

WAFER POLISHING SYSTEM AND WAFER PROCESSING METHOD

Technical Field

5 **[0001]** The present invention belongs to the technical field of fabrication of semiconductor integrated circuit chips, and particularly relates to wafer polishing system and a wafer processing method.

Related Art

10 **[0002]** A chemical mechanical planarization (CMP) device typically includes a semiconductor equipment front end module (EFEM), a cleaning unit and a polishing unit. The EFEM mainly includes a cassette for storing wafers, a robotic arm for transferring wafers and an air purification system. The cleaning unit mainly comprises a varied number of megasonic cleaning components, roller brush cleaning components, drying components, and devices for transferring wafers between the components. The polishing unit typically includes a workbench, a polishing disk, a polishing
15 head, a polishing arm, a trimming device and a polishing liquid arm, and each component is arranged on the workbench according to its process position.

20 **[0003]** Since the CMP device is divided into different functional units, the transfer of wafers between different functional units has a significant influence on the production efficiency of the device and the quality of wafers. At present, a wafer is transferred between the polishing unit and the cleaning unit by means of a polishing transfer platform and a double-claw robotic arm, and the double-claw grips a polished wafer and a non-polished wafer by means of different claws and places the non-polished wafer on the transfer platform or takes the polished wafer from the transfer platform to realize wafer feeding and discharging of the polishing unit. In other words, the polished wafer is transferred from a polishing region to a cleaning region as follows: the polished wafer is
25 placed onto the transfer platform by means of a transfer arm or a polishing head, a wet robotic arm takes the wafer from the transfer platform and places the wafer onto a base of a temporary storage

unit of the cleaning unit, and then the wafer is taken by a robotic arm in the cleaning region for next operation. That is to say, the transfer platform, the wet robotic arm and the base have to work together to transfer the wafer between the polishing region and the cleaning region, leading to a relatively complex structure, low transfer efficiency, a high possibility of introducing impurities in the transfer process and a greater possibility of separating impurities from the wafer due to the transfer time and space.

SUMMARY OF INVENTION

[0004] To overcome the defects in the prior art, the present invention provides a wafer polishing system, which realizes efficient transfer of wafers between a polishing region and a cleaning region by means of a wafer transfer mechanism capable of moving to a docking station and partially located in a wafer cleaning unit and has a simpler structure, as well as a wafer processing method using the wafer polishing system.

[0005] The technical solution adopted by the present invention to solve the aforesaid technical problems is as follows: a wafer polishing system includes:

a wafer polishing unit;

at least one wafer cleaning unit, arranged adjacent to the wafer polishing unit; and

a wafer transfer passage;

the wafer polishing system further includes a wafer transfer mechanism, and at least part of the wafer transfer mechanism is located in the wafer cleaning unit;

a docking station is formed on the wafer transfer passage, and at least part of the wafer transfer mechanism is able to move to the docking station to transfer a wafer between the wafer polishing unit and the wafer cleaning unit.

[0006] Further, the wafer transfer mechanism is used for adjusting a posture of the wafer.

[0007] Further, an intersection area is formed between the wafer transfer passage and an extension line of a position where the wafer cleaning unit closest to the wafer polishing unit is

located, and the docking station is located in the intersection area.

[0008] Further, the wafer transfer mechanism adjusts the posture of the wafer by:

flipping the wafer into a vertical or approximately vertical state;

and/or, flipping the wafer into a horizontal or approximately horizontal state;

5 and/or, driving the wafer to move horizontally;

and/or, driving the wafer to move vertically;

and/or, driving the wafer to swing along an arc.

[0009] Further, the wafer transfer passage is located in the wafer polishing unit or on a side of the wafer polishing unit, and the docking station is arranged in the wafer transfer passage.

10 **[0010]** Further, the wafer polishing system further includes:

a clamping device, used for clamping the wafer; and

a designated docking position, located in the wafer cleaning unit;

the clamping device and the wafer transfer mechanism are able to move to the docking station to implement wafer transfer between the clamping device and the wafer transfer mechanism;

15

the wafer transfer mechanism, after taking the wafer, moves to the designated docking position.

[0011] Further, the wafer polishing system further includes:

a wafer transfer unit, wherein the wafer transfer unit at least includes a transfer platform,

20 the transfer platform is able to move to the docking position to implement wafer transfer between the clamping device and the transfer platform.

[0012] Further, the wafer polishing system further includes a first transfer rail, and the clamping device moves back and forth along the first transfer rail; the wafer transfer unit further includes a second transfer rail, and the transfer platform moves back and forth along the second transfer rail;

25 the transfer platform is docked with the clamping device.

[0013] Further, the wafer polishing system further includes a first guide rail, and the wafer

transfer mechanism moves along the first guide rail; the wafer transfer mechanism, the clamping device and the wafer transfer unit are able to move until projections of two or three of the wafer transfer mechanism, the clamping device and the wafer transfer unit overlap at least partially.

[0014] Further, projections of the first transfer rail, the second transfer rail and the first guide rail overlap at least partially; or, the projections of the first transfer rail, the second transfer rail and the wafer transfer mechanism overlap at least partially.

[0015] Further, at least part of the second transfer rail is arranged above the wafer transfer passage; the second transfer rail, the wafer transfer passage and the first transfer rail extend in a same direction; an angle is formed between an extension direction of the second transfer rail and an extension direction of the first guide rail in a horizontal plane.

[0016] Further, the second transfer rail is perpendicular to the first guide rail.

[0017] Further, the wafer transfer mechanism includes a swing arm, a flipping arm connected to the swing arm and a claw portion for clamping the wafer, the flipping arm is able to rotate around an axis of itself to drive the claw portion to switch the wafer between a horizontal or approximately horizontal state and a vertical or approximately vertical state, and the swing arm is used for driving the flipping arm and the claw portion to swing.

[0018] Further, the swing arm is provided with a swing shaft, which extends in a direction parallel to the wafer transfer passage, and the swing arm drives the flipping arm and the claw portion to swing around the swing shaft.

[0019] Further, the swing arm and the flipping arm are arranged coaxially and connected telescopically.

[0020] Further, the wafer transfer mechanism at least includes a spindle and a claw assembly, and the spindle drives the claw assembly to switch the wafer between a horizontal or approximately horizontal state and a vertical or approximately vertical state.

[0021] Further, a contact point between the claw assembly and the wafer is misaligned with a contact point for the clamping device to grip the wafer.

[0022] Further, the claw assembly at least includes a rotatable claw, the rotatable claw includes a shaft parallel to the wafer and a claw body rotatably connected to the shaft, and a side surface of the claw body abut against a side wall of the wafer.

[0023] Further, the claw assembly further includes a stationary claw, and an inner wall of the stationary claw is arc-shaped to fit the side wall of the wafer.

[0024] Further, when the wafer is flipped into the vertical or approximately vertical state, the rotatable claw is located at a top of the wafer.

[0025] Further, the wafer polishing system further includes a second guide rail, an angle is formed between the second guide rail and a first guide rail in a vertical plane, the wafer transfer mechanism moves along the second guide rail, and the second guide rail moves along the first guide rail.

[0026] Further, the clamping device, the wafer transfer mechanism and the transfer platform are allowed to be located on the docking station at the same time.

[0027] Further, two or more clamping devices are configured, at least one clamping device is simultaneously docked with a transfer platform and the wafer transfer mechanism, or, at least one clamping device is simultaneously docked with two wafer transfer mechanisms.

[0028] Further, the wafer transfer mechanism is used for adjusting the wafer from a horizontal or approximately horizontal state to a vertical or approximately vertical state.

[0029] The present invention further discloses a wafer processing method for a wafer polishing system, including:

a step of transferring a wafer to be polished to a wafer polishing unit;

a step of transferring the wafer to a docking station after the wafer is polished, and docking the wafer polishing unit with a wafer transfer mechanism on the docking station to implement wafer transfer between the wafer polishing unit and the wafer transfer mechanism; and

a step of flipping the wafer into a vertical or approximately vertical state after the wafer transfer mechanism takes the wafer, and moving the wafer to a wafer cleaning unit.

[0030] Further, the wafer processing method for a wafer polishing system includes:

a step of clamping the wafer to be polished by a clamping device and then transferring the wafer to the wafer polishing unit;

5 a step of clamping the wafer to the docking station by the clamping device after the wafer is polished, and docking the clamping device with the wafer transfer mechanism on the docking station to implement wafer transfer between the clamping device and the wafer transfer mechanism; and

10 a step of flipping the wafer into the vertical or approximately vertical state after the wafer transfer mechanism takes the wafer, and moving the wafer to a designated docking position in the wafer cleaning unit.

[0031] Further, in the step of flipping the wafer into the vertical or approximately vertical state after the wafer transfer mechanism takes the wafer, and moving the wafer to a designated docking position in the wafer cleaning unit, the wafer transfer mechanism, after taking the wafer, flips the wafer and then moves to the designated docking position; or, the wafer transfer mechanism moves
15 to the designated docking position and then flips the wafer; or, the wafer transfer mechanism moves to the designated docking position and flips the wafer synchronously.

[0032] Further, in the step of clamping the wafer to be polished by a clamping device and then transferring the wafer to the wafer polishing unit, a transfer platform of a wafer transfer unit moves to the docking station, and the clamping device clamps the wafer from the transfer platform.

20 **[0033]** Further, in the step of clamping the wafer to be polished by a clamping device and then transferring the wafer to the wafer polishing unit,

the clamping device transfers the wafer to be polished from a transfer platform to a wafer holder;

the wafer on the wafer holder is transferred into a polishing region by a polishing head;

25 after the wafer is polished, the polishing head transfers the polished wafer to the wafer holder;

the clamping device clamps the wafer from the wafer holder and transfers the wafer out of the wafer polishing unit.

[0034] Further, after the wafer is polished, the clamping device clamps the wafer to the docking station and is docked with the wafer transfer mechanism located on the docking station to implement wafer transfer between the clamping device and the wafer transfer mechanism, a transfer platform of a wafer transfer unit returns for avoidance, and the wafer transfer mechanism moves to the designated docking position by means of a first guide rail and/or a second guide rail.

[0035] Further, in the step of moving the wafer to a designated docking position, the wafer moves to the designated docking position by movement in a horizontal direction and ascending or descending in a vertical direction by means of a first guide rail and a second guide rail; or, the wafer swings to the designated docking position along an arc; or, the wafer horizontally moves to the designated docking position along the first guide rail.

[0036] Further, the designated docking position is located in the wafer cleaning unit.

[0037] Further, the wafer processing method for a wafer polishing system further includes a step of moving at least part of the wafer cleaning unit to the designated docking position to transfer the wafer in the vertical or approximately vertical state.

[0038] The present invention has the following beneficial effects: 1) part of the wafer transfer mechanism is located in the wafer cleaning unit and is able to move to the docking station, such that direct interaction between the wafer polishing unit and the wafer cleaning unit is realized, intermediate interaction links are omitted, the interaction structure is simplified, the wafer transfer path is shortened, the number of devices used for wafer transfer is reduced, and damage to the wafer is minimized; 2) the docking station is located at the intersection point between the wafer transfer passage and the extension line of the wafer cleaning unit closest to the wafer polishing unit, such that the path for transferring the wafer between the wafer cleaning unit and the wafer polishing unit by the wafer transfer mechanism is the shortest, the wafer transfer efficiency is high, and the negative influence of the environment on the wafer is minimized; 3) the wafer transfer

mechanism integrates posture adjustment and transfer of the wafer, such that the functions are enriched, and the structure is simple; 4) the structure based on a transfer platform, a wet robotic arm and a base in the prior art is simplified, wafer transfer is realized by docking of the wafer transfer mechanism on the docking station, the structure is simplified, the efficiency of transferring the polished wafer out of the wafer polishing system is improved, the risk of introducing impurities is reduced, and the possibility of separating impurities out of the wafer due to the transfer time and space is lowered; 5) the wafer transfer mechanism moves in the horizontal direction and the vertical direction to transfer the wafer from the clamping device to the designed docking position and is able to flip the wafer from a horizontal state into a vertical state, such that the number of times of wafer transfer is reduced, and the wafer is transferred more quickly and conveniently; 6) the wafer transfer mechanism is able to flip the wafer in different directions to satisfy different direction requirements when the wafer enters the cleaning unit; 7) the level of structural integration is high, the number of positions to be debugged is reduced, and the debugging workload is reduced; 8) the claw assembly includes the stationary claw and the rotatable claw, and after the rotatable claw releases the wafer, the wafer moves freely in the plane where the claw assembly is located, such that the wafer may be transferred more conveniently; 9) in the process of transferring the wafer out of the wafer polishing unit by the clamping device, the transfer platform of the wafer transfer unit may return to prepare in advance a non-polished wafer that will enter the wafer polishing unit, such that the efficiency of transferring the non-polished wafer into the wafer polishing unit of the wafer polishing system is improved.

BRIEF DESCRIPTION OF DRAWINGS

[0039] FIG. 1 is a schematic diagram according to the present invention.

[0040] FIG. 2 is a schematic stereogram of a wafer polishing system according to Embodiment 1 of the present invention, in a case where a clamping device and a wafer transfer mechanism are located on a docking station.

[0041] FIG. 3 is a schematic stereogram of the wafer transfer mechanism according to Embodiment 1 of the present invention, in a case where a wafer is in a horizontal state.

[0042] FIG. 4 is a schematic stereogram of the wafer transfer mechanism according to Embodiment 1 of the present invention, in a case where the wafer is in a vertical state.

5 **[0043]** FIG. 5 is a schematic stereogram of a claw assembly according to Embodiment 1 of the present invention.

[0044] FIG. 6 is a schematic perspective view of the claw assembly gripping the wafer according to Embodiment 1 of the present invention.

[0045] FIG. 7 is a first schematic perspective view of the claw assembly gripping the wafer
10 according to Embodiment 1 of the present invention, in a case where a rotatable claw releases the wafer.

[0046] FIG. 8 is a schematic perspective view in a case where the wafer is separated from the claw assembly according to Embodiment 1 of the present invention.

[0047] FIG. 9 is a second schematic diagram of the claw assembly gripping the wafer according
15 to Embodiment 1 of the present invention, in a case where the rotatable claw releases the wafer.

[0048] FIG. 10 is a first schematic cooperation diagram of the wafer transfer mechanism with a first guide rail and a second guide rail according to Embodiment 1 of the present invention.

[0049] FIG. 11 is a second schematic cooperation diagram of the wafer transfer mechanism with the first guide rail and the second guide rail according to Embodiment 1 of the present invention.

20 **[0050]** FIG. 12 is a schematic structural diagram of an area where a designated docking position is located according to Embodiment 1 of the present invention.

[0051] FIG. 13 is a first schematic diagram of a swing type wafer transfer mechanism according to Embodiment 1 of the present invention.

[0052] FIG. 14 is a second schematic diagram of the swing type wafer transfer mechanism
25 according to Embodiment 1 of the present invention.

[0053] FIG. 15 is a schematic diagram in a case where the swing type wafer transfer mechanism

switches the wafer from the horizontal state to the vertical state according to Embodiment 1 of the present invention.

[0054] FIG. 16 is a schematic diagram of swinging of the swing type wafer transfer mechanism according to Embodiment 1 of the present invention, in a case where the wafer is flipped
5 synchronously.

[0055] FIG. 17 is a schematic diagram of swinging of the swing type wafer transfer mechanism according to Embodiment 1 of the present invention.

[0056] FIG. 18 is a schematic stereogram of a wafer polishing system according to Embodiment 2 of the present invention, in a case where a clamping device and a transfer platform are located
10 on a docking station.

[0057] FIG. 19 is a schematic stereogram of the wafer polishing system according to Embodiment 2 of the present invention, in a case where the clamping device and a wafer transfer mechanism are located on the docking station.

[0058] FIG. 20 is a schematic top view of the wafer polishing system according to Embodiment 2 of the present invention, in a case where the clamping device and the transfer platform are located
15 on the docking station.

[0059] FIG. 21 is a schematic top view of the wafer polishing system according to Embodiment 2 of the present invention, in a case where the clamping device, the wafer transfer mechanism and the transfer platform are all located on the docking station.

[0060] FIG. 22 is a schematic side view of the wafer polishing system according to Embodiment 2 of the present invention, in a case where the clamping device, the wafer transfer mechanism and the transfer platform are all located on the docking station.

[0061] FIG. 23 is a schematic top view of the wafer polishing system according to Embodiment 2 of the present invention, in a case where the clamping device, the wafer transfer mechanism and
25 the transfer platform are all located on the docking station.

[0062] FIG. 24 is a first schematic diagram in a case where the wafer transfer mechanism drives

a wafer to move to a designated docking position according to Embodiment 2 of the present invention.

[0063] FIG. 25 is a second schematic diagram in a case where the wafer transfer mechanism drives the wafer to move to the designated docking position according to Embodiment 2 of the present invention.

[0064] FIG. 26 is a third schematic diagram in a case where the wafer transfer mechanism drives the wafer to move to the designated docking position according to Embodiment 2 of the present invention.

[0065] FIG. 27 is a schematic partial view of the wafer transfer mechanism provided with a swing shaft according to Embodiment 2 of the present invention.

[0066] FIG. 28 is a schematic stereogram of a wafer polishing system according to Embodiment 3 of the present invention.

[0067] FIG. 29 is a schematic top view of the wafer polishing system according to Embodiment 3 of the present invention.

[0068] FIG. 30 is a schematic partial stereogram of the wafer polishing system according to Embodiment 3 of the present invention, in a case where a wafer transfer mechanism moves a wafer to a designated docking position.

[0069] FIG. 31 is a partial side view in the state of FIG. 30.

[0070] FIG. 32 is a schematic stereogram of the wafer polishing system according to Embodiment 3 of the present invention, in a case where one clamping device is docked with a transfer platform and one clamping device is docked with the wafer transfer mechanism.

[0071] Wherein: 1, wafer polishing unit; 11, first transfer rail; 12, wafer transfer passage; 2, wafer cleaning unit; 21, cleaning unit robotic arm; 3, clamping device; 4, wafer; 5, wafer transfer mechanism; 51, first guide rail; 52, second guide rail; 53, spindle; 54, claw assembly; 541, rotatable claw; 542, shaft; 543, claw body; 544, stationary claw; 55, swing arm; 551, swing shaft; 552, power source; 56, flipping arm; 57, claw portion; 61, docking station; 62, designated docking

position; 7, wafer transfer unit; 71, transfer platform; 72, second transfer rail.

DESCRIPTION OF EMBODIMENTS

[0072] To allow those skilled in the art to gain a better understanding of the technical solutions of the present invention, the technical solutions in the embodiments of the present invention will be clearly and completely described below in conjunction with accompanying drawings of these embodiments. Obviously, the embodiments described below are merely illustrative ones, and are not all possible ones of the present invention. All other embodiments obtained by those ordinarily skilled in the art based on the following ones without creative labor should also fall within the protection scope of the present invention.

[0073] As shown in FIG. 1, a wafer polishing system includes a wafer polishing unit 1, at least one wafer cleaning unit 2 arranged adjacent to the wafer polishing unit 1, a wafer transfer passage 12 and a wafer transfer mechanism 5. At least part of the wafer transfer mechanism 5 is located in the wafer cleaning unit 2, and the wafer transfer mechanism 5 is used for adjusting the posture of a wafer 4. The posture of the wafer 4 includes an inclination angle of the wafer 4 and a position where the wafer 4 is located. A docking station 61 is formed on the wafer transfer passage 12. At least part of the wafer transfer mechanism 5 is able to move to the docking station 61 to implement transfer of the wafer 4 between the wafer polishing unit 1 and the wafer cleaning unit 2, that is, the wafer 4 is transferred from the wafer polishing unit 1 to the wafer cleaning unit 2 by the wafer transfer mechanism 5 without any other transfer mechanisms, such that the transfer structure is simple, the transfer path of the wafer 4 is short, and damage to the wafer 4 in the transfer process is minimized.

[0074] Specifically, a plurality of wafer cleaning units 2 are configured, and an intersection point is formed between the wafer transfer passage 12 and an extension line of the position where the wafer cleaning unit 2 closest to the wafer polishing unit 1 is located. In other words, as shown in FIG. 1, the wafer transfer passage 12 is located on a line 01, the extension line of the position,

where the wafer cleaning unit 2 closest to the wafer polishing unit 1 is located, is 02, an intersection point is formed between 01 and 02, and the docking station 61 is located on the intersection point. Of course, 01 is not definitely a center line of the wafer transfer passage 12, and 02 is not definitely a center line of the wafer cleaning unit 2 closest to the wafer polishing unit 1, and 01 and 02 merely indicate approximate directions. That is to say, the intersection point is an intersection area rather than merely a point, and the docking station 61 is located in the intersection area.

[0075] More specifically, the wafer transfer mechanism 5 is used for adjusting the posture of the wafer 4. For example, the wafer transfer mechanism 5 flips the wafer 4, which is initially in a horizontal state or at any posture, into a vertical or approximately vertical state; or, the wafer transfer mechanism 5 flips the wafer 4, which is initially in a vertical state or at any posture, into a horizontal or approximately horizontal state; or, the wafer transfer mechanism 5 drives the wafer 4 to move horizontally; or, the wafer transfer mechanism 5 drives the wafer 4 to move vertically; or, the wafer transfer mechanism 5 drives the wafer 4 to swing along an arc; or, two, three or four of flipping the wafer, horizontally moving the wafer, vertically moving the wafer and swinging the wafer along an arc are performed synchronously. The present invention has no specific limitation in this aspect.

[0076] In this embodiment, the wafer transfer mechanism 5 at least includes a spindle 53 and a claw assembly 54, and the spindle 53 drives the claw assembly 54 to switch the wafer between the horizontal or approximately horizontal state and the vertical or approximately vertical state. In other words, the wafer transfer mechanism 5 is used for adjusting the wafer 4 from the horizontal or approximately horizontal state to the vertical or approximately vertical state.

[0077] As shown in FIGS. 3-9, the claw assembly 54 at least includes a rotatable claw 541, the rotatable claw 541 includes a shaft 542 parallel to the wafer 4 and a claw body 543 rotatably connected to the shaft 542, and a side surface of the claw body 543 abuts against a side wall of the wafer 4. As shown in FIGS. 7 and 8, the rotatable claw 541 may rotate in a vertical plane perpendicular to the wafer 4 to be located below the wafer 4, such that when the wafer 4 moves in

a direction indicated by the arrow, the wafer 4 will not be interfered or hindered by the rotatable claw 541, thus providing convenience for transfer of the wafer 4.

[0078] The claw assembly 54 further includes a stationary claw 544, and an inner wall of the stationary claw 544 may be arc-shaped to fit the side wall of the wafer 4. A central angle of the stationary claw 544 is greater than that of the claw body 543 of the rotatable claw 541, such that the contact area between the stationary claw 544 and the wafer 4 is enlarged. To ensure that the wafer 4 is firmly clamped, the center of the stationary claw 544 and the center of the claw body 543 are located at two radial ends of the wafer 4.

[0079] As shown in FIG. 9, to ensure that the wafer 4 in the vertical or approximately vertical state is firmly clamped by the claw assembly 54, the rotatable claw 541 is located at the top of the wafer 4 in this case, that is, the stationary claw 544 supports the wafer 4.

[0080] The wafer polishing system further includes a clamping device 3 for clamping the wafer 4 and a designated docking position 62 located in the wafer cleaning unit 2. The clamping device 3 and the wafer transfer mechanism 5 are able to move to the docking station 61 to implement wafer transfer between the clamping device 3 and the wafer transfer mechanism 5. FIG. 2 illustrates a state where wafer transfer is implemented between the clamping device 3 and the wafer transfer mechanism 5 on the docking station 61. After taking the wafer 4, the wafer transfer mechanism 5 moves to the designated docking position 62 in the wafer cleaning unit 2.

[0081] In the docking process, the clamping device 3 may descend to be docked with the wafer transfer mechanism 5; or, the wafer transfer mechanism 5 may ascend to be docked with the clamping device 3; or, the clamping device 3 and the wafer transfer mechanism 5 may move close to each other to be docked.

[0082] To realize ascending, descending and horizontal movement of the wafer transfer mechanism 5, as shown in FIGS. 10 and 11, the wafer polishing system further includes a first guide rail 51 and a second guide rail 52. An angle is formed between the first guide rail 51 and the second guide rail 52 in the vertical plane, and specifically, in this embodiment, the first guide rail

51 and the second guide rail 52 are perpendicular to each other. The wafer transfer mechanism 5 is able to move along the second guide rail 52, and the second guide rail 52 is able to move along the first guide rail 51, thus indirectly realizing movement of the wafer transfer mechanism 5 along the first guide rail 51.

5 **[0083]** The clamping device 3 is any structure that is able to ascend, descend, move horizontally and grip the wafer in the prior art and will not be detailed here.

[0084] As shown in FIG. 12, the designated docking position 62 is located in the wafer cleaning unit 2, and specifically, may be a wafer buffer box in the cleaning unit 2. At the designated docking position 62, a cleaning unit robotic arm 21 may clamp the wafer 4, which is in the vertical or
10 approximately vertical state, on the wafer transfer mechanism 5 for the next process, such as the cleaning process of the wafer.

[0085] The wafer transfer mechanism 5 may adopt a swing type structure. As shown in FIGS. 13 and 14-17, the wafer transfer mechanism 5 includes a swing arm 55, a flipping arm 56 connected to the swing arm 55, and a claw portion 57 used for clamping the wafer 4. The flipping
15 arm 56 is able to rotate around an axis of itself to drive the claw portion 57 to switch the wafer 4 between the horizontal or approximately horizontal state and the vertical or approximately vertical state, as shown in FIG. 15, and the swing arm 55 drives the flipping arm 56 and the claw portion 57 to swing synchronously.

[0086] Specifically, the swing arm 55 is provided with a swing shaft 551, which extends in a
20 direction parallel to the wafer transfer passage 12. The swing shaft 55 is driven by an external power supply 552 to drive the flipping arm 56 and the claw portion 57 to swing around the swing shaft 551. As shown in FIG. 17, the wafer 4 swings along an arc. As shown in FIG. 16, the wafer 4 is flipped while swinging along an arc.

[0087] Meanwhile, the swing arm 55 and the flipping arm 56 are arranged coaxially and
25 connected telescopically, that is, the total length of the swing arm 55 and the flipping arm 56 is adjustable.

[0088] A wafer processing method for a wafer polishing system is implemented by means of the wafer polishing system and includes the following steps:

a wafer to be polished is transferred to the wafer polishing unit 1;

after being polished, the wafer is transferred to the docking station 61 and docked with the wafer transfer mechanism 5 on the docking station 61, such that wafer transfer between the wafer polishing unit 1 and the wafer transfer mechanism 5 is implemented; and

the wafer transfer mechanism 5 takes the wafer 4, then flips the wafer 4 into a vertical or approximately vertical state and moves to the wafer cleaning unit 2.

[0089] More specifically, a wafer processing method for a wafer polishing system is implemented by means of the wafer polishing system and includes the following steps:

the clamping device 3 clamps a wafer 4 to be polished and then transfers the wafer 4 to the wafer polishing unit 1; specifically, the clamping device 3 clamps the wafer 4 to be polished and then transfers the wafer 4 in a horizontal state to the wafer polishing unit 1;

after being polished, the wafer 4 is clamped by the clamping device 3 to the docking station 61 and docked with the wafer transfer mechanism 5 on the docking station 61, such that wafer transfer between the clamping device 3 and the wafer transfer mechanism 5 is implemented; specifically, the clamping device 3 clamps the wafer 4 in the horizontal state to the docking station 61, and on the docking station 61, a contact point between the claw assembly 54 (including the rotatable claw 541 and the stationary claw 544) of the wafer transfer mechanism 5 and the wafer 4 is misaligned with a contact point for the clamping device 3 to grip the wafer 4, that is, interference between the claw assembly 54 and the clamping device 3 is avoided; of course, in the transfer process, the clamping device 3 releases the wafer 4 before the claw assembly 54 clamps the wafer 4, or the clamping device 3 releases the wafer 4 after the claw assembly 54 clamps the wafer 4, or the clamping device 3 releases the wafer 4 while the claw assembly 54 clamps the wafer 4, and the present invention has no specific limitation in this aspect;

after taking the wafer 4, the wafer transfer mechanism 5 flips the wafer 4 into a vertical

or approximately vertical state, as shown in FIG. 4, and then moves to the designated docking position; specifically, after the wafer transfer mechanism 5 takes the wafer 4, the clamping device 4 returns (moves away from the docking station 61), the wafer transfer mechanism 5 flips the wafer 4 into the vertical or approximately vertical state, at this moment, the rotatable claw 541 is located at the top of the wafer 4, the stationary claw 544 is located at the bottom of the wafer 4, and then the wafer transfer mechanism 5 moves to the designated docking position; or, after taking the wafer 4, the wafer transfer mechanism 5 moves away from the docking station 61 or directly moves to the designed docking position and then flips the wafer 4 into the vertical or approximately vertical state, and at this moment, the clamping device 3 may not return; or, the wafer transfer mechanism 5, after taking the wafer 4, flips the wafer 4 and moves synchronously; at least part of the wafer cleaning unit 2 is able to move to the designated docking position 62 to transfer the wafer 4 in the vertical or approximately vertical state. In this embodiment, the wafer may be transferred by means of the cleaning unit robotic arm 21, which belongs to the prior art and will not be repeated here. The next process performed by the wafer cleaning unit 2 also belongs to the prior art and will not be repeated here.

[0090] In the above process, the docking station 61 and the wafer transfer mechanism 5 for transferring the wafer between the docking station 61 and the wafer cleaning unit 2 are arranged to replace the transfer platform, the wet robotic arm and the base in the prior art, and the wafer transfer mechanism 5 may interact with a robotic arm in the cleaning region of the wafer cleaning unit 2 to allow the robotic arm in the cleaning region to take the wafer 4, and transfer of the wafer 4 is realized by docking of the wafer transfer mechanism 5 on the docking station 61, such that the structure is simplified, the efficiency of transferring polished wafers out of the wafer polishing system is improved, the risk of introducing impurities into the wafers is lowered, and the possibility that impurities are separated from the wafers due to the transfer time and space is lowered.

Embodiment 2

[0091] In Embodiment 1, the process of clamping the polished wafer 4 by the clamping device 3 is not specifically described.

[0092] As shown in FIG. 18, in this embodiment, the wafer polishing system further includes a wafer transfer unit 7, and the wafer transfer unit 7 at least includes a transfer platform 71, which is able to move to the docking station 61 and used for implementing wafer transfer between the clamping device 3 and the transfer platform 71.

[0093] In other words, the wafer 4 to be polished is placed on the transfer platform 71, and the clamping device 3 takes the wafer 4 from the transfer platform 71 and then transfers the wafer 4 to the wafer polishing unit 1.

[0094] To realize movement of the transfer platform 71, the wafer transfer unit 7 further includes a second transfer rail 72, and the transfer platform 71 moves back and forth along the second transfer rail 72. Meanwhile, the transfer platform 71 ascends and descends along the second transfer rail 72.

[0095] In Embodiment 1, the movement path of the clamping device 3 is not specifically described either, and the clamping device 3 may be any structure in the prior art. In this embodiment, as shown in FIG. 19, the wafer polishing system further includes a first transfer rail 11, and the clamping device 3 moves back and forth along the first transfer rail 11 and also ascends and descends along the first transfer rail 11.

[0096] The second transfer rail 72 is perpendicular to the first guide rail 51, and the first transfer rail 11 is also perpendicular to the first guide rail 51.

[0097] The first transfer rail 11 and the second transfer rail 72 extend in the same direction, and at least part of a projection of the first transfer rail 11 overlaps with a projection of the second transfer rail 72, such that the transfer platform 71 is docked with the clamping device 3. The projections may overlap in the vertical direction or in the horizontal direction, and as shown in FIG. 20, an area L is an overlap area of the projections of the first transfer rail 11 and the second transfer rail 72. Of course, the projections of the first transfer rail 11 and the second transfer rail

72 do not definitely overlap, and the clamping device 3 and the transfer platform 71 may move until projections of the clamping device 3 and the transfer platform 71 overlap to realize docking between the transfer platform 71 and the clamping device 3.

[0098] In other words, the clamping device 3, the wafer transfer mechanism 5 and the transfer platform 71 may be simultaneously located on the docking station 61, as shown in FIGS. 21-23. Of course, when the clamping device 3 and the transfer platform 71 are docked on the docking station 61 to transfer the wafer 4, the wafer transfer mechanism 5 may be not located on the docking station 61, as shown in FIG. 20.

[0099] To implement wafer transfer between the clamping device 3 and the wafer transfer mechanism 5 on the docking station 61 in Embodiment 1 and wafer transfer between the clamping device 3 and the transfer platform 71 in this embodiment, projections of the first transfer rail 11, the second transfer rail 72 and the first guide rail 51 overlap at least partially, as shown in FIGS. 22 and 23. Overlapping of the projections of the first transfer rail 11, the second transfer rail 72 and the first guide rail 51 does not refer to complete overlapping in the vertical direction as long as the clamping device 3, the wafer transfer mechanism 5 and the transfer platform 71 are able to move to the docking station 61 to transfer the wafer 4 upwards and downwards. So, projections of the first transfer rail 11, the second transfer rail 72 and the wafer transfer mechanism 5 may overlap at least partially, and in this case, the projections of the first guide rail 51, the first transfer rail 11 and the second transfer rail 72 may not overlap. Or, projections of at least two or three of the wafer transfer mechanism 5, the clamping device 3 and the wafer transfer unit 7 overlap at least partially to realize transfer of the wafer 4.

[0100] It may be seen, from the above description, that the docking station 61 is a concept of the stereoscopic space, which has a fixed projection in the vertical direction, is extendable upwards or downwards in the vertical direction, and is not limited to a specific point. In other words, the docking station 61 is stereoscopic in the Z-axis direction and the position of the docking station 61 in the X-axis direction and the position of the docking station 61 in the Y-axis direction are

relatively fixed.

[0101] The wafer transfer passage 12 is arranged in the wafer polishing unit 1 or on one side of the wafer polishing unit 1 and is a transfer passage for transferring the wafer 4, and the docking station 61 is arranged in the wafer transfer passage 12, as shown in FIG. 23.

5 **[0102]** At least part of the second transfer rail 72 is arranged above the wafer transfer passage 12 (not excluding the design that part of the second transfer rail 72 is located in the wafer transfer passage 12), the first transfer rail 11 may be also arranged above the wafer transfer passage 12, and the second transfer rail 72, the first transfer passage 11 and the wafer transfer passage 12 extend in the same direction. An angle is formed between the extension direction of the wafer
10 transfer passage 12 and the extension direction of the first guide rail 51 in the horizontal plane. In this embodiment, the angle between the extension direction of the wafer transfer passage 12 and the extension direction of the first guide rail 51 in the horizontal plane is specifically 90°.

[0103] Of course, as shown in FIGS. 26 and 27, in a case where the wafer transfer mechanism 5 adopts a swing type structure, the swing shaft 331 of the wafer transfer mechanism 5 may be
15 connected to (for example, but not limited to) a side wall of a tank of the wafer cleaning unit 2, the swing arm 55 swings around the swing shaft 551, and the wafer 4 may directly swing from A to C, that is, the wafer 4 swings to the designated docking position 62 along an arc. Of course, as shown in FIG. 27, the wafer 4 may directly swing from D to F or from D to E and then swing from E to F. The movement trajectory of the wafer 4 is not limited.

20 **[0104]** Of course, the swing type structure of the wafer transfer mechanism 5 may be combined with the structure in FIG. 10 and the structure in FIG. 11, that is, the swing motion is combined with the movement in the vertical direction and the movement in the horizontal direction, or the swing motion is combined with the movement in the horizontal direction.

[0105] A wafer processing method for a wafer polishing system is implemented by means of
25 the wafer polishing system and includes the following steps:

the transfer platform 71 of the wafer transfer unit 7 moves to the docking station 61

along the second transfer rail 72, and the clamping device 3 moves to the docking station 61 along the first transfer rail 11;

the clamping device 3 takes a wafer 4 to be polished from the transfer platform 71 of the wafer transfer unit 7 and transfers the wafer 4 in a horizontal state to a wafer holder of the
5 wafer polishing unit 1 (the wafer holder belongs to the prior art and will not be repeated here);

the wafer 4 on the wafer holder is transferred to a polishing region (the polishing region belongs to the prior art and will not be repeated here) by a polishing head (the polishing head belongs to the prior art and will not be repeated here);

after the wafer 4 is polished, the polishing head transfers the polished wafer 4 to the
10 wafer holder;

the clamping device 3 clamps the wafer 4 from the wafer holder and transfers the wafer 4 out of the wafer polishing unit 1; specifically, after the wafer 4 is polished, the clamping device 3 clamps the wafer 4 to the docking station 61 and is docked with the wafer transfer mechanism 5 on the docking station 61 to implement wafer transfer between the clamping device 3 and the
15 wafer transfer mechanism 5; specifically, the clamping device 3 clamps the wafer 4 in the horizontal state to the docking station 61, and a contact point between the claw assembly 54 (including the rotatable claw 541 and the stationary claw 544) of the wafer transfer mechanism 5 located on the docking station 61 is misaligned with a contact point for the clamping device 3 to grip the wafer 4, that is, interference between the claw assembly 54 and the clamping device 3 is
20 avoided;

at this moment, the transfer platform 71 of the wafer transfer unit 7 returns for avoidance, and the wafer transfer mechanism 5 moves to the designated docking position 62 by means of the first guide rail 51 and/or the second guide rail 52;

the wafer transfer mechanism 5 moves to the designated docking position 62 by means
25 of the first guide rail 51 and/or the second guide rail 52, that is, the wafer 4 moves to the designated docking position 62 by movement in the horizontal direction and ascending or descending in the

vertical direction by means of the first guide rail 51 and the second guide rail 52, as shown in FIG. 24, the wafer 4 descends from A to B and then moves horizontally from B to C, or the wafer 4 moves horizontally and then descends, and the sequential order of motions is not limited; or, the wafer 4 swings to the designated docking position 62 along an arc, as shown in FIG. 26, the wafer transfer mechanism 5 is provided with the swing arm 55, and the wafer 4 directly swings from A to C; or, as shown in FIG. 27, the wafer 4 directly swings from D to E and then swings to F; or, the wafer 4 horizontally moves to the designated docking position 62 along the first guide rail 51 and does not move in the vertical direction, as shown in FIG. 25.

[0106] The wafer transfer mechanism 5 takes the wafer 4, flips the wafer 4 into the vertical or approximately vertical state as shown in FIG. 4, and then moves to the designated docking position 62, which is arranged in the wafer cleaning unit 2. Of course, the sequence of swing and flipping may be changed. Specifically, after the wafer transfer mechanism 5 takes the wafer 4, the clamping device 3 returns (moves away from the docking station 61), the wafer transfer mechanism 5 flips the wafer 4 into the vertical or approximately vertical state, at this moment, the rotatable claw 541 is located at the top of the wafer 4, the stationary claw 544 is located at the bottom of the wafer 4, and then the wafer transfer mechanism 5 moves to the designated docking position; or, after taking the wafer 4, the wafer transfer mechanism 5 moves away from the docking station 61 or directly moves to the designated docking position and then flips the wafer 4 into the vertical or approximately vertical state, and at this moment, the clamping device 3 may not return; or, the wafer transfer mechanism 5, after taking the wafer 4, flips the wafer 1 and moves synchronously.

[0107] At least part of the wafer cleaning unit 2 is able to move the designated docking position 62 to transfer the wafer 4 in the vertical or approximately vertical state. In this embodiment, the wafer 2 may be transferred by means of a cleaning unit robotic arm 21, which belongs to the prior art and will not be repeated here. The next process performed by the wafer cleaning unit 2 also belongs to the prior art and will not be repeated here.

Embodiment 3

[0108] In Embodiment 1 and Embodiment 2, the wafer polishing unit 1 and the wafer cleaning unit 2 are arranged on a single side. As shown in FIGS. 28-31, the wafer polishing units 1 and the wafer cleaning units 2 may be arranged on two sides, that is, the polishing units 1 and the wafer cleaning units 2 are arranged on two sides of the wafer transfer passage 12. Two wafer transfer mechanisms 5 are configured and share one docking station 61. The two wafer transfer mechanisms 5 may be in different working states, as shown FIG. 31, the wafer transfer mechanism 5 on the left side flips a wafer 4 into a vertical state on the docking station 61, and the wafer transfer mechanism 5 on the right side drives a wafer 4 to move to the designated docking position 62.

[0109] In this case, two or more clamping devices 3 are configured. For example, the clamping devices 3 include a first clamping device 301 and a second clamping device 302.

[0110] A wafer processing method for a wafer polishing system is implemented by the wafer polishing system and includes the following steps:

the transfer platform 71 of the wafer transfer unit 7 moves to the docking station 61 along the second transfer rail 72, and the first clamping device 301 moves to the docking station 61 along the first transfer rail 11;

the first clamping device 301 takes a wafer 4 to be polished from the transfer platform 71 of the wafer transfer unit 7 and then transfers the wafer 4 in a horizontal state to a wafer holder of the wafer polishing unit 1; the next step is the same as that in Embodiment 2 and will not be repeated here; and

at the same time, the second clamping device 301 clamps a polished wafer 4 from the wafer holder, moves to the docking station 61 along the other first transfer rail 11 and is docked with the wafer transfer mechanism 5 located on the docking station 61 to implement wafer transfer between the clamping device 3 and the wafer transfer mechanism 5; other motions of the second clamping device 302 are the same as those in Embodiment 2 and will not be repeated here.

[0111] Of course, the first clamping device 301 and the second clamping device 302 may

process wafers independently and will not move to the docking station 61 at the same time. Or, the clamping devices 3 are respectively docked with two wafer transfer mechanisms 5. The present invention has no specific limitation in this aspect.

[0112] The above specific embodiments are used for explaining the present invention rather than limiting the present invention. Any modifications and transformations made to the present invention based on the spirit and protection scope of the claims should also fall within the protection scope of the present invention.

CLAIMS

1. A wafer polishing system, comprising:

a wafer polishing unit (1);

at least one wafer cleaning unit (2), arranged adjacent to the wafer polishing unit (1); and

5 a wafer transfer passage (12);

characterized in that, the wafer polishing system further comprises a wafer transfer mechanism (5), and at least part of the wafer transfer mechanism (5) is located in the wafer cleaning unit (2);

10 a docking station (61) is formed on the wafer transfer passage (12), and at least part of the wafer transfer mechanism (5) is able to move to the docking station (61) to transfer a wafer (4) between the wafer polishing unit (1) and the wafer cleaning unit (2).

2. The wafer polishing system according to claim 1, characterized in that the wafer transfer mechanism (5) is used for adjusting a posture of the wafer (4).

15 3. The wafer polishing system according to claim 1, characterized in that an intersection area is formed between the wafer transfer passage (12) and an extension line of a position where the wafer cleaning unit (2) closest to the wafer polishing unit (1) is located, and the docking station (61) is located in the intersection area.

4. The wafer polishing system according to claim 2, characterized in that the wafer transfer mechanism (5) adjusts the posture of the wafer (4) by:

20 flipping the wafer (4) into a vertical or approximately vertical state;

and/or, flipping the wafer (4) into a horizontal or approximately horizontal state;

and/or, driving the wafer (4) to move horizontally;

and/or, driving the wafer (4) to move vertically;

and/or, driving the wafer (4) to swing along an arc.

25 5. The wafer polishing system according to claim 1, characterized in that the wafer transfer passage (12) is located in the wafer polishing unit (1) or on a side of the wafer polishing unit (1),

and the docking station (61) is arranged in the wafer transfer passage (12).

6. The wafer polishing system according to claim 1, characterized by further comprising:

a clamping device (3), used for clamping the wafer (4); and

a designated docking position (62), located in the wafer cleaning unit (2);

5 wherein, the clamping device (3) and the wafer transfer mechanism (5) are able to move to the docking station (61) to implement wafer transfer between the clamping device (3) and the wafer transfer mechanism (5);

the wafer transfer mechanism (5), after taking the wafer (4), moves to the designated docking position (62).

10 7. The wafer polishing system according to claim 6, characterized by further comprising:

a wafer transfer unit (7), wherein the wafer transfer unit (7) at least comprises a transfer platform (71), the transfer platform (71) is able to move to the docking station (61) to implement wafer transfer between the clamping device (3) and the transfer platform (71).

8. The wafer polishing system according to claim 7, characterized by further comprising a
15 first transfer rail (11), wherein the clamping device (3) moves back and forth along the first transfer rail (11); the wafer transfer unit (7) further comprises a second transfer rail (72), and the transfer platform (71) moves back and forth along the second transfer rail (72); the transfer platform (71) is docked with the clamping device (3).

9. The wafer polishing system according to claim 8, characterized by further comprising a
20 first guide rail (51), wherein the wafer transfer mechanism (5) moves along the first guide rail (51); the wafer transfer mechanism (5), the clamping device (3) and the wafer transfer unit (7) are able to move until projections of two or three of the wafer transfer mechanism (5), the clamping device (3) and the wafer transfer unit (7) overlap at least partially.

10. The wafer polishing system according to claim 9, characterized in that projections of the
25 first transfer rail (11), the second transfer rail (72) and the first guide rail (51) overlap at least partially; or, the projections of the first transfer rail (11), the second transfer rail (72) and the wafer

transfer mechanism (5) overlap at least partially.

11. The wafer polishing system according to claim 9, characterized in that at least part of the second transfer rail (72) is arranged above the wafer transfer passage (12); the second transfer rail (72), the wafer transfer passage (12) and the first transfer rail (11) extend in a same direction; an angle is formed between an extension direction of the second transfer rail (72) and an extension direction of the first guide rail (51) in a horizontal plane.

12. The wafer polishing system according to claim 10, characterized in that the second transfer rail (72) is perpendicular to the first guide rail (51).

13. The wafer polishing system according to claim 1 or 5, characterized in that the wafer transfer mechanism (5) comprises a swing arm (55), a flipping arm (56) connected to the swing arm (55) and a claw portion (57) for clamping the wafer (4), the flipping arm (56) is able to rotate around an axis of itself to drive the claw portion (57) to switch the wafer (4) between a horizontal or approximately horizontal state and a vertical or approximately vertical state, and the swing arm (55) is used for driving the flipping arm (56) and the claw portion (57) to swing.

14. The wafer polishing system according to claim 13, characterized in that the swing arm (55) is provided with a swing shaft (551), which extends in a direction parallel to the wafer transfer passage (12), and the swing arm (55) drives the flipping arm (56) and the claw portion (57) to swing around the swing shaft (551).

15. The wafer polishing system according to claim 13, characterized in that the swing arm (55) and the flipping arm (56) are arranged coaxially and connected telescopically.

16. The wafer polishing system according to claim 1 or 5, characterized in that the wafer transfer mechanism (5) at least comprises a spindle (53) and a claw assembly (54), and the spindle (53) drives the claw assembly (54) to switch the wafer (4) between a horizontal or approximately horizontal state and a vertical or approximately vertical state.

17. The wafer polishing system according to claim 16, characterized in that a contact point between the claw assembly (54) and the wafer (4) is misaligned with a contact point for a clamping

device (3) to grip the wafer (4).

18. The wafer polishing system according to claim 16, characterized in that the claw assembly (54) at least comprises a rotatable claw (541), the rotatable claw (541) comprises a shaft (542) parallel to the wafer (4) and a claw body (543) rotatably connected to the shaft (542), and a side
5 surface of the claw body (543) abut against a side wall of the wafer (4).

19. The wafer polishing system according to claim 18, characterized in that the claw assembly (54) further comprises a stationary claw (544), and an inner wall of the stationary claw (544) is arc-shaped to fit the side wall of the wafer (4).

20. The wafer polishing system according to claim 18, characterized in that when the wafer
10 (4) is flipped into the vertical or approximately vertical state, the rotatable claw (541) is located at a top of the wafer (4).

21. The wafer polishing system according to claim 8, characterized by further comprising a second guide rail (52), wherein an angle is formed between the second guide rail (52) and a first guide rail (51) in a vertical plane, the wafer transfer mechanism (5) moves along the second guide
15 rail (52), and the second guide rail (52) moves along the first guide rail (51).

22. The wafer polishing system according to claim 7, characterized in that the clamping device (3), the wafer transfer mechanism (5) and the transfer platform (71) are allowed to be located on the docking station (61) at the same time.

23. The wafer polishing system according to claim 6, characterized in that two or more said
20 clamping devices (3) are configured, at least one said clamping device (3) is simultaneously docked with a transfer platform (71) and the wafer transfer mechanism (5), or, at least one said clamping device (3) is simultaneously docked with two said wafer transfer mechanisms (5).

24. The wafer polishing system according to claim 1, characterized in that the wafer transfer mechanism (5) is used for adjusting the wafer (4) from a horizontal or approximately horizontal
25 state to a vertical or approximately vertical state.

25. A wafer processing method for a wafer polishing system, characterized by comprising:

a step of transferring a wafer to be polished to a wafer polishing unit;

a step of transferring the wafer to a docking station after the wafer is polished, and docking the wafer polishing unit with a wafer transfer mechanism on the docking station to implement wafer transfer between the wafer polishing unit and the wafer transfer mechanism; and

5 a step of flipping the wafer into a vertical or approximately vertical state after the wafer transfer mechanism takes the wafer, and moving the wafer to a wafer cleaning unit.

26. The wafer processing method for a wafer polishing system according to claim 25, characterized by comprising:

10 a step of clamping the wafer to be polished by a clamping device and then transferring the wafer to the wafer polishing unit;

a step of clamping the wafer to the docking station by the clamping device after the wafer is polished, and docking the clamping device with the wafer transfer mechanism on the docking station to implement wafer transfer between the clamping device and the wafer transfer mechanism; and

15 a step of flipping the wafer into the vertical or approximately vertical state after the wafer transfer mechanism takes the wafer, and moving the wafer to a designated docking position in the wafer cleaning unit.

27. The wafer processing method for a wafer polishing system according to claim 26, characterized in that in the step of flipping the wafer into the vertical or approximately vertical state after the wafer transfer mechanism takes the wafer, and moving the wafer to a designated docking position in the wafer cleaning unit, the wafer transfer mechanism, after taking the wafer, flips the wafer and then moves to the designated docking position; or, the wafer transfer mechanism moves to the designated docking position and then flips the wafer; or, the wafer transfer mechanism moves to the designated docking position and flips the wafer synchronously.

25 28. The wafer processing method for a wafer polishing system according to claim 26, characterized in that in the step of clamping the wafer to be polished by a clamping device and

then transferring the wafer to the wafer polishing unit, a transfer platform of a wafer transfer unit moves to the docking station, and the clamping device clamps the wafer from the transfer platform.

29. The wafer processing method for a wafer polishing system according to claim 26, characterized in that in the step of clamping the wafer to be polished by a clamping device and

5 then transferring the wafer to the wafer polishing unit,

the clamping device transfers the wafer to be polished from a transfer platform to a wafer holder;

the wafer on the wafer holder is transferred into a polishing region by a polishing head;

after the wafer is polished, the polishing head transfers the polished wafer to the wafer holder;

10 the clamping device clamps the wafer from the wafer holder and transfers the wafer out of the wafer polishing unit.

30. The wafer processing method for a wafer polishing system according to claim 26, characterized in that after the wafer is polished, the clamping device clamps the wafer to the docking station and is docked with the wafer transfer mechanism located on the docking station
15 to implement wafer transfer between the clamping device and the wafer transfer mechanism, a transfer platform of a wafer transfer unit returns for avoidance, and the wafer transfer mechanism moves to the designated docking position by means of a first guide rail and/or a second guide rail.

31. The wafer processing method for a wafer polishing system according to claim 26, characterized in that in the step of moving the wafer to a designated docking position, the wafer
20 moves to the designated docking position by movement in a horizontal direction and ascending or descending in a vertical direction by means of a first guide rail and a second guide rail; or, the wafer swings to the designated docking position along an arc; or, the wafer horizontally moves to the designated docking position along the first guide rail.

32. The wafer processing method for a wafer polishing system according to claim 26,
25 characterized in that the designated docking position is located in the wafer cleaning unit.

33. The wafer processing method for a wafer polishing system according to claim 26,

characterized by further comprising a step of moving at least part of the wafer cleaning unit to the designated docking position to transfer the wafer in the vertical or approximately vertical state.