toughened alumina (ZTA), SiC, and Si3N4.

[0017] The seal ring can be formed from a metal selected from the group consisting of silver, palladium, platinum, nickel, gold, and alloys thereof. Sometimes, the seal ring is formed from a set of sublayers. The solder preform may also be formed from a gold-tin alloy, a lead-based alloy, or a lead-free alloy.

[0018] These and other non-limiting characteristics of the disclosure are more particularly disclosed below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The following is a brief description of the drawings, which are presented for the purposes of illustrating the exemplary embodiments disclosed herein and not for the purposes of limiting the same.

[0020] **FIG. 1** is a side cross-sectional view of a conventional electronic package.

[0021] **FIG. 2** is an exploded perspective view of a conventional electronic package.

[0022] **FIG. 3** is a perspective view of an “ideal” cover lid having a plate with a metallized seal ring thereon.

[0023] **FIG. 4** is a perspective view of a cover lid in which the seal ring is undesirably offset.

CLAIMS

1. A method of making a cover lid, comprising:

applying a polymeric mask to a first surface of a plate, thus dividing the first surface of the plate into a central area covered by the polymeric mask and a peripheral area not covered by the polymeric mask, wherein the plate also has a second surface, and a sidewall joining the first surface and second surface together;

forming a seal ring by metallizing the peripheral area of the first surface and the sidewall of the plate, wherein the seal ring is formed from at least two sublayers; and

removing the polymeric mask to obtain the cover lid, wherein the central area of the first surface is not metallized.

2. The method of claim 1, wherein the plate is made from beryllium-copper, molybdenum, bronze, glass, an iron-nickel-cobalt alloy, or a ceramic selected from the group consisting of alumina (Al_2O_3), beryllia (BeO), aluminum nitride (AlN), zirconia toughened alumina (ZTA), SiC, and Si_3N_4.

3. The method of claim 1, wherein the plate has a thickness of about 0.5 millimeter to about 1 millimeter.

4. The method of claim 1, wherein the plate is formed from a non-magnetic material.

5. The method of claim 1, wherein the peripheral area is from about 20% to about 35% of the surface area of the first surface of the plate.

6. The method of claim 1, wherein the seal ring is formed from a metal selected from the group consisting of silver, palladium, platinum, nickel, gold, and alloys thereof.

7. The method of claim 1, wherein the seal ring is formed from a non-magnetic metal.

8. The method of claim 1, wherein the seal ring on the peripheral area has a width of about 0.5 mm to about 1 mm.

9. The method of claim 1, wherein the seal ring on the peripheral area has a thickness of about 1 micrometer (μm) to about 40 μm.

10. The method of claim 1, wherein the plate is in the shape of a disk or a rectangular prism.

11. The method of claim 1, wherein the sidewall has a plurality of faces.

12. The method of claim 1, further comprising tack welding a solder preform to the seal ring on the peripheral area.

13. The method of claim 12, wherein the solder preform has a melting temperature of from about 200°C to about 350°C.

14. The method of claim 12, wherein the solder preform is formed from a gold-tin alloy, a lead-based alloy, or a lead-free alloy.

15. The method of claim 1, wherein the polymeric mask is a polyamide.

16. The cover lid produced by the method of claim 1.

17. A cover lid, comprising:

a plate comprising a first surface, a second surface, and a sidewall joining the first surface and second surface together;

a seal ring on a peripheral area of the first surface and the sidewall of the plate, wherein the seal ring is formed from nickel and gold, and wherein a central area of the first surface of the plate is exposed; and

a solder preform connected to the seal ring on the peripheral area.

18. The cover lid of claim 17, wherein the plate is made from beryllium-copper, molybdenum, bronze, glass, an iron-nickel-cobalt alloy, or a ceramic selected from the group consisting of alumina (Al_2O_3), beryllia (BeO), aluminum nitride (AlN), zirconia toughened alumina (ZTA), SiC, and Si_3N_4.

19. The method of claim 1, wherein the at least two sublayers from which the seal ring is formed includes a nickel sublayer and a gold sublayer laid down over the nickel sublayer.