

WHAT IS CLAIMED IS:

1. A CMP wafer cleaning equipment, ~~characterized in that,~~ comprising:

a cleaning input unit,

a megasonic cleaning unit,

5 a number of scrubbing units, ~~and~~

a spin-drying unit arranged in sequence, ~~in addition,~~ it also includes and

a transfer robot located above the cleaning equipment,

wherein the transfer robot comprises a horizontal movement axis, a vertical movement axis and a number of wafer grabbing devices, ~~which can~~ configured to transport wafers between the units, one of the wafer grabbing devices near the side of the spin-drying unit ~~can~~ is configured to grab and flip the wafers with own wafer flipping function,

wherein the CMP wafer cleaning equipment further comprises a buffer unit, which is located in front of the cleaning input unit and is configured to temporarily store a number of wafers,

wherein a water injector is installed in the buffer unit to prevent the wafers from being dried without being cleaned.

2. The CMP wafer cleaning equipment of claim 1, ~~characterized in that,~~ further comprising a polishing wafer channel ~~is~~ located between the cleaning input unit and the megasonic cleaning unit, so that the wafer to be subjected to chemical-mechanical polishing ~~can~~ is arranged to pass through the cleaning equipment when it enters the a polishing area.

3. The CMP wafer cleaning equipment of claim 2, ~~characterized in that,~~ wherein the cleaning input unit comprises a wafer bracket; and

both the polished wafer channel and the wafer bracket ~~in the cleaning input unit can~~ are configured to be moved out simultaneously or separately to facilitate wafer loading.

4. ~~The CMP wafer cleaning equipment of claim 1, characterized in that,~~ it also includes a buffer unit, which is located in front of the cleaning input unit and can temporarily store a number of wafers.

5. The CMP wafer cleaning equipment of claim 4, characterized in that, a water injector is installed in the buffer unit to prevent the wafers from being dried without being cleaned.

64. The CMP wafer cleaning equipment of claim 1, characterized in that, suitable for flipping the wafers are in the vertical direction during cleaning and brushing, and flipping the wafers in the horizontal direction during spin-drying.

75. The CMP wafer cleaning equipment of claim 1, characterized in that, suitable for flipping the wafers are in the vertical direction during cleaning, brushing, and spin-drying.

86. The CMP wafer cleaning equipment of claim 1, characterized in that, wherein the transfer robot includes the a first wafer grabbing device and the a second wafer grabbing device.

97. The A CMP wafer cleaning equipment of claim 1, characterized in that, the CMP wafer cleaning equipment also comprising:

a cleaning input unit,

a megasonic cleaning unit,

a number of scrubbing units,

a spin-drying unit arranged in sequence,

a transfer robot located above the cleaning equipment, wherein the transfer robot comprises a horizontal movement axis, a vertical movement axis and a number of wafer grabbing devices configured to transport wafers between the units, one of the wafer grabbing devices is configured to grab and flip the wafers with own wafer flipping function includes, and

an independent flipping robot that is designed to eliminate the need for the one of the wafer grabbing devices close to the spin-drying unit to turn the wafers,

wherein the CMP wafer cleaning equipment further comprises a buffer unit, which is located in front of the cleaning input unit and is configured to temporarily store a number of wafers,

wherein a water injector is installed in the buffer unit to prevent the wafers from being dried without being cleaned.

10. A wafer transfer robot used to transfer the wafers in the cleaning module of the chemical

mechanical planarization equipment, to take out the wafers that have been cleaned in the cleaning unit in a vertical state, and to flip over and place them horizontally into the drying unit of the cleaning module, characterized in that, comprising:—

a horizontal transfer shaft only located on one side of the cleaning unit;

5 a horizontal transfer carriage that is arranged on the horizontal transfer shaft and can move laterally along the horizontal transfer shaft;—

the first vertical lifting shaft that is arranged on the lateral transfer pallet and can perform vertical movement on the lateral transfer carriage;

a rotating platform arranged on the first vertical lifting shaft;

10 the first jaw clamping arm which is connected to the rotating table and driven by the rotating platform to make rotational movement for wafer grabbing and placement.—

11. The wafer transfer robot of claim 10, characterized in that, the cleaning unit and drying unit is installed with switchable doors for automatic opening or closing when the wafer transfer robot grabs and places wafers.—

15 12. The wafer transfer robot of claim 10, characterized in that, the cleaning unit includes a pre-drying unit and other units of cleaning module, which are located on both sides of the pre-drying unit; the pre-drying unit works in vertical direction; the wafers in the pre-drying unit are transferred to the drying unit by the first jaw clamping arm; the other units of cleaning module may be one or more of the wafer transition unit, megasonic cleaning unit, and scrubbing unit.—

20 13. The wafer transfer robot of claim 12, characterized in that, the wafer transfer robot further includes: at least one second vertical lifting shaft, which is arranged on the lateral transfer carriage and can perform vertical movement on the lateral transfer carriage; the first vertical lifting shaft is located between the second vertical lifting shaft and the drying unit; each of the second vertical lifting shafts is also provided with a second claw clamping arm that can be used to transfer wafers
25 from the other units of cleaning module to the pre-drying unit in combination with the first claw clamping arm.—

14. A wafer flipping method by wafer transfer robot of claim 12 or 13, characterized in that, the method includes a wafer placement and robot returning;

the placement of wafer includes the following steps: after taking out the wafer from the pre-drying unit or cleaning unit, the first jaw clamping arm performs interactive or non-interactive actions in three movement directions: horizontal, vertical, and rotation, flips the wafer from the vertical state to the horizontal state, and places it in the drying unit;—

the robot returning includes the following steps: after placing the wafer in the drying unit, the first jaw clamping arm restores from horizontal state to vertical state through interactive or non-interactive actions in three movement directions: horizontal, vertical, and rotation, and returns to the original position.—

15. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the placement of wafer includes the following steps:—

after taking out the wafer from pre-drying unit, the first jaw clamping arm moves in the following three directions simultaneously: the horizontal transfer carriage drives the first jaw clamping arm to make transverse motion in the direction away from the drying unit; the rotating platform drives the first jaw clamping arm to rotate to the side close to the drying unit until the wafer reaches a horizontal state, and the first vertical lifting shaft drives the first jaw clamping arm to move vertically to a certain position ;—

then the horizontal transfer carriage drives the first jaw clamping arm to move laterally towards the drying unit until the wafer is positioned above drying unit; the first vertical lifting shaft drives the first jaw clamping arm to move vertically downwards until the wafer is positioned on the designated mechanism inside the drying unit; the first jaw clamping arm releases the wafer so that the wafer is positioned on the designated mechanism inside the drying unit.—

16. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the placement of wafer specifically includes the following steps: after the first jaw clamping arm takes out the wafer from the pre-drying unit, the horizontal transfer carriage drives the first jaw clamping

arm to make transverse motion away from the drying unit; the rotating platform drives the first jaw clamping arm to rotate to the side close to the drying unit until the wafer reaches a horizontal state, and the first vertical lifting shaft drives the first jaw clamping arm to move vertically to a certain position; then the horizontal transfer carriage drives the first jaw clamping arm to move laterally towards the drying unit until the wafer is positioned above drying unit; the first vertical lifting shaft drives the first jaw clamping arm to move vertically downwards until the wafer is positioned on the designated mechanism inside the drying unit; the first jaw clamping arm releases the wafer so that the wafer is positioned on the designated mechanism inside the drying unit.

17. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the placement of wafer specifically includes the following steps: after the first jaw clamping arm takes out the wafer from the pre-drying unit, the horizontal transfer carriage drives the first jaw clamping arm to make transverse motion away from the drying unit; the rotating platform drives the first jaw clamping arm to rotate to the side close to the drying unit until the wafer reaches a horizontal state, and then the horizontal transfer carriage drives the first jaw clamping arm to move laterally towards the drying unit until the wafer is positioned above drying unit; the first vertical lifting shaft drives the first jaw clamping arm to move vertically downwards until the wafer is positioned on the designated mechanism inside the drying unit; the first jaw clamping arm releases the wafer so that the wafer is positioned on the designated mechanism inside the drying unit.—

18. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the placement of wafer specifically includes the following steps: after the first jaw clamping arm takes out the wafer from the pre-drying unit, the rotating platform drives the first jaw clamping arm to rotate to the side close to the drying unit until the wafer reaches a horizontal state, and then the horizontal transfer carriage drives the first jaw clamping arm to move laterally towards the drying unit until the wafer is positioned above drying unit; the first vertical lifting shaft drives the first jaw clamping arm to move vertically downwards until the wafer is positioned on the designated mechanism inside the drying unit; the first jaw clamping arm releases the wafer so that the wafer

is positioned on the designated mechanism inside the drying unit.—

19. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the robot returning specifically includes the following steps: the first jaw clamping arm moves in the following three directions simultaneously when the wafer is positioned at drying unit: the horizontal transfer carriage drives the first jaw clamping arm to make transverse motion away from the drying unit; the rotating platform drives the first jaw clamping arm to rotate downward unit until the latter is in a vertical state, and the first vertical lifting shaft drives the first jaw clamping arm to move up vertically to a certain position.

20. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the robot returning specifically includes the following steps: when the wafer is positioned at drying unit, the first vertical lifting shaft drives the first jaw clamping arm to move up vertically to a certain position; the horizontal transfer carriage drives the first jaw clamping arm to make transverse motion to a certain position away from the drying unit; and then the rotating platform drives the first jaw clamping arm to rotate downward unit until the latter is in a vertical state.

21. The wafer flipping method by wafer transfer robot of claim 14, characterized in that, the robot returning specifically includes the following steps: when the wafer is positioned at drying unit, the horizontal transfer carriage drives the first jaw clamping arm to make transverse motion to a certain position away from the drying unit; the first vertical lifting shaft drives the first jaw clamping arm to move up vertically to a certain position; and then the rotating platform drives the first jaw clamping arm to rotate downward unit until the latter is in a vertical state.