

Claims

1. A die bonding apparatus comprising:

a first inert gas container having a first inert gas concentration;

5 a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than the first inert gas concentration;

a bond head located in the second inert gas container for receiving a die for bonding; and

10 a third inert gas container movable relative to the first inert gas container and the second inert gas container, the third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die bonding;

15 wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container.

2. The die bonding apparatus of claim 1, wherein the third inert gas container is located below the first inert gas container.

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3. The die bonding apparatus of claim 1 or claim 2, wherein the third inert gas container is mounted on a bond stage.

4. A die bonding apparatus comprising:

25 a first inert gas container having a first inert gas concentration;

a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than the first inert gas concentration;

30 a bond head located in the second inert gas container for receiving a die for bonding; and

a third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die bonding;

wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container;

wherein the third inert gas container is mounted on a bond stage; and

5 wherein the bond stage comprises walls at a peripheral of the bond stage, and the walls comprise a plurality of inert gas outlets for expelling inert gas towards the first inert gas container to form an air curtain to restrict ambient air from entering the third inert gas container.

10 5. The die bonding apparatus of claim 4, wherein the bond stage is locatable below the first and second inert gas containers, and there is a gap between the walls of the bond stage and the first inert gas container which allows the bond stage to move relative to the first and second inert gas containers.

15 6. A die bonding apparatus comprising:  
a first inert gas container having a first inert gas concentration;  
a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than the first inert gas concentration;

20 a bond head located in the second inert gas container for receiving a die for bonding; and

a third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die bonding;

25 wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container;

wherein the third inert gas container is mounted on a bond stage; and

30 wherein the bond stage comprises an additional storage space for storing one or more nozzles which are mountable onto the bond head, wherein the additional storage space is adjacent a position where the substrate is locatable for die bonding.

7. A die bonding apparatus comprising:  
a first inert gas container having a first inert gas concentration;

a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than the first inert gas concentration;

5 a bond head located in the second inert gas container for receiving a die for bonding; and

a third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die bonding;

10 wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container;

wherein the third inert gas container is mounted on a bond stage; and

15 wherein the bond stage is movable between a loading position where the substrate is loaded onto the bond stage, and a bonding position where the die is bonded to the substrate.

8. The die bonding apparatus of claim 7, further comprising a transfer arm operative to transport the substrate and to place the substrate onto the bond stage when the bond stage is at the loading position.

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9. The die bonding apparatus of any one of the preceding claims, wherein:

the first inert gas container comprises a first container opening;

the second inert gas container comprises a second container opening; and

25 the first container opening and the second container opening are aligned to allow the bond head to extend through the respective openings to bond the die to the substrate.

10. A die bonding apparatus comprising:

a first inert gas container having a first inert gas concentration;

30 a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than the first inert gas concentration;

a bond head located in the second inert gas container for receiving a die for bonding; and

a third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die bonding;

5 wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container;

wherein:

the first inert gas container comprises a first container opening;

the second inert gas container comprises a second container opening;

10 and

the first container opening and the second container opening are aligned to allow the bond head to extend through the respective openings to bond the die to the substrate;

15 further comprising a die transporter operative to transport the die to a pick-up position located in the first inert gas container, wherein the pick-up position is aligned to the first container opening and the second container opening to allow the bond head to move to the pick-up position to pick up the die from the die transporter.

11. The die bonding apparatus of claim 10, further comprising a die transporter opening on a side wall of the first inert gas container, wherein a die transfer arm is operative to extend through the die transporter opening to transfer the die to the die transporter.

12. A die bonding apparatus comprising:  
25 a first inert gas container having a first inert gas concentration;  
a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than the first inert gas concentration;

30 a bond head located in the second inert gas container for receiving a die for bonding; and

a third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die bonding;

wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container;

wherein:

- 5                   the first inert gas container comprises a first container opening;  
                  the second inert gas container comprises a second container opening;

and

                  the first container opening and the second container opening are aligned to allow the bond head to extend through the respective openings to bond the die to the  
10               substrate; and

                  wherein the first container opening is comprised in a base plate including:

                  a first plate comprising a first plate hole; and

                  a second plate spaced from the first plate comprising a second plate hole aligned with the first plate hole, the first and second plate holes together forming the first  
15               container opening.

13.     The die bonding apparatus of claim 12, further comprising an exhaust connected to the base plate to draw in air from the first container opening in-between the first plate and the second plate.

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14.     A die bonding apparatus comprising:

                  a first inert gas container having a first inert gas concentration;

                  a second inert gas container having a second inert gas concentration enclosed within the first inert gas container, the second inert gas concentration being higher than  
25               the first inert gas concentration;

                  a bond head located in the second inert gas container for receiving a die for bonding; and

                  a third inert gas container having an inert gas environment that is separate from the first and second inert gas containers and where a substrate is locatable for die  
30               bonding;

                  wherein the bond head is operative to move the die between a first position within the second inert container and a second position within the third inert gas container to bond the die onto the substrate located in the third inert gas container;

further comprising a second container inert gas supply connected to the second inert gas container to supply inert gas to the second inert gas container, wherein the first inert gas container receives inert gas from the second container inert gas supply through an overflow from the second inert gas container and there is no inert gas supply directly  
5 connected to the first inert gas container.

15. The die bonding apparatus of claim 14, wherein the second container inert gas supply comprises a plurality of inert gas outlets spaced equally apart to direct a laminar flow around the bond head located within the second inert gas container towards an  
10 opening of the second inert gas container.

16. The die bonding apparatus of any one of the preceding claims, further comprising a transparent window at a side wall of the second inert gas container for allowing a user to look into the second inert gas container.  
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