

What is claimed is

1. A pre-alignment apparatus for a warped wafer, comprising: a bottom plate (10), a lifting shaft (20), a rotating shaft (30), a rotating disk (40), a compensating disk assembly (50), and an optomechanical assembly (60), wherein the lifting shaft (20), the compensating disk assembly (50) and the optomechanical assembly (60) are arranged on the bottom plate (10), the rotating shaft (30) is connected to the lifting shaft (20), the rotating disk (40) is connected to the rotating shaft (30);
- further comprising:
- an air nozzle assembly (70), configured to blow air to an edge of one side of a warped wafer (90), and apply pressure to the edge of the warped wafer (90), so as to planarize a region of the edge of the warped wafer (90); and
- a roller assembly (80), arranged corresponding to the air nozzle assembly (70) along a vertical direction, and configured to, in condition that the air nozzle assembly (70) blows the air to the warped wafer (90), support the edge of the warped wafer (90) on another side of the warped wafer (90),
- wherein the air nozzle assembly (70) and the roller assembly (80) are arranged on an optomechanical bracket (61) of the optomechanical assembly (60).
2. The pre-alignment apparatus for the warped wafer according to claim 1, wherein
- the air nozzle assembly (70) comprises an air nozzle supporting member (710) and an air nozzle; the air nozzle supporting member (71) is connected to the optomechanical bracket (61), and the air nozzle is mounted on the air nozzle supporting member (71); and
- the roller assembly (80) comprises a roller supporting member (81) and a supporting roller (82); the roller supporting member (81) is connected to the optomechanical bracket (61), the supporting roller (82) is mounted on the roller supporting member (81), and a spherical top surface of the supporting roller (82) is arranged opposite to an air outlet of the air nozzle.
3. The pre-alignment apparatus for the warped wafer according to claim 2, wherein the air nozzle assembly (70) comprises a plurality of air nozzles; the plurality of air nozzles are distributed in a circular arc shape on the air nozzle supporting member (71), and a distribution circle in which the plurality of air nozzles are located is concentric with the rotating disk (40).
4. The pre-alignment apparatus for the warped wafer according to claim 3, wherein distances from air outlet surfaces of the plurality of air nozzles to a rotating disk warped wafer rigid supporting surface (110) are different; in condition that one air nozzle is nearer to the optomechanical bracket

(61) than another air nozzle, a distance from an air outlet surface of the one air nozzle to the rotating disk warped wafer rigid supporting surface (110) is less than a distance from an air outlet surface of the another air nozzle to the rotating disk warped wafer rigid supporting surface (110).

5 5. The pre-alignment apparatus for the warped wafer according to claim 3 or 4, wherein the supporting roller (82) and one of the plurality of air nozzles closest to the optomechanical bracket (61) are coaxially arranged along the vertical direction; in condition that the one of the plurality of air nozzles blows the air to the warped wafer (90), the spherical top surface of the supporting roller (82) and the rotating disk warped wafer rigid supporting surface (110) are located on a same plane.

10 6. The pre-alignment apparatus for the warped wafer according to claim 5, wherein the roller assembly (80) further comprises a plurality of auxiliary rollers (83); the plurality of auxiliary rollers (83) are arranged corresponding to other air nozzle other than the one of the plurality of air nozzles closest to the optomechanical bracket (61), respectively; each of the other air nozzles and a corresponding auxiliary roller (83) are coaxially arranged along the vertical direction; and

15 a spherical top surface of a respective auxiliary rollers (83) is not coplanar with the spherical top surface of the supporting roller (82), and in condition that one auxiliary roller (83) is nearer to the supporting roller (82) than another auxiliary roller (83), a distance from a spherical top surface of the one auxiliary roller (83) to the rotating disk warped wafer rigid supporting surface (110) is greater than a distance from a spherical top surface of the another auxiliary roller (83) to the
20 rotating disk warped wafer rigid supporting surface (110).

7. The pre-alignment apparatus for the warped wafer according to any one of claims 2 to 4, wherein the roller supporting member (81) and the air nozzle supporting member (71) are both provided with a light passing hole.

25 8. The pre-alignment apparatus for the warped wafer according to any one of claims 1 to 3, wherein the roller assembly (80) further comprises a lifting driving member (84); the lifting driving member (84) is connected to the optomechanical bracket (61) and the roller supporting member (81) respectively.

30 9. The pre-alignment apparatus for the warped wafer according to any one of claims 1 to 4, further comprising a switching shaft (100), wherein the switching shaft (100) is arranged between the bottom plate (10) and the optomechanical assembly (60).

10. A pre-alignment method for a warped wafer, comprising:

receiving a warped wafer (90) by a rotating disk (40);

providing a positive pressure to an air nozzle assembly (70) and blowing air to an edge of one

side of the warped wafer (90) by the air nozzle assembly (70), so as to planarize a region of the edge of the warped wafer (90);

supporting the warped wafer (90) by a roller assembly (80) on another side of the warped wafer (90);

5 executing planarization treatment;

driving the rotating disk (40) by a rotating shaft (30) to continuously rotate for one revolution, supporting the warped wafer (90) by the roller assembly (80) when the rotating shaft (30) rotates, and collecting edge information of the warped wafer (90) by an optomechanical assembly (60) when the rotating shaft (30) rotates and sending the collected edge information of the warped
10 wafer (90) by the optomechanical assembly (60) to a controller to calculate an eccentricity;

driving the rotating disk (40) by a lifting shaft (20) to descend to a handover operation position, handing over the warped wafer (90) to a compensating disk (52) from the rotating disk (40);

driving the rotating disk (40) by the lifting shaft (20) to continue to descend to a handover low position, and moving a compensating shaft (51) to compensate the eccentricity of the warped
15 wafer (90);

driving the rotating disk (40) by the lifting shaft (20) to ascend to the handover operation position, handing over the warped wafer (90) to the rotating disk (40) from the compensating disk (52), and driving the rotating disk (40) by the lifting shaft (20) to continue to ascend to a pre-alignment operation position;

20 providing the positive pressure to the air nozzle assembly (70) and blowing the air to the edge of the one side of the warped wafer (90) by the air nozzle assembly (70), so as to planarize the region of the edge of the warped wafer (90);

supporting the warped wafer (90) by the roller assembly (80) on the other side of the warped wafer (90);

25 driving the rotating disk (40) by the rotating shaft (30) to rotate, supporting the warped wafer (90) by the roller assembly (80) when the rotating shaft (30) rotates, and collecting by the optomechanical assembly (60) notch information of the warped wafer (90) and the edge information of the warped wafer (90) and sending by the optomechanical assembly (60) the collected notch information of the warped wafer (90) and the collected edge information of the
30 warped wafer (90) to the controller;

calculating by the controller an eccentricity allowance of the warped wafer (90) based on the collected notch information of the warped wafer (90) and the collected edge information of the warped wafer (90), when the eccentricity allowance of the warped wafer (90) satisfies a preset

condition, rotating by the rotating shaft (30) a notch of the warped wafer (90) to a lower side of the optomechanical assembly (60); and

5 rotating the rotating shaft (30) back and forth by a small angle, collecting by the optomechanical assembly (60) the notch information of warped wafer (90) and sending by the optomechanical assembly (60) the notch information of warped wafer (90) to the controller, calculating by the controller a notch position error of the warped wafer (90) based on the notch information of the warped wafer (90), rotating the rotating shaft (30) to compensate the notch position error, and finishing orientating of the warped wafer (90).

11. The pre-alignment method for the warped wafer according to claim 10, further comprising:

10 before the executing the planarization treatment, ascending the roller assembly (80) to a high position and supporting warped wafer (90) by the roller assembly (80); and

before the driving the rotating disk (40) by the lifting shaft (20) to descend to the handover operation position, and handing over the warped wafer (90) to the compensating disk (52) from the rotating disk (40), descending the roller assembly to a low position.

15 12. The pre-alignment method for the warped wafer according to claim 10, further comprising:

before the receiving the warped wafer (90) by the rotating disk (40), adjusting a switching shaft based on a size of the warped wafer (90), and adjusting the optomechanical assembly (60) to be on an operation position corresponding to the size of the warped wafer (90).