

SEMICONDUCTOR CHAMBER

TECHNICAL FIELD

5 [0001] The present disclosure relates to the technical field of semiconductor equipment, and in particular, to a semiconductor chamber.

BACKGROUND

10 [0002] In a process, e.g., a Physical Vapor Deposition (PVD) process, a wafer is placed on a base in a process chamber, a plasma is formed in the process chamber and bombards a target above the base to cause atoms of the target to escape and be deposited on a surface of the wafer, so as to form a desired thin film on the surface of the wafer. When the process, e.g., the PVD process, is performed, the wafer needs to be placed in a closed process environment inside the process chamber, so as to prevent the atoms of the target
15 from being diffused and deposited on an inner wall of the process chamber or on other parts.

[0003] In an existing process chamber, a target is provided at a top of a chamber body, a liftable base for bearing a wafer is provided below the target, a shielding piece is disposed around the chamber body on an inner side of the chamber body, a lower
20 shielding ring is disposed on the base and surrounds the wafer, and a cover ring is laid on the lower shielding ring during a process. The cover ring overlaps the shielding piece when the base is lowered from a process position.

[0004] However, when being installed, the cover ring is manually overlapped on the shielding piece, which makes it hard to ensure that the cover ring is concentric with the
25 shielding piece by visual observation only. Therefore, when the base is lifted up to the process position and the lower shielding ring holds the cover ring up from the shielding piece, it is also hard to ensure that the cover ring is concentric with the base, and the cover ring may possibly cover an edge of the wafer, such that a thin film deposited on the edge of the wafer is very thin or even no thin film is deposited on the edge of the
30 wafer, which affects chip performance.

SUMMARY

[0005] In order to solve at least one of the technical problems in the existing art, the present disclosure provides a semiconductor chamber, which can prevent a wafer from being covered and improve uniformity of a thin film deposited on the wafer, thereby improving chip performance.

[0006] For achieving the objective of the present disclosure, there is provided a semiconductor chamber, including a chamber body, and a first blocking piece and a liftable base assembly which are disposed in the chamber body, wherein

the first blocking piece is fixedly connected to an inner wall of the chamber body, and is disposed around the inner wall of the chamber body along a circumferential direction of the inner wall of the chamber body;

the base assembly includes a base body, a second blocking piece, and a positioning structure, and the base body is configured to bear a wafer; the second blocking piece is disposed on and around the base body along a circumferential direction of the base body, and when the base body is raised to a process position, the second blocking piece partially overlaps the first blocking piece, and a portion of the second blocking piece which overlaps the first blocking piece is on a side of the first blocking piece away from the base body; and

the positioning structure is disposed between the base body and the second blocking piece, and is configured to determine relative positions of the base body and the second blocking piece.

[0007] Optionally, the positioning structure includes a plurality of first positioning grooves, a plurality of second positioning grooves, and a plurality of positioning members, the plurality of first positioning grooves are provided on a surface of the base body facing the second blocking piece, the plurality of second positioning grooves are provided on a surface of the second blocking piece facing the base body, the positioning members, the first positioning grooves, and the second positioning grooves are the same in number and are arranged in one-to-one correspondence, and each positioning member is respectively inserted into a corresponding first positioning groove and a corresponding second positioning groove.

[0008] Optionally, the second blocking piece includes a first blocking portion and a second blocking portion, the first blocking portion is annular and is disposed on and around the base body along the circumferential direction of the base body, and the positioning structure is disposed between the base body and the first blocking portion;
5 and the second blocking portion is annular and is located below the first blocking portion, the second blocking portion overlaps the first blocking piece, and a portion of the second blocking portion which overlaps the first blocking piece is on the side of the first blocking piece away from the base body.

[0009] Optionally, a first connecting part is provided on the base body, and is disposed
10 around a peripheral side of the base body along the circumferential direction of the base body; and the second blocking piece further includes a connecting section connected between the first blocking portion and the second blocking portion, the connecting section is disposed around a peripheral side of the first connecting part and opposite to the first connecting part, and the base assembly further includes a detachable connector
15 configured to detachably connect the first connecting part to the connecting section.

[0010] Optionally, the second blocking portion includes an annular horizontal blocking section and a cylindrical vertical blocking section connected to each other, the horizontal blocking section is disposed around the connecting section, and the vertical blocking section is disposed around the first blocking piece with a gap provided between the
20 vertical blocking section and the first blocking piece.

[0011] Optionally, the first connecting part is provided with a threaded through hole, the connecting section is provided with a threaded counterbore hole corresponding to the threaded through hole, and the connector includes a screw for thread fitting with the threaded counterbore hole and the threaded through hole.

[0012] Optionally, an annular convex edge facing a center of the base body is provided
25 on the first blocking portion, an upper surface of the annular convex edge is higher than an upper surface of the wafer borne on the base body, and an inner diameter of the annular convex edge is larger than a diameter of the wafer borne on the base body.

[0013] Optionally, an annular groove is further provided on the first blocking portion,
30 the annular groove is provided on a surface of the first blocking portion close to the base body and located below the annular convex edge, a distance between an annular vertical surface of the annular groove away from the center of the base body and an outer circumferential surface of the wafer borne on the base body is larger than a distance

between an annular vertical surface of the annular convex edge facing the center of the base body and the outer circumferential surface of the wafer borne on the base body.

[0014] Optionally, surfaces of the first blocking piece and the second blocking piece which face a top of the chamber body are roughened.

- 5 [0015] Optionally, the semiconductor chamber further includes a target component disposed at a top of the chamber body, wherein the base assembly is disposed in the chamber body for forming a closed process environment together with the target component.

[0016] The present disclosure has the following beneficial effects:

- 10 in the semiconductor chamber provided by the present disclosure, by disposing the second blocking piece on and around the base body along the circumferential direction of the base body, partially overlapping the second blocking piece with the first blocking piece when the base body is raised to the process position, and making the portion of the second blocking piece which overlaps the first blocking piece be on the side of the first
- 15 blocking piece away from the base body, the second blocking piece can be endowed with the functions of the cover ring and the lower shielding ring of the base assembly in the existing art, so that when a semiconductor process is performed, a closed process environment can be formed in the semiconductor chamber by the base body, the first blocking piece, the second blocking piece, and the target component disposed at a top of
- 20 the chamber body. By disposing the positioning structure between the base body and the second blocking piece, the relative positions of the base body and the second blocking piece can be determined with the positioning structure, so that the second blocking piece can be made to be concentric and coaxial with the base body, thereby preventing the second blocking piece from covering the wafer borne on the base body. Moreover,
- 25 Unlike the case in the existing art in which the cover ring overlaps the shielding piece and is separated from the base, the second blocking piece of the present disclosure is disposed on the base body and thus cannot be separated from the base body during the whole semiconductor process and can be raised up or lowered down along with the base body all the time, so that changes of the relative positions of the second blocking piece
- 30 and the base body can be avoided, and the second blocking piece can be prevented from covering the wafer borne on the base body during the semiconductor process, thereby improving the uniformity of the thin film deposited on the wafer and improving the chip performance.

BRIEF DESCRIPTION OF DRAWINGS

[0017] FIG. 1 is a schematic structural diagram of an existing semiconductor chamber;
and

5 [0018] FIG. 2 is a schematic structural diagram of a semiconductor chamber according to an embodiment of the present disclosure;

[0019] Description of reference numerals:

11-chamber body; 12-adaptor; 13-target; 14-base assembly; 141-shielding piece;
142-cover ring; 143-lower shielding ring; 144-cooling water tray; 145-top tray;
10 15-vacuum screw; 16-sealing ring; 17-thermocouple; 2-base body; 21-first connecting part; 3-first blocking piece; 4-second blocking piece; 41-first blocking portion; 411-threaded counterbore hole; 412-annular convex edge; 413-annular groove; 42-second blocking portion; 421-horizontal blocking section; 422-vertical blocking section; 43-connecting section; 5-connector; 6-positioning member; 71-chamber body;
15 72-target component; 73-cooling part; 74-water cooling passage; 75-thermocouple; 76-corrugated tube; 77-adapter part; 8-wafer.

DETAIL DESCRIPTION OF EMBODIMENTS

[0020] In order to enable those of ordinary skill in the art to better understand the
20 technical solution of the present disclosure, a semiconductor chamber provided by the present disclosure is described in detail below with reference to the accompanying drawings.

[0021] As shown in FIG. 1, an existing process chamber includes a chamber body 11, an adaptor 12, a target 13, and a base assembly 14. The base assembly 14 includes a
25 shielding piece 141, a cover ring 142, a lower shielding ring 143, a cooling water tray 144, and a top tray 145. The adaptor 12 is disposed on the chamber body 11, the target 13 is disposed on the adaptor 12, the shielding piece 141 is disposed on the adaptor 12 and disposed in the chamber body 11 along a circumferential direction of the chamber body 11, the top tray 145 is disposed on the cooling water tray 144, the cooling water
30 tray 144 is configured to cool the top tray 145, and the lower shielding ring 143 is

disposed on the top tray 145 along a circumferential direction of the top tray 145. When a semiconductor process is not performed, the cooling water tray 144, the top tray 145, and the lower shielding ring 143 are lowered to a low position, and the cover ring 142 overlaps the shielding piece 141. When the semiconductor process is performed, the top
5 tray 145 supports a wafer 8, the cooling water tray 144, the top tray 145, and the lower shielding ring 143 are raised to a high position (i.e., a process position), the lower shielding ring 143 holds the cover ring 142 up from the shielding piece 141 to separate the cover ring 142 from the shielding piece 141, and a labyrinth structure is formed
10 between the cover ring 142 and the shielding piece 141, thus forming a closed process environment by the target 13, the shielding piece 141, the cover ring 142, the lower shielding piece 143, and the top tray 145 together.

[0022] It is found through research by the applicant that, since the cover ring 142 is manually overlapped on the shielding piece 141, it is hard to ensure that the cover ring 142 is concentric with the shielding piece 141 by visual observation only. Therefore,
15 when the cooling water tray 144, the top tray 145, and the lower shielding ring 143 are raised to the high position and the lower shielding ring 143 holds the cover ring 142 up from the shielding piece 141, it is also hard to ensure that the cover ring 142 is concentric with the top tray 145, and the cover ring 142 may possibly cover an edge of the wafer 8, such that a thin film deposited on the edge of the wafer 8 is very thin or even
20 no thin film is deposited on the edge of the wafer 8, which affects chip performance.

[0023] In order to solve the above technical problem, as shown in FIG. 2, an embodiment of the present disclosure provides a semiconductor chamber, including a chamber body 71, and a first blocking piece 3 and a liftable base assembly which are disposed in the chamber body 71. The first blocking piece 3 is fixedly connected to an
25 inner wall of the chamber body 71, and is disposed around the inner wall of the chamber body 71 along a circumferential direction of the inner wall of the chamber body 71. The base assembly includes a base body 2, a second blocking piece 4, and a positioning structure. The base body 2 is configured to bear a wafer 8. Optionally, the base body 2 is coaxial with the chamber body 71. The second blocking piece 4 is disposed on and
30 around the base body 2 along a circumferential direction of the base body 2. When the base body 2 is raised to a process position, the second blocking piece 4 partially overlaps the first blocking piece 3, and a portion of the second blocking piece 4 which overlaps the first blocking piece 3 is on a side of the first blocking piece 3 away from the base

body 2. The positioning structure is disposed between the base body 2 and the second blocking piece 4, and is configured to determine relative positions of the base body 2 and the second blocking piece 4.

[0024] In the semiconductor chamber provided in the embodiments of the present disclosure, by disposing the second blocking piece 4 on the base body 2 along the circumferential direction of the base body 2, partially overlapping the second blocking piece 4 with the first blocking piece 3 when the base body 2 is raised to the process position, and making the portion of the second blocking piece 4 which overlaps the first blocking piece 3 be on the side of the first blocking piece 3 away from the base body 2, the second blocking piece 4 can be endowed with the functions of the cover ring 142 and the lower shielding ring 143 of the base assembly in the existing art, so that when a semiconductor process is performed, a closed process environment can be formed in the semiconductor chamber by the base body 2, the first blocking piece 3, the second blocking piece 4, and a target component 72 disposed at a top of the chamber body 71.

By disposing the positioning structure between the base body 2 and the second blocking piece 4, the relative positions of the base body 2 and the second blocking piece 4 can be determined with the positioning structure, so that the second blocking piece 4 can be made to be concentric and coaxial with the base body 2, thereby preventing the second blocking piece 4 from covering the wafer 8 borne on the base body 2. Moreover, since the second blocking piece 4 is disposed on the base body 2, the second blocking piece 4 cannot be separated from the base body 2 during the whole semiconductor process and can be raised up or lowered down along with the base body 2 all the time, in contrast with the existing art in which the cover ring overlaps the shielding piece and can be separated from the top tray in the base assembly. Thus, changes of the relative positions of the second blocking piece 4 and the base body 2 can be avoided, and the second blocking piece 4 can be prevented from covering the wafer 8 borne on the base body 2 during the semiconductor process, thereby improving uniformity of a thin film deposited on the wafer 8 and improving the chip performance.

[0025] By disposing the positioning structure between the base body 2 and the second blocking piece 4, when the second blocking piece 4 and the base body 2 are installed, the relative positions of the base body 2 and the second blocking piece 4 can be determined with the positioning structure, so that the second blocking piece 4 can be made to be concentric and coaxial with the base body 2. In this way, after the installation of the

second blocking piece 4 and the base body 2 is completed, that is, after the second blocking piece 4 is disposed on the base body 2 along the circumferential direction of the base body 2, the second blocking piece 4 is located on the base body 2 at such a position that the second blocking piece 4 is concentric and coaxial with the base body 2, thereby preventing the second blocking piece 4 from covering the wafer 8 borne on the base body during the semiconductor process.

[0026] When the semiconductor process is not performed, the base body 2 is lowered to a low position, and the second blocking piece 4 is lowered to the low position along with the base body 2, at this time, the second blocking piece 4 is separated from the first blocking piece 3 and does not overlap the first blocking piece 3, and the base body 2, the first blocking piece 3, the second blocking piece 4, and the target component 72 disposed at the top of the chamber body 71 do not form the closed process environment, which allows a manipulator to transfer the wafer 8 to be processed onto the base body 2 or to remove the processed wafer 8 from the base body 2. When the semiconductor process is performed, the base body 2 bearing the wafer 8 is raised to the process position, and the second blocking piece 4 is raised to the process position along with the base body 2, at this time, the second blocking piece 4 partially overlaps the first blocking piece 3, the portion of the second blocking piece 4 which overlaps the first blocking piece 3 is on the side of the first blocking piece 3 away from the base body 2, the target component 72 disposed at the top of the chamber body 71 can block, from the top of the chamber body 71, atoms of a target which escape due to bombarding by a plasma in the semiconductor process; with the portion of the second blocking piece 4 which overlaps the first blocking piece 3 on the side of the first blocking piece 3 away from the base body 2, the first blocking piece 3 disposed along the circumferential direction of the inner wall of the chamber body 71 can block the atoms of the target from a circumferential side; and the base body 2 and the second blocking piece 4 can block the atoms of the target from a bottom, thus forming the closed process environment by the base body 2, the first blocking piece 3, the second blocking piece 4, and the target component 72 disposed at the top of the chamber body 71.

[0027] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the positioning structure may include a plurality of first positioning grooves, a plurality of second positioning grooves, and a plurality of positioning members 6. The plurality of first positioning grooves are provided on a surface of the base body 2 facing the second

blocking piece 4 (e.g., an upper surface of the base body 2 in FIG. 2), the plurality of second positioning grooves are provided on a surface of the second blocking piece 4 facing the base body 2 (e.g., a lower surface of the second blocking piece 4 in FIG. 2), the positioning members 6, the first positioning grooves, and the second positioning grooves are the same in number and are arranged in one-to-one correspondence, and each positioning member 6 is respectively inserted into a corresponding first positioning groove and a corresponding second positioning groove.

[0028] When the second blocking piece 4 and the base body 2 are installed, the plurality of positioning members 6 may be first inserted into the plurality of first positioning grooves in one-to-one correspondence, at this time, a part of each positioning member 6 is in the corresponding first positioning groove, the remaining part is outside the corresponding first positioning groove; and then the second blocking piece 4 is placed on the base body 2, and the parts of the plurality of positioning members 6 which are outside the corresponding first positioning grooves are inserted into the plurality of second positioning grooves in one-to-one correspondence, thereby realizing positioning of the relative positions of the second blocking piece 4 and the base body 2 with the positioning members 6, the first positioning grooves, and the second positioning grooves which are disposed in one-to-one correspondence, at this time, each positioning member 6 is respectively inserted into a corresponding first positioning groove and a corresponding second positioning groove.

[0029] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the second blocking piece 4 may include a first blocking portion 41 and a second blocking portion 42. The first blocking portion 41 is annular and is disposed on and around the base body 2 along the circumferential direction of the base body 2, the positioning structure is disposed between the base body 2 and the first blocking portion 41, and the first blocking portion 41 is disposed on the base body 2 through the positioning structure. The second blocking portion 42 is annular and is located below the first blocking portion 41. The second blocking portion 42 overlaps the first blocking piece 3, and a portion of the second blocking portion 42 which overlaps the first blocking piece 3 is on the side of the first blocking piece 3 away from the base body 2.

[0030] By providing the annular first blocking portion 41 and the second blocking portion 42 overlapping the first blocking portion 41 and disposing the first blocking portion 41 around the base body 2 along the circumferential direction of the base body 2,

the second blocking piece 4 formed by the first blocking portion 41 and the second blocking portion 42 can be disposed on and around the base body 2 along the circumferential direction of the base body 2. In addition, with the second blocking portion 42 located below the first blocking portion 41 and overlapping the first blocking piece 3 and the portion of the second blocking portion 42 which overlaps the first blocking piece 3 located on the side of the first blocking piece 3 away from the base body 2, the second blocking piece 4 can partially overlap the first blocking piece 3, and the portion of the second blocking portion 42 which overlaps the first blocking piece 3 can be located on the side of the first blocking piece 3 away from the base body 2, so that when a deposition process is performed in the semiconductor chamber, the first blocking piece 3 and the second blocking piece 4 can protect the inner wall of the chamber body 71, and deposition of a thin film on the inner wall of the chamber body 71 can be avoided. By disposing the positioning structure between the base body 2 and the first blocking portion 41, the positioning structure can be disposed between the base body 2 and the second blocking piece 4. By disposing the first blocking portion 41 on the base body 2 through the positioning structure, the base body 2 and the first blocking portion 41 can be positioned with the positioning structure, thereby realizing the positioning of the base body 2 and the second blocking piece 4.

[0031] As shown in FIG. 2, optionally, the plurality of first positioning grooves may be provided on a side surface of the base body 2 facing the second blocking piece 4, and the plurality of second positioning grooves may be provided on a side surface of the second blocking piece 4 facing the base body 2.

[0032] Optionally, the first blocking portion 41 and the second blocking portion 42 are of an integral structure, so that the second blocking piece 4 including the first blocking portion 41 and the second blocking portion 42 is of an integral structure, that is, in the base assembly of the semiconductor chamber provided in the embodiments of the present disclosure, the second blocking piece 4 is of an integral structure, and the functions of the cover ring 142 and the lower shielding ring 143 of the existing base assembly are realized by the second blocking piece 4 which is of an integral structure.

[0033] As shown in FIG. 2, in a preferred embodiment of the present disclosure, a first connecting part 21 may be provided on the base body 2, and is disposed around a peripheral side of the base body 2 along the circumferential direction of the base body 2. The second blocking piece 4 may further include a connecting section 43 connected

between the first blocking portion 41 and the second blocking portion 42, and the connecting section 43 is disposed around a peripheral side of the first connecting part 21 and opposite to the first connecting part 21. The base assembly may further include a detachable connector 5 configured to detachably connect the first connecting part 21 to the connecting section 43.

[0034] Since the second blocking piece 4 can block the atoms of the target from the bottom, the atoms of the target are deposited on the second blocking piece 4. When excessive atoms of the target are deposited on the second blocking piece 4, the second blocking piece 4 needs to be cleaned or replaced for preventing the atoms of the target deposited on the second blocking piece 4 from polluting the wafer 8 borne on the base body 2 when the atoms of the target fall off from the second blocking piece 4, at this time, the second blocking piece 4 having the atoms of the target deposited thereon needs to be detached from the base body 2, so as to clean the second blocking piece 4 having the atoms of the target deposited thereon or connect a replaced new the second blocking piece 4 to the base body 2. The second blocking piece 4 can be detachably connected to the base body 2 through the connector 5 detachably connecting the first connecting part 21 to the connecting section 43.

[0035] As shown in FIG. 1, in the existing base assembly, the lower shielding ring 143 and the top tray 145 are connected in a following way: a vacuum screw 15 is inserted upwards from a bottom of the top tray 145 and sequentially penetrates through the top tray 145 and the lower shielding ring 143 from bottom to top to connect the lower shielding ring 143 to the top tray 145; and the top tray 145 and the cooling water tray 144 are connected in a following way: a vacuum screws 15 is inserted downwards from a top of the top tray 145 and sequentially penetrates through the top tray 145 and the cooling water tray 144 from top to bottom to connect the top tray 145 to the cooling water tray 144. In this way, when the lower shielding ring 143 needs to be cleaned or replaced due to excessive deposited atoms of the target, the vacuum screw 15 connecting the top tray 145 to the cooling water tray 144 needs to be removed first to separate the top tray 145 from the cooling water tray 144, the top tray 145 and the lower shielding ring 143 need to be taken off together, and then the lower shielding ring 143 and the top tray 145 may be separated from each other, which results in a complicated process of detaching the shielding ring 143 for cleaning or replacement. In addition, a thermocouple 17 is provided in the cooling water tray 144 for detecting a temperature of the top tray

145, and is communicated with the atmosphere, and a sealing ring is disposed between the top tray 145 and the cooling water tray 144 to realize isolation of a vacuum from the atmosphere. Therefore, when the top tray 145 is separated from the cooling water tray 144, the vacuum between the top tray 145 and the cooling water tray 144 is destroyed, and even if the top tray 145 is mounted on the cooling water tray 144 again, a degree of the vacuum between the top tray 145 and the cooling water tray 144 cannot be restored to an initial state, which affects a process result and also affects temperature measurement of the thermocouple 17. With the temperature measurement of the thermocouple 17 affected, the process result is also affected.

[0036] As shown in FIG. 2, in the base assembly of the semiconductor chamber provided in the embodiments of the present disclosure, the first connecting part 21 is detachably connected to the connecting section 43 through the connector 5, the first connecting part 21 is disposed around a peripheral side of the base body 2 along the circumferential direction of the base body 2, and the connecting section 43 is disposed between the first blocking portion 41 and the second blocking portion 42 and opposite to the first connecting part 21, for example, the connecting section 43 is disposed around and opposite to the first connecting part 21. Therefore, detachable connection of the second blocking piece 4 and the base body 2 can be realized from a circumferential side of the second blocking piece 4 and the base body 2, so that the second blocking piece 4 can be detached, even in the presence of a cooling part 73 connected to the bottom of the base body 2, from the base body 2 without detaching the base body 2 from the cooling part 73, which facilitates detachment of the second blocking piece 4 for cleaning or replacement, and avoids destruction of a vacuum between the base body 2 and the cooling part 73, thereby improving the process result.

[0037] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the second blocking portion 42 may include an annular horizontal blocking section 421 and a cylindrical vertical blocking section 422 connected to each other, the horizontal blocking section 421 is disposed around the connecting section 43, and the vertical blocking section 422 is disposed around the first blocking piece 3 with a gap provided therebetween. Specifically, as shown in FIG. 2, the vertical blocking section 422 is disposed outside the first blocking piece 3 and surrounds the first blocking piece 3, and a lateral gap is provided between the vertical blocking section 422 and the first blocking piece 3.

[0038] By providing the annular horizontal blocking section 421 and the cylindrical vertical blocking section 422 and disposing the horizontal blocking section 421 around the connecting section 43, the atoms of the target can be blocked by the horizontal blocking section 421 from the bottom; and by disposing the vertical blocking section 422 around the first blocking piece 3 with the gap provided therebetween, the atoms of the target can be blocked by the vertical blocking section 422 from the circumferential side, thereby forming the relatively closed process environment by the base body 2, the first blocking piece 3, the second blocking piece 4, and the target subassembly 72 disposed at the top of the chamber body 71.

[0039] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the first connecting part 21 may be provided with a threaded through hole, the connecting section 43 may be provided with a threaded counterbore hole 411 corresponding to the threaded through hole, and the connector 5 may include a screw for thread fitting with the threaded counterbore hole 411 and the threaded through hole. Optionally, a plurality of threaded through holes may be provided and symmetrically distributed along a circumferential direction of the first connecting part 21; and the threaded counterbore holes 411, the screws, and the threaded through holes are the same in number, and are arranged in one-to-one correspondence.

[0040] By inserting the screw into the threaded counterbore hole 411 and the threaded through hole in sequence and twisting the screw in the threaded counterbore hole 411 and the threaded through hole to closely attach the screw to the threaded counterbore hole 411, the first connecting part 21 is connected to the connecting section 43 with the screw, so as to connect the first blocking portion 41 to the base body 2, thereby connecting the second blocking piece 4 to the base body 2. By loosening the screw, the screw is detached from the threaded through hole and the threaded counterbore hole 411 in sequence, so that the first connecting part 21 can be detached from the connecting section 43, the first blocking portion 41 can be detached from the base body 2, and the second blocking piece 4 can be detached from the base body 2.

[0041] As shown in FIG. 1, a reason for using the vacuum screw 15 to connect the lower shielding ring 143 to the top tray 145 in the existing base assembly is that a threaded hole formed in the lower shielding ring 143 for the vacuum screw 15 to penetrate through is a blind hole. If a common screw is used to connect the lower shielding ring 143 to the top tray 145, the air may be kept between the common screw and the blind

hole after the common screw penetrates through the blind hole. When the semiconductor process is performed and the process chamber needs to be vacuumized, the air kept between the common screw and the blind hole cannot be drawn out in time. Therefore, the air between the common screw and the blind hole may gradually diffuse into the process chamber during the semiconductor process, which may affect a vacuum degree in the process chamber, such that the vacuum degree in the process chamber cannot meet a process requirement, resulting in a poor semiconductor process result. In view of the above, the vacuum screw 15 needs to be used to connect the lower shielding ring 143 to the top tray 145, so as to ensure that the air in the blind hole can be drawn out when the process chamber needs to be vacuumized. As shown in FIG. 2, in the base assembly provided in the embodiments of the present disclosure, the threaded hole for the screw to penetrate through is set to be the threaded through hole, so that the air in the threaded through hole can be squeezed out by the screw after the screw penetrates through the threaded through hole, with no air kept in the threaded through hole. Therefore, a common screw can be used to connect the second blocking piece 4 to the base body 2 in the base assembly provided in the embodiments of the present disclosure. Since the common screw has a lower cost than the vacuum screw 15, a cost of the base assembly can be reduced by using the common screw to connect the second blocking piece 4 to the base body 2.

[0042] As shown in FIG. 2, in a preferred embodiment of the present disclosure, an annular convex edge 412 extending towards a center of the base body 2 may be provided on the first blocking portion 41, an upper surface of the annular convex edge 412 is higher than an upper surface of the wafer 8 borne on the base body 2, and an inner diameter of the annular convex edge 412 is larger than a diameter of the wafer 8 borne on the base body 2.

[0043] By providing the annular convex edge 412 facing the center of the base body 2 on the first blocking portion 41, setting at least the upper surface of the annular convex edge 412 to be higher than the upper surface of the wafer 8 borne on the base body 2, and setting the inner diameter of the annular convex edge 412 to be larger than the diameter of the wafer 8 borne on the base body 2, the atoms of the target, which move diagonally downwards from an outer side of the wafer 8 borne on the base body 2, can be blocked by the annular convex edge 412 and thus can be prevented from moving to the wafer 8, so that the atoms of the target moving diagonally downwards from the outer side of the

wafer 8 borne on the base body 2 can be prevented from being deposited on a side surface of the wafer 8 facing the base body 2, thereby avoiding back plating of the wafer 8 and improving the semiconductor process result.

[0044] As shown in FIG. 2, in a preferred embodiment of the present disclosure, an annular groove 413 may be further provided on the first blocking portion 41, and the annular groove 413 is provided on a surface of the first blocking portion 41 close to the base body 2 and located below the annular convex edge 412, a distance between an annular vertical surface of the annular groove 413 away from the center of the base body 2 and an outer circumferential surface of the wafer 8 borne on the base body 2 is larger than a distance between an annular vertical surface of the annular convex edge 412 facing the center of the base body and the outer circumferential surface of the wafer 8 borne on the base body 2.

[0045] A reason for such design is as follows: the atoms of the target may also be deposited on the surface of the first blocking portion 41 close to the base body 2 to form a thin film during the semiconductor process; when the thin film of the deposited atoms of the target on the surface of the first blocking portion 41 close to the base body 2 becomes thicker and thicker and crystal grains grow larger and larger, sharp burrs can be easily generated; and after the sharp burrs are generated, ignition between the sharp burrs and the wafer 8 are very likely to occur, resulting in the poor semiconductor process result. By providing the annular groove 413 on the surface of the first blocking portion 41 close to the base body 2, locating the annular groove 413 below the annular convex edge 412, and setting the distance between the annular vertical surface of the annular groove 413 away from the center of the base body 2 and the outer circumferential surface of the wafer 8 borne on the base body 2 to be larger than the distance between the annular vertical surface of the annular convex edge 412 facing the center of the base body and the outer circumferential surface of the wafer 8 borne on the base body 2, a distance between the surface of the first blocking portion 41 close to the base body 2 and the outer circumferential surface of the wafer 8 borne on the base body 2 can be increased, thereby avoiding the ignition and improving the semiconductor process result.

[0046] As shown in FIG. 2, optionally, a lower surface of the annular convex edge 412 may be higher than the upper surface of the wafer 8 borne on the base body 2.

[0047] A reason for such design is as follows: the atoms of the target may also be deposited on the annular vertical surface of the annular convex edge 412 facing the center of the base body 2 during the semiconductor process; and by setting the lower surface of the annular convex edge 412 to be higher than the upper surface of the wafer 8 borne on the base body 2, the annular vertical surface of the annular convex edge 412 facing the center of the base body 2 can be higher than the upper surface of the wafer 8 borne on the base body 2, so that a thin film deposited on the annular vertical surface of the annular convex edge 412 facing the center of the base body 2 can be prevented from becoming thicker and thicker and crystal grains can be prevented from growing larger and larger, thereby avoiding generation of sharp burrs and thus avoiding ignition occurring between the sharp burrs and the wafer 8, and therefore, the poor semiconductor process result caused by the ignition can be avoided, and the semiconductor process result can be improved.

[0048] In a preferred embodiment of the present disclosure, surfaces of the first blocking piece 3 and the second blocking piece 4 which face the top of the chamber body 71 may be roughened.

[0049] By roughening the surfaces of the first blocking piece 3 and the second blocking piece 4 facing the top of the chamber body 71, roughness and adhesion of the surfaces of the first blocking piece 3 and the second blocking piece 4 facing the top of the chamber body 71 can be enhanced, and the atoms of the target deposited on the surfaces of the first blocking piece 3 and the second blocking piece 4 facing the top of the chamber body 71 can be prevented from falling off, so that the atoms of the target deposited on the surfaces of the first blocking piece 3 and the second blocking piece 4 facing the top of the chamber body 71 can be prevented from falling on the wafer 8 to affect the semiconductor process result, cycles of cleaning and maintenance of the first blocking piece 3 and the second blocking piece 4 can be prolonged, and the semiconductor process result can be improved.

[0050] Optionally, a roughening method may include sand blasting or aluminum spraying.

[0051] Optionally, the surfaces of the first blocking piece 3 and the second blocking piece 4 facing the top of the chamber body 71 may include a surface of the annular groove 413.

[0052] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the semiconductor chamber may further include the cooling part 73, which may be disposed at the bottom of the base body 2 for cooling the base body 2.

[0053] As shown in FIG. 2, in a preferred embodiment of the present disclosure, water cooling passages 74 may be provided in the cooling part 73 for allowing cooling water to flow through to cool the base body 2.

[0054] As shown in FIG. 2, in a preferred embodiment of the present disclosure, a thermocouple 75 may be provided in the cooling part 73 for detecting a temperature of the base body 2.

[0055] As shown in FIG. 2, in a preferred embodiment of the present disclosure, corrugated tubes 6 may be provided at the bottom of the cooling part 73.

[0056] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the semiconductor chamber may further include the target component 72 disposed at the top of the chamber body 71. The base assembly is disposed in the chamber body 71 for forming the closed process environment together with the target component 72.

[0057] As shown in FIG. 2, in a preferred embodiment of the present disclosure, the process chamber may further include an annular adapter part 77 disposed at the top of the chamber body 71. The target component 72 is disposed on the top of the adapter part 77, and the first blocking piece 3 is disposed on the adapter part 77. That is, the target component 72 is disposed at the top of the chamber body 71 through the adapter part 77, and the first blocking piece 3 is disposed in the chamber body 71 through the adapter part 77.

[0058] In summary, the semiconductor chamber provided in the embodiments of the present disclosure can prevent the wafer 8 from being covered, and improve the uniformity of the thin film deposited on the wafer 8, thereby improving the chip performance.

[0059] It should be understood that the above embodiments are merely exemplary embodiments adopted to illustrate the principle of the present disclosure, and the present disclosure is not limited thereto. Various modifications and improvements can be made by those of ordinary skill in the art without departing from the spirit and essence of the present disclosure, and those modifications and improvements are also considered to fall within the scope of the present disclosure.

What is claimed is:

1. A semiconductor chamber, comprising a chamber body, and a first blocking piece and a liftable base assembly which are disposed in the chamber body, wherein

5 the first blocking piece is fixedly connected to an inner wall of the chamber body, and is disposed around the inner wall of the chamber body along a circumferential direction of the inner wall of the chamber body;

the base assembly comprises a base body, a second blocking piece, and a positioning structure, and the base body is configured to bear a wafer; the second
10 blocking piece is disposed on and around the base body along a circumferential direction of the base body, and when the base body is raised to a process position, the second blocking piece partially overlaps the first blocking piece, and a portion of the second blocking piece which overlaps the first blocking piece is on a side of the first blocking piece away from the base body; and

15 the positioning structure is disposed between the base body and the second blocking piece, and is configured to determine relative positions of the base body and the second blocking piece.

2. The semiconductor chamber of claim 1, wherein the positioning structure
20 comprises a plurality of first positioning grooves, a plurality of second positioning grooves, and a plurality of positioning members, the plurality of first positioning grooves are provided on a surface of the base body facing the second blocking piece, the plurality of second positioning grooves are provided on a surface of the second blocking piece facing the base body, the positioning members, the first positioning
25 grooves, and the second positioning grooves are the same in number and are arranged in one-to-one correspondence, and each positioning member is respectively inserted into a corresponding first positioning groove and a corresponding second positioning groove.

3. The semiconductor chamber of claim 1, wherein the second blocking piece
30 comprises a first blocking portion and a second blocking portion, the first blocking portion is annular and is disposed on and around the base body along the circumferential direction of the base body, and the positioning structure is disposed

between the base body and the first blocking portion; and the second blocking portion is annular and is located below the first blocking portion, the second blocking portion overlaps the first blocking piece, and a portion of the second blocking portion which overlaps the first blocking piece is on the side of the first blocking piece away from the base body.

4. The semiconductor chamber of claim 3, wherein a first connecting part is provided on the base body, and is disposed around a peripheral side of the base body along the circumferential direction of the base body; and the second blocking piece further comprises a connecting section connected between the first blocking portion and the second blocking portion, the connecting section is disposed around a peripheral side of the first connecting part and opposite to the first connecting part, and the base assembly further comprises a detachable connector configured to detachably connect the first connecting part to the connecting section.

5. The semiconductor chamber of claim 4, wherein the second blocking portion comprises an annular horizontal blocking section and a cylindrical vertical blocking section connected to each other, the horizontal blocking section is disposed around the connecting section, and the vertical blocking section is disposed around the first blocking piece with a gap provided between the vertical blocking section and the first blocking piece.

6. The semiconductor chamber of claim 4, wherein the first connecting part is provided with a threaded through hole, the connecting section is provided with a threaded counterbore hole corresponding to the threaded through hole, and the connector comprises a screw for thread fitting with the threaded counterbore hole and the threaded through hole.

7. The semiconductor chamber of claim 3, wherein an annular convex edge facing a center of the base body is provided on the first blocking portion, an upper surface of the annular convex edge is higher than an upper surface of the wafer borne on the base body, and an inner diameter of the annular convex edge is larger than a diameter of the wafer borne on the base body.

8. The semiconductor chamber of claim 7, wherein an annular groove is further provided on the first blocking portion, the annular groove is provided on a surface of the first blocking portion close to the base body and located below the annular convex edge, a distance between an annular vertical surface of the annular groove away from the center of the base body and an outer circumferential surface of the wafer borne on the base body is larger than a distance between an annular vertical surface of the annular convex edge facing the center of the base body and the outer circumferential surface of the wafer borne on the base body.

9. The semiconductor chamber of claim 1, wherein surfaces of the first blocking piece and the second blocking piece which face a top of the chamber body are roughened.

10. The semiconductor chamber of any one of claims 1 to 9, further comprising a target component disposed at a top of the chamber body, wherein the base assembly is disposed in the chamber body for forming a closed process environment together with the target component.