

polishing fixture.

SUMMARY

In view of the problems in the prior art, embodiments of the present creation-invention provides a chemical mechanical polishing fixture having lateral perforation structures, which can reduce the weight of a chemical polishing fixture by providing the chemical polishing fixture with lateral openings of larger sizes, so that the chemical polishing fixture may have the technical effect of being applicable to different wafer sizes in spite of a same design.

According to a first aspect of the present invention, there is provided ~~The a~~ chemical mechanical polishing fixture having lateral perforation structures comprising according to ~~the present creation includes~~ a holder, a retaining ring and a plurality of bushing screws. The holder includes: an annular substrate, a plurality of first holes and a plurality of lateral perforation structures. The annular substrate has a first joint surface, an outer periphery and an inner periphery. The first holes are annularly arranged on the first joint surface, and each first hole includes a first inner thread structure. The lateral perforation structures penetrate from the outer periphery to the inner periphery of the annular substrate, and the lateral perforations are selected from: a converse U-shaped cube structure, ~~an converse U-shaped cube structure,~~ a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above. The retaining ring has a second joint surface and a plurality of second holes, where the second holes are annularly arranged on the second joint surface, and each second hole corresponds to one first hole. The bushing screw has a screw head, a hollow structure and a screw rod, where an inner wall surface of the screw rod has a second inner thread structure, an outer wall surface of the screw rod has an outer thread structure, each bushing screw penetrates the second holes of the retaining ring and the first holes of the holder, and then is locked to the first inner thread structure via the outer thread structure to fix the holder and the retaining ring, so that the first joint surface and the second joint surface are joined closely, and the second inner thread structure is used for locking the chemical mechanical polishing fixture having lateral perforation structures to a semiconductor machine individually with a setscrew.

~~The present creation further provides~~ According to a second aspect of the present invention, there is provided a chemical mechanical polishing fixture having

lateral perforation structures, including: a holder and a plurality of bushing screws. The holder includes: an annular substrate, a plurality of ~~third~~-holes and a plurality of lateral perforation structures. The annular substrate has a first joint surface, an outer periphery and an inner periphery. The ~~third~~-holes are annularly arranged on the first joint surface, and each ~~third~~-hole includes a first inner thread structure. The lateral perforation structures penetrate from the outer periphery to the inner periphery of the annular substrate, and the lateral perforations are selected from: a converse U-shaped cube structure, ~~an converse U-shaped cube structure~~, a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above. The bushing screw has a screw head, a hollow structure and a screw rod, where an inner wall surface of the screw rod has a second inner thread structure, an outer wall surface of the screw rod has an outer thread structure, each bushing screw penetrates the ~~third~~-holes of the holder, and then is locked to the first inner thread structure via the outer thread structure to be fixed to the holder, and the second inner thread structure is used for locking the first joint surface to a semiconductor machine by the chemical mechanical polishing fixture having lateral perforation structures individually with a setscrew.

~~The present creation further provides~~ According to a third aspect of the present invention, there is provided a chemical mechanical polishing fixture having lateral perforation structures, including: a holder ~~and a retaining ring~~. The holder includes: an annular substrate, a plurality of ~~third~~-holes and a plurality of lateral perforation structures. The annular substrate has a first joint surface, an outer periphery and an inner periphery. The ~~third~~-holes are annularly arranged on the first joint surface, and each ~~third~~-hole includes a first inner thread structure for individually providing a screw to be locked to a semiconductor machine. The lateral perforation structures penetrate from the outer periphery to the inner periphery of the annular substrate, and the lateral perforations are selected from: a converse U-shaped cube structure, ~~an converse U-shaped cube structure~~, a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above.

~~The present creation further provides~~ According to a fourth aspect of the present invention, there is provided a chemical mechanical polishing fixture having

lateral perforation structures, including: a holder and a retaining ring. The holder includes: an annular substrate, a plurality of bumps and a plurality of lateral perforation structures. The annular substrate has a first joint surface, an outer periphery and an inner periphery. The bumps are annularly arranged on the first joint surface, and each bump includes: a first
5 engagement surface, which is a plane extending radially along the annular substrate, a root portion of the first engagement surface inclining towards an outer side of the bump to form a barb structure. The lateral perforation structures penetrate from the outer periphery to the inner periphery of the annular substrate, and the lateral perforations are selected from: a
10 converse U-shaped cube structure, ~~an converse U-shaped cube structure,~~ a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above. The retaining ring has a second joint surface and a plurality of first grooves, where the first grooves are annularly arranged on the second joint surface, and each first groove includes: a second engagement surface,
15 which is a plane extending radially along the retaining ring, a root portion of the second engagement surface inclining towards the second joint surface to form a barb structure. The holder and the retaining ring are axially aligned, so that the first joint surface is aligned with the second joint surface, the bumps are aligned with the first grooves, and the holder and the retaining ring respectively reversely rotate along a circumferential direction to engage the first engagement surface of the bump with the second engagement surface of the
20 first groove.

~~The present creation further provides~~ According to a fifth aspect of the present invention, there is provided a chemical mechanical polishing fixture having lateral
25 lateral perforation structures, including: a retaining ring and a holder. The retaining ring includes: an annular substrate and a plurality of bumps. The annular substrate has a first joint surface. The bumps are annularly arranged on the first joint surface, and each bump includes: a first engagement surface, which is a plane extending radially along the annular substrate, a root portion of the first engagement surface inclining towards an outer side of the bump to form a barb structure. The holder has an annular structure, a second joint
30 surface and a plurality of first grooves, where the annular structure has an outer periphery and an inner periphery, the first grooves are annularly arranged on the second joint surface, and each first groove includes: a second engagement surface, which is a plane extending

radially along the holder, a root portion of the second engagement surface inclining towards the second joint surface to form a barb structure. Lateral perforation structures penetrate from the outer periphery to the inner periphery of the annular structure, and the lateral perforations are selected from: a converse U-shaped cube structure, ~~an converse U-shaped cube structure,~~ a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above. The holder and the retaining ring are axially aligned, so that the first joint surface is aligned with the second joint surface, the bumps are aligned with the first grooves, and the holder and the retaining ring respectively reversely rotate along a circumferential direction to engage the first engagement surface of the bump with the second engagement surface of the first groove.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of a conventional wafer fixture;

FIG. 2A, FIG. 2B, and FIG. 2C are a front view, a partially enlarged view of an area 2, and a schematic side view seen from C in one embodiment of a chemical mechanical polishing fixture according to the present creation;

FIG. 2D, FIG. 2E, and FIG. 2F are a front view and a partially enlarged view of an area 2 in one embodiment of a chemical mechanical polishing fixture according to the present creation, which are schematic views of shapes of lateral perforations 502, 503 and 504 respectively;

FIG. 3A is a sectional exploded view of elements in the area 2 along a section A-A in the embodiment of FIG. 2B, which is an embodiment that a bushing screw 300 uses a screw head with a flat-head structure;

FIG. 3B is one embodiment of a combined view of elements in the area 2 along a section A-A in the embodiment of FIG. 2B;

FIG. 3C is a three-dimensional view in the area 2 along a section A-A in the embodiment of FIG. 2B;

FIG. 3D is a structural view of lateral perforations along a section B-B in the

CLAIMS

What is claimed is:

1. A chemical mechanical polishing fixture having lateral perforation structures,
5 comprising:

a holder, comprising:

an annular substrate having a first joint surface, an outer periphery and an inner periphery;

a plurality of first holes annularly arranged on the first joint surface, each first hole
10 comprising a first inner thread structure; and

a plurality of lateral perforation structures penetrating from the outer periphery to the inner periphery of the annular substrate, wherein the lateral perforations are selected from:
a converse U-shaped cube structure, ~~an converse U-shaped cube structure,~~ a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a
15 hybrid structure of at least one cuboid structure and the above;

a retaining ring having a second joint surface and a plurality of second holes, wherein the second holes are annularly arranged on the second joint surface, and each second hole corresponds to one first hole; and

a plurality of bushing screws, each having a screw head, a hollow structure and a
20 screw rod, wherein an inner wall surface of the screw rod has a second inner thread structure, an outer wall surface of the screw rod has an outer thread structure, each bushing screw penetrates the second holes of the retaining ring and the first holes of the holder, and then is locked to the first inner thread structure via the outer thread structure to fix the holder and the retaining ring, so that the first joint surface and the second joint surface are
25 joined closely, and the second inner thread structure is used for locking the chemical mechanical polishing fixture having lateral perforation structures to a semiconductor machine individually with a setscrew.

2. The chemical mechanical polishing fixture having lateral perforation structures

according to claim 1, wherein the bushing screw further comprises:

a tapping gap extending from the bottom of the screw rod to the screw head, and used for making the bushing screw easily locked.

3. The chemical mechanical polishing fixture having lateral perforation structures
5 according to claim 1 or 2, wherein the lateral perforation structures have an angle R or an angle C at a bending position.

4. The chemical mechanical polishing fixture having lateral perforation structures
according to any one of claims 1 to 3, wherein an inclined angle of 60 degrees to 120
degrees is formed between the lateral perforation structures and the outer periphery of the
10 annular substrate.

5. A chemical mechanical polishing fixture having lateral perforation structures,
comprising:

a holder, comprising:

an annular substrate having a first joint surface, an outer periphery and an inner
15 periphery;

a plurality of ~~third~~ holes annularly arranged on the first joint surface, each ~~third~~ hole
comprising a first inner thread structure; and

a plurality of lateral perforation structures penetrating from the outer periphery to the
inner periphery of the annular substrate, wherein the lateral perforations are selected from:
20 a converse U-shaped cube structure, ~~an converse U-shaped cube structure~~, a cuboid
structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a
hybrid structure of at least one cuboid structure and the above; and

a plurality of bushing screws, each having a screw head, a hollow structure and a
screw rod, wherein an inner wall surface of the screw rod has a second inner thread
25 structure, an outer wall surface of the screw rod has an outer thread structure, each bushing
screw penetrates the ~~third~~ holes of the holder, and then is locked to the first inner thread
structure via the outer thread structure to be fixed to the holder, and the second inner thread

structure is used for locking the first joint surface to a semiconductor machine by the chemical mechanical polishing fixture having lateral perforation structures individually with a setscrew.

6. The chemical mechanical polishing fixture having lateral perforation structures according to claim 5, wherein the bushing screw further comprises:

a tapping gap extending from the bottom of the screw rod to the screw head, and used for making the bushing screw easily locked.

7. The chemical mechanical polishing fixture having lateral perforation structures according to claim 5 or 6, wherein the lateral perforation structures have an angle R or an angle C at a bending position.

8. The chemical mechanical polishing fixture having lateral perforation structures according to any one claims 5 to 7, wherein an inclined angle of 60 degrees to 120 degrees is formed between the lateral perforation structures and the outer periphery of the annular substrate.

9. A chemical mechanical polishing fixture having lateral perforation structures, comprising:

a holder, comprising:

an annular substrate having a first joint surface, an outer periphery and an inner periphery;

a plurality of ~~third~~ holes annularly arranged on the first joint surface, each ~~third~~ hole comprising a first inner thread structure for individually providing a screw to be locked to a semiconductor machine; and

a plurality of lateral perforation structures penetrating from the outer periphery to the inner periphery of the annular substrate, wherein the lateral perforations are selected from:

a converse U-shaped cube structure, ~~an converse U-shaped cube structure,~~ a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above.

10. The chemical mechanical polishing fixture having lateral perforation structures according to claim 9, wherein the lateral perforation structures are the converse U-shaped cube structure ~~or the converse U-shaped cube structure~~, and the converse U-shaped cube structure ~~or the converse U-shaped cube structure~~ is configured below the ~~third~~ holes.

5 11. The chemical mechanical polishing fixture having lateral perforation structures according to claim 9, wherein the lateral perforation structures have an angle R or an angle C at a bending position.

12. The chemical mechanical polishing fixture having lateral perforation structures
10 according to any one of claims 9 to 11, wherein an inclined angle of 60 degrees to 120 degrees is formed between the lateral perforation structures and the outer periphery of the annular substrate.

13. A chemical mechanical polishing fixture having lateral perforation structures,
15 comprising:

a holder, comprising:

an annular substrate having a first joint surface, an outer periphery and an inner periphery;

a plurality of bumps annularly arranged on the first joint surface, each bump
20 comprising:

a first engagement surface, which is a plane extending radially along the annular substrate, a root portion of the first engagement surface inclining towards an outer side of the bump to form a barb structure; and

a plurality of lateral perforation structures penetrating from the outer periphery to the
25 inner periphery of the annular substrate, wherein the lateral perforations are selected from:
a converse U-shaped cube structure, ~~an converse U-shaped cube structure~~, a cuboid structure, a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above; and

a retaining ring having a second joint surface and a plurality of first grooves, wherein

comprising:

a retaining ring, comprising:

an annular substrate having a first joint surface; and

- 5 a plurality of bumps annularly arranged on the first joint surface, each bump comprising:

a first engagement surface, which is a plane extending radially along the annular substrate, a root portion of the first engagement surface inclining towards an outer side of the bump to form a barb structure; and

- 10 a holder having an annular structure, a second joint surface and a plurality of first grooves, wherein the annular structure has an outer periphery and an inner periphery, the first grooves are annularly arranged on the second joint surface, and each first groove comprises:

- a second engagement surface, which is a plane extending radially along the holder, a
15 root portion of the second engagement surface inclining towards the second joint surface to form a barb structure; and

- a plurality of lateral perforation structures, penetrating from the outer periphery to the inner periphery of the annular structure, wherein the lateral perforations are selected from: a
converse U-shaped cube structure, ~~an converse U-shaped cube structure,~~ a cuboid structure,
20 a cylinder structure, an elliptic cylinder structure, a flat cuboid structure or a hybrid structure of at least one cuboid structure and the above;

- wherein the holder and the retaining ring are axially aligned, so that the first joint surface is aligned with the second joint surface, the bumps are aligned with the first grooves, and the holder and the retaining ring respectively reversely rotate along a circumferential
25 direction to engage the first engagement surface of the bump with the second engagement surface of the first groove.

19. The chemical mechanical polishing fixture having lateral perforation structures according to claim 18, wherein the bump further comprises: a first guide surface disposed