

Claims

1. A chip alignment mounting device, including a feed mechanism, a substrate carrying mechanism, a chip feed mechanism, a chip flip mechanism and a chip bonding mechanism, is characterized in that:

the feed mechanism mentioned above provides ~~the~~ substrate not mounted with chips to the substrate carrying mechanism located in ~~the~~ a substrate loading area, and removes the substrate mounted with chips from the substrate carrying mechanism in the substrate loading area;

the substrate carrying mechanism mentioned above loads and fixes the substrate, and drives the substrate to move on ~~the~~ first plane parallel to ~~the~~ an X-Y plane, wherein ~~the~~ the motion range of the substrate includes the substrate loading area and ~~the~~ a mounting area, ~~the~~ the substrate carrying mechanism can transport each predetermined mounting positions on the substrate to ~~the~~ mounting position in the mounting area;

the chip feed mechanism mentioned above provides the chips to the chip flip mechanism at ~~the~~ a chip feed position of the chip alignment mounting device;

the chip flip mechanism mentioned above can make a first rotation around ~~the~~ first rotation axis parallel to the X-Y plane to pick up the chips from the chip feed position, then deliver the chips to ~~the~~ chip transfer position through the first rotation and finally provide the chip bonding mechanism with the chips;

the chip bonding mechanism mentioned above can make a second rotation around ~~the~~ second rotation axis parallel to ~~the~~ Z direction to pick up the chips from the chip transfer position, and mount the chips on the predetermined chip mounting positions of the substrate at the mounting position through the second rotation;

the X-Y plane is the plane on which ~~the~~ a substrate surface is fixed by the substrate carrying mechanism, and the Z direction is perpendicular to the X-Y plane; the mounting position, the chip feed position and the chip transfer position are all fixed positions,

the chip alignment mounting device also includes a pre-alignment imaging mechanism, an uplooking imaging mechanism and / or a downlooking imaging mechanism, wherein,

the pre-alignment imaging mechanism fixed in a + Z direction of the chip feed position photographs in a -Z direction, and images the chip on the chip feed position;

the uplooking imaging mechanism fixed in the - Z direction of a chip uplooking imaging position photographs in the + Z direction, and images the chip on the chip uplooking imaging position;

the downlooking imaging mechanism fixed in the + Z direction of the mounting position photographs in the -Z direction, and images the predetermined mounting positions or

the chip already mounted;

wherein, the +Z direction is along the Z direction from a back surface of the substrate in contact with the substrate carrying mechanism to a front surface of the substrate with a predetermined mounting position, and the -Z direction is along the Z direction from the front surface of the substrate with the predetermined mounting position to the back surface of the substrate in contact with the substrate carrying mechanism.

2. The chip alignment mounting device in Claim 1 is characterized in that: the chip flip mechanism has a plurality of first rotation arms which extend along ~~the~~a radial direction of the first rotation axis on ~~the~~a second plane perpendicular to the first rotation axis, and the ends of the plurality of first rotation arms are provided with a chip picking mechanism capable of telescopic motion along ~~the~~a direction of the first rotation arms and perpendicular to the first rotation axis; ~~When~~When the chip flip mechanism rotates around the first rotation axis, each chip picking mechanism rotates in ~~the~~an order of “~~the~~the chip feed position--~~a~~a chip carrying waiting position--~~the~~the chip transfer position--~~a~~a no chip waiting position--~~the~~the chip feed position”, wherein

the chip carrying waiting position is used for the chip picking mechanism to wait after it obtains the chips from the chip feed position, and the no chip waiting position is used for the chip picking mechanism to wait after it transfers the chips at the chip transfer position.

3. The chip alignment mounting device in Claim 2 is characterized in that: the chip bonding mechanism has a plurality of second rotation arms which extend along ~~the~~a radial direction of the second rotation axis on ~~the~~a third plane perpendicular to the second rotation axis; the ends of the plurality of second rotation arms are provided with chip bonding heads perpendicular to the second rotation arms and parallel to the direction of the second rotation axis; ~~When~~When the chip bonding mechanism rotates around the second rotation axis, each chip bonding head rotates in ~~the~~an order of “~~the~~the chip transfer position--~~a~~a chip flux dipping position--~~the~~the chip uplooking imaging position--~~the~~the chip mounting position--~~the~~the chip transfer position”, wherein the chip flux dipping position completes the chip flux dipping, and the chip uplooking imaging position completes the chip uplooking photographing and imaging.

~~4. The chip alignment mounting device in Claim 2 or 3 is characterized in that: the chip alignment mounting device also includes a pre-alignment imaging mechanism, a uplooking imaging mechanism and / or a downlooking imaging mechanism, wherein,~~

~~the pre-alignment imaging mechanism fixed in the + Z direction of the chip feed position photographs in the -Z direction, and images the chip on the chip feed position;~~

~~the uplooking imaging mechanism fixed in the $-Z$ direction of the chip uplooking imaging position photographs in the $+Z$ direction, and images the chip on the uplooking imaging position;~~

~~the downlooking imaging mechanism fixed in the $+Z$ direction of the mounting position photographs in the $-Z$ direction, and images the predetermined mounting positions or the chip already mounted;~~

~~Wherein, the $+Z$ direction is along the $-Z$ direction from the back surface of the substrate in contact with the substrate carrying mechanism to the front surface of the substrate with a predetermined mounting position, and the $-Z$ direction is along the $+Z$ direction from the front surface of the substrate with a predetermined mounting position to the back surface of the substrate in contact with the substrate carrying mechanism.~~

5.4. The chip alignment mounting device in Claim 1 is characterized in that: the feed mechanism includes a substrate Z direction feed mechanism~~feed mechanism~~, a feed conveying mechanism, a blanking conveying mechanism and a blanking mechanism, wherein,

the substrate Z direction feed mechanism is distributed along the Z direction and is arranged to transport the substrate not mounted with chips to the X-Y plane along the Z direction;

the feed conveying mechanism is distributed parallel to the X-Y plane and is arranged to receive the substrate not mounted with chips from the substrate Z direction feed mechanism and transport it to the substrate carrying mechanism;

the blanking conveying mechanism is distributed parallel to the X-Y plane, and is arranged to receive the substrate mounted with chips from the substrate carrying mechanism and transport it to the blanking mechanism;

the blanking mechanism is distributed along the Z direction, and is arranged to send the substrate mounted with chips out of the X-Y plane along the Z direction and separate it from the chip alignment mounting device.

6.5. The chip alignment mounting device in Claim ~~5-4~~ is characterized in that: the substrate Z direction feed mechanism is arranged to transport the substrate not mounted with chips along the Z direction to ~~the~~a substrate feed area parallel to the X-Y plane along the Z direction;

~~T~~The feed conveying mechanism is arranged to transport the substrate not mounted with chips from the substrate feed area through ~~the~~a first substrate waiting area parallel to the X-Y plane to the substrate loading area;

~~t~~The substrate carrying mechanism is arranged to load the substrate not mounted with

chips from the substrate loading area, and to mount all the predetermined mounting positions;

The blanking conveying mechanism is arranged to transport the substrate mounted with chips from the substrate loading area through the second substrate waiting area parallel to the X-Y plane to the substrate storage area parallel to the X-Y plane;

The blanking mechanism is arranged to send the substrate mounted with chips out of the X-Y plane from the substrate storage area along the Z direction and separate it from the chip alignment mounting device;

The feed conveying mechanism and the blanking conveying mechanism share a guide rail, and the substrate feed area, the first substrate waiting area, the substrate loading area, the second substrate waiting area and the substrate storage area are located on the same side of the guide rail, and are sequentially distributed along the guide rail.

7.6. A chip alignment mounting method of mounting a chip on a substrate by using the chip alignment mounting device of claim 5, is characterized in that:

Step 1: the feed mechanism transfers the substrate not mounted with chips to the substrate carrying mechanism which fixes the substrate not mounted with chips, and transports it to the chip-mounting area;

Step 2: the chip feed mechanism transports the chips to the chip feed position;

Step 3: the chip flip mechanism rotates for the first time, so that each chip picking mechanism installed on the chip flip mechanism enters the chip feed position, the chip carrying waiting position, the chip transfer position and the no chip waiting position respectively;

Step 4: the chip bonding mechanism rotates for the second time, so that each chip bonding head installed on the chip bonding mechanism enters the chip transfer position, the chip flux dipping position, the chip uplooking imaging position and the chip mounting position respectively;

Step 5: the chip flip mechanism transfers the chips at the chip transfer position to the chip bonding mechanism which mounts the chips on the substrate at the mounting position, and the chip feed mechanism delivers the next chip to the chip feed position;

Step 6: the chip flip mechanism continues to rotate, so that each chip picking mechanism rotates in the order of “the chip feed position-- the chip carrying waiting position-- the chip transfer position-- the no chip waiting position-- the chip feed position”. At the same time, the chip bonding mechanism continues to rotate, so that each bonding head rotates in the order of “the chip transfer position-- the chip flux dipping position-- the chip uplooking imaging position-- the chip mounting position-- the chip transfer position”. The chip picking mechanism of the chip flip mechanism rotates synchronously with the bonding head of the chip bonding

mechanism;

Step 7: repeat steps 5 to 6 until all the predetermined mounting positions on the substrate are mounted with chips;

Step 8: the substrate carrying mechanism sends the substrate which has been mounted with chips out of the mounting area, releases ~~the~~ fixation of the substrate, and transfers the substrate to the feed mechanism.

~~Step 2 also includes the pre-alignment imaging mechanism to photograph and image the chip at the chip feed position, obtain a first position deviation of the chip relative to the chip feed position, and then correct the first position deviation by the chip feed mechanism;~~

~~Step 4 also includes photographing and imaging the chips at the chip uplooking imaging position by the uplooking imaging mechanism and obtaining a second position deviation of the chip relative to the chip uplooking imaging position; photographing the predetermined chip mounting position of the substrate or the chip already mounted by the downlooking imaging mechanism and obtaining a third position deviation of the predetermined chip mounting position relative to the mounting position; combining the second position deviation and the third position deviation by the substrate carrying mechanism to correct the position deviation.~~

~~8.7.~~ The chip alignment mounting method in Claim ~~7-6~~ is characterized in that: the chip picking mechanism of the chip flip mechanism is arranged to expand along the radial direction of the first rotation axis in ~~the~~ a plane perpendicular to the ~~substrate~~ surface ~~of the substrate~~ and the chip bonding head of the chip bonding mechanism is arranged to expand in a direction parallel to the second rotation axis. ~~When~~ the chip flip mechanism and the chip bonding mechanism transfer at the chip transfer position, the chip picking mechanism extends and/ or the chip bonding head extends out to transfer.

~~9. The chip alignment mounting method in Claim 7 is characterized in that:~~

~~Step 2 also includes a pre-alignment imaging mechanism to photograph and image a chip at the chip feed position, obtain the first position deviation of the chip relative to the chip feed position, and then correct the position deviation by the chip feed mechanism;~~

~~Step 4 also includes photographing and imaging the chips at the uplooking imaging position by the uplooking imaging mechanism and obtaining the second position deviation of the chip relative to the uplooking imaging position; photographing the predetermined chip position of the substrate or the chip already mounted by the downlooking imaging mechanism and obtaining the third position deviation of the predetermined chip position relative to the~~

~~mounting position; combining the second position deviation and the third position deviation by the substrate carrying mechanism to correct the position deviation.~~

10.8. The chip alignment mounting method in Claim 76 is characterized in that: step 1 also includes:

the substrate Z direction feed mechanism lifts the substrate not mounted with chips to the substrate feed area;

the feed conveying mechanism of the feed mechanism obtains the substrate not mounted with chips from the substrate feed area, and transports the substrate to the substrate loading area through the first substrate waiting area;

the substrate carrying mechanism loads the substrate not mounted with chips from the substrate loading area and transports the substrate to the mounting area, and finally transports the substrate from the mounting area to the substrate loading area after mounting chips at all predetermined mounting positions of the substrate not mounted with chips;

the blanking conveying mechanism of the feed mechanism receives the substrate from the substrate loading area and transports the substrate to the substrate storage area through the second substrate waiting area;

the blanking mechanism obtains the substrate mounted with chips from the substrate storage area and sends out the chip alignment mounting device.