

stage on which a substrate is mounted; a bonding head, sucking and holding a chip by using a holding surface opposite to the stage, and being relatively movable with respect to the stage in a surface direction and a normal direction of the stage; a copying mechanism, which is a copying mechanism provided in the bonding head, and provided with a fixed member comprising one of
5 a concave spherical surface and a convex spherical surface and a movable member comprising another of the concave spherical surface and the convex spherical surface and provided to be swingable with the holding surface with respect to the fixed member; and a controller, executing a copying process adjusting a facing surface, which is an end surface of the chip held on the holding surface or the holding surface, to be parallel to a reference plane, which is a planar
10 surface of a substrate held by the stage or a planar surface of the stage, by having the facing surface follow the reference plane. The copying mechanism is switchable between a free state in which the movable member is swingable and a locked state in which swinging of the movable member is limited, and in the copying process, the controller moves the bonding head relative to the surface direction of the reference plane while keeping the facing surface abutting against the
15 reference plane in a state in which the copying mechanism is switched to the free state until an axial direction position of the bonding head reaches a predetermined reference position, and switches the copying mechanism to the locked state at a time when the axial direction position reaches the reference position.

[0009] In this case, in the copying process, the controller may move the bonding head at least
20 in four directions parallel to the reference plane.

[0010] In addition, in the copying process, in a procedure of moving the bonding head along a predetermined copying route, the controller may specify the axial direction position at a time when the axial direction position is closest to the stage as the reference position.

[0011] In addition, the reference position may be determined in advance based on a

configuration of the bonding head and the stage or a result of a previous copying process.

[0012] A manufacturing method of a semiconductor device disclosed in the specification is a manufacturing method which manufactures the semiconductor device by bonding a chip sucked and held by a holding surface of a bonding head having a copying mechanism to a substrate mounted on a stage. The manufacturing method includes: a copying step of adjusting a facing surface, which is an end surface of the chip held on the holding surface or the holding surface, to be parallel to a reference plane, which is a planar surface of a substrate held by the stage or a planar surface of the stage, by having the facing surface follow the reference plane. The copying mechanism is provided with a fixed member comprising one of a concave spherical surface and a convex spherical surface and a movable member comprising another of the concave spherical surface and the convex spherical surface and provided to be swingable with the holding surface with respect to the fixed member, and the copying mechanism is switchable between a free state in which the movable member is swingable and a locked state in which swinging of the movable member is limited. In the copying step, the bonding head is moved relative to the surface direction of the reference plane while keeping the facing surface abutting against the reference plane in a state in which the copying mechanism is switched to the free state until an axial direction position of the bonding head reaches a predetermined reference position, and the copying mechanism is switched to the locked state at a time when the axial direction position reaches the reference position.

Effects of Invention

[0013] According to the technique disclosed in the specification, the holding surface of the bonding head can be adjusted to be parallel to the planar surface of the stage at high accuracy by a simple procedure.

WHAT IS CLAIMED IS:

1. A semiconductor device manufacturing device, comprising:

a stage on which a substrate is mounted;

a bonding head, sucking and holding a chip by using a holding surface opposite to the stage,

5 and being relatively movable with respect to the stage in a surface direction and a normal direction of the stage;

a copying mechanism, which is a copying mechanism provided in the bonding head, and provided with a fixed member comprising one of a concave spherical surface and a convex spherical surface and a movable member comprising another of the concave spherical surface
10 and the convex spherical surface and provided to be swingable with the holding surface with respect to the fixed member; and

a controller, executing a copying process adjusting a facing surface, which is an end surface of the chip held on the holding surface or the holding surface, to be parallel to a reference plane, which is a planar surface of a substrate held by the stage or a planar surface of the stage, by
15 having the facing surface follow the reference plane,

wherein the copying mechanism is switchable between a free state in which the movable member is swingable and a locked state in which swinging of the movable member is limited, and

in the copying process, the controller moves the bonding head relative to the surface
20 direction of the reference plane while keeping the facing surface abutting against the reference plane in a state in which the copying mechanism is switched to the free state until an axial direction position of the bonding head reaches a predetermined reference position, and switches the copying mechanism to the locked state at a time when the axial direction position reaches the reference position.

2. The semiconductor device manufacturing device as claimed in claim 1,

in the copying process, the controller moves the bonding head at least in four directions parallel to the reference plane.

3. The semiconductor device manufacturing device as claimed in claim 1 or 2,

5 wherein in the copying process, in a procedure of moving the bonding head along a predetermined copying route, the controller specifies the axial direction position at a time when the axial direction position is closest to the stage as the reference position.

4. The semiconductor device manufacturing device as claimed in claim 1 or 2,

10 wherein the reference position is determined in advance based on a configuration of the bonding head and the stage or a result of a previous copying process.

5. A semiconductor device manufacturing method, which manufactures the semiconductor device by bonding a chip sucked and held by a holding surface of a bonding head having a copying mechanism to a substrate mounted on a stage, the manufacturing method comprising:

15 a copying step of adjusting a facing surface, which is an end surface of the chip held on the holding surface or the holding surface, to be parallel to a reference plane, which is a planar surface of a substrate held by the stage or a planar surface of the stage, by having the facing surface follow the reference plane,

20 wherein the copying mechanism is provided with a fixed member comprising one of a concave spherical surface and a convex spherical surface and a movable member comprising another of the concave spherical surface and the convex spherical surface and provided to be swingable with the holding surface with respect to the fixed member, and the copying mechanism is switchable between a free state in which the movable member is swingable and a locked state in which swinging of the movable member is limited, and

in the copying step, the bonding head is moved relative to a surface direction of the

reference plane while the facing surface is kept abutting against the reference plane in a state in which the copying mechanism is switched to the free state until an axial direction position of the bonding head reaches a predetermined reference position, and the copying mechanism is switched to the locked state at a time when the axial direction position reaches the reference position.

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