SLURRY DISPENSING APPARATUS, MECHANISM, SYSTEM AND POLISHING METHOD

TECHNICAL FIELD

The disclosure relates to the technical field of semiconductor processing, in particular to a slurry dispensing apparatus, mechanism, system and a polishing method.

BACKGROUND

In the semiconductor manufacturing process, chemical mechanical polishing is currently the most mature and effective polishing and planarization technique, and it plays an extremely important role in related fields. Chemical mechanical polishing is a technology that uses chemical etching and mechanical force to polish and planarize silicon wafers or substrate materials that are under processing. The impurities or uneven structures on the wafer surface are removed by chemical reaction and physical mechanical force for planarization.

Conventionally, the chemical slurry is usually directly dripped on the surface of the polishing pad to grind the wafer. When the polishing pad rotates at a high speed, most of the slurry dripped on the surface of the polishing pad spreads towards the edge; after a certain period of time, due to the difference in surface structural wear and tear between the centre and the edge of the polishing pad, the distribution of the slurry is uneven, resulting in an unstable polishing rate of the wafer during polishing, thereby reducing the yield of the product.

SUMMARY

Therefore, the technical problem to be solved by the present disclosure is to overcome the defects in the prior art that the slurry is unevenly distributed in the polishing process of the wafer, resulting in an unstable polishing rate and reducing the yield of the product.

To solve the above technical problems, the present disclosure provides a slurry dispensing apparatus, comprising:

a main body, being strip-shaped and having a cavity in its interior, wherein the top of the main body is provided with at least one inlet, and the bottom of the main body is an opening and forms an outlet; wherein an inner side wall of the opening has an inclined surface, and the inclined surface is inwardly or outwardly inclined, forming a shape resembling a scraper, suitable for squeezing slurry into a polishing pad, such that the slurry is evenly distributed, so as to reduce wave pattern resulted on a workpiece for subsequent processing; and one end of the main body in its longitudinal direction is a fixed end and the other end is a swinging end.

Optionally, the slurry dispensing apparatus further comprises:

a baffle, wherein the baffle is in the cavity, at different distances from inner walls on two sides of the cavity, and a bottom surface of the baffle is higher than a bottom surface of the main body.

Optionally, in the slurry dispensing apparatus, the baffle has at its bottom an inclined surface on a side further away from the inner wall of the cavity, and the inclined surface is inwardly or outwardly inclined.

Optionally, the slurry dispensing apparatus further comprises:

a side plate mounted to an outer wall of the main body on a side distant from the baffle.

The present disclosure also provides a slurry dispensing mechanism, including the above slurry dispensing apparatus.

Optionally, the slurry dispensing mechanism further comprises:

a connecting assembly, with one end connected to the main body; and

a driver for mounting to a platform, wherein the driver is connected to an end of the connection assembly distant from the main body, for driving the main body to evenly scrape the slurry on the surface of the polishing pad; the driver has a swing state of driving the main body to scrape on the surface of the polishing pad, and a reset state of being restored to its initial position; and the driver is suitable for driving the main body to move to a predetermined position.

Optionally, in the slurry dispensing mechanism, the connecting assembly further comprises:

a clamp, mounted to the driver;

a first connecting rod, with one end rotatably connected to the clamp, and the other end rotatably connected to the main body; and

a second connecting rod, with one end rotatably connected to the clamp, and the other end rotatably connected to the main body; wherein the first connecting rod, the second connecting rod, the main body and the clamp form a quadrilateral.

Optionally, in the slurry dispensing mechanism, the main body is further provided with a first connector and a second connector, and the first connector is on a side of the main body, and the second connector is on the top of the main body;

the clamp is further provided with a third connector, wherein one end of the first connecting rod is rotatably connected to the first connector, and the other end is rotatably connected to the third connector; and

the second connecting rod comprises at least two sections of connecting rods that are movably connected.

The present disclosure also provides a slurry dispensing system, including the above slurry dispensing mechanism.

Optionally, the slurry dispensing system further comprises:

a platform;

a polishing pad, rotatably mounted on the platform, suitable for placing a workpiece, wherein the main body is placed on the polishing pad;

a polisher, with one end mounted to the platform, and the other end suitable for polishing the workpiece;

a dresser, with one end mounted to the platform, and the other end suitable for trimming the surface of the polishing pad; and

a washer, with one end mounted to the platform, and the other end suitable for washing the surface of the polishing pad, wherein the washer is located in the movement direction of the main body, and is suitable for preventing waste particles that are formed in the polishing process from flowing into the polishing pad and causing mechanical damage to the surface of the workpiece.

The present disclosure also provides a polishing method, utilizing the above slurry dispensing system, comprising:

assembling of equipment, by installing the polishing pad, polisher, dresser, washer and slurry dispensing mechanism to the platform;

pre-processing, by setting the polishing pad in a static state, and inputting slurry into the main body for a time period of 3~10s;

scraping, by rotating the polishing pad, such that the main body scrapes the slurry evenly on the surface of the polishing pad;

polishing, by starting the polisher to polish the workpiece; and

washing, by starting the washer to wash away particles on the surface of the polishing pad.

The technical solutions of the present disclosure have the following benefits.

1. The slurry dispensing apparatus provided by the present disclosure incudes a main body, being strip-shaped and having a cavity in its interior, wherein the top of the main body is provided with at least one inlet, and the bottom of the main body is an opening and forms an outlet; wherein an inner side wall of the opening has an inclined surface, and the inclined surface is inwardly or outwardly inclined, and one end of the main body in its longitudinal direction is a fixed end and the other end is a swinging end.

During polishing of the wafer, the main body is placed on the surface of the polishing pad, and the slurry is transported from the inlet to the cavity of the main body, and is dispensed or titrated on the surface of the polishing pad through the outlet at the bottom, forming a temporary accumulation. When the polishing pad is rotating at a high speed, one end of the main body is relatively fixed, and the other end swings against the rotation direction of the polishing pad. The inclined surface at the inner side wall of the opening with the inwardly or outwardly inclined structure forms a shape resembling a scraper, and is able to evenly scrape the slurry in the grooves on the surface of the polishing pad, avoiding spreading of the slurry to the edge of the polishing pad due to centrifugal force, so that the slurry is evenly distributed at the centre and the edge of the polishing pad. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. With the dispensing through the inlet, it may avoid the generation of wave pattern on the surface of the polishing pad, which would affect the wafer polishing. It may also effectively control the amount of slurry used, reduce the consumption of slurry, and save the cost of operation, and it has the advantages of being structurally simple and easy to operate.

2. The slurry dispensing apparatus provided by the present disclosure further includes a baffle in the cavity, the baffle being at different distances from inner walls

on two sides of the cavity, and the bottom surface of the baffle is higher than the bottom surface of the main body.

When the slurry is dispensed on the surface of the polishing pad, and after the inner wall of the main body scrapes the slurry, the baffle in the cavity of the main body is able to scrape the slurry again, which improves the effect of scraping and makes the distribution of the slurry more uniform at the centre and edge of the polishing pad. This reduces the difference in the surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

3. In the slurry dispensing apparatus provided by the present disclosure, the baffle has at its bottom an inclined surface on a side further away from the inner wall of the cavity, and the inclined surface is inwardly or outwardly inclined.

The inwardly or outwardly inclined surface structure may, when scraping the slurry, gather the slurry on the inclined surface, thereby improving the scraping effect.

4. The slurry dispensing apparatus provided by the present disclosure further includes a side plate mounted to an outer wall of the main body on a side distant from the baffle.

When the slurry is being scraped on the surface of the polishing pad, due to the high-speed rotation of the polishing pad, the slurry on the surface of the polishing pad will, following the scraping by the inner side wall of the main body and the inclined surface at the bottom of the baffle, spread along the inclined surface towards two sides. The side plate on the outer wall of the main body may block the slurry that spreads to the edge of the polishing pad, and reduce the slurry flowing out of the surface of the polishing pad, thereby increasing the retention time of the slurry on the polishing pad, improving the scraping effect, reducing the consumption of the slurry, and saving the cost of operation. It has the advantages of being simple in structure and convenient to operate.

5. The slurry dispensing mechanism provided by the present disclosure includes a slurry dispensing apparatus, a connecting assembly and a driver. The driver is mounted to a platform. One end of the connecting assembly is connected to the main body, and the other end is connected to the driver, and the driver is used to drive the main body to evenly scrape the slurry on the surface of the polishing pad; the driver

has a swing state of driving the main body to scrape on the surface of the polishing pad, and a reset state of being restored to its initial position.

During the polishing of the wafer, the main body is driven by the driver to scrape on the surface of the polishing pad, to evenly distribute or spread the slurry on the polishing pad, avoiding spreading of the slurry to the edge of the polishing pad due to centrifugal force, so that the slurry is evenly distributed at the centre and the edge of the polishing pad. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

6. In the slurry dispensing mechanism provided by the present disclosure, the connecting assembly includes a clamp, a first connecting rod and a second connecting rod. The clamp is mounted to the driver. The first connecting rod has one end rotatably connected to the clamp, and the other end rotatably connected to the main body; the second connecting rod has one end rotatably connected to the clamp, and the other end rotatably connected to the main body; wherein the first connecting rod, the second connecting rod, the main body and the clamp form a quadrilateral.

By forming a quadrilateral with the first connecting rod, the second connecting rod, the main body and the clamp, the quadrilateral structure will be deformed when the driver drives the main body to scrape, causing a change in the position of the main body, so that the slurry may be scraped from different angles to make the slurry evenly distributed on the polishing pad. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

7. In the slurry dispensing mechanism provided by the present disclosure, the main body is further provided with a first connector and a second connector, and the first connector is on a side of the main body, and the second connector is on the top of the main body; the clamp is further provided with a third connector, wherein one end of the first connecting rod is rotatably connected to the first connector, and the other end is rotatably connected to the third connector; and the second connecting rod includes at least two sections of connecting rods that are movably connected.

The second connecting rod including at least two sections movably connected, the first connecting rod, the main body, and the clamp form a polygon. The first connecting rod movably connects one side of the main body and the clamp through the first connector and the third connector, respectively, and the second connecting rod movably connects the top of the main body and the clamp through the second connector and the third connector, respectively. The polygon structure will be deformed when the driver drives the main body to scrape, causing a change in the position of the main body, so that the slurry may be scraped from different angles to make the slurry evenly distributed on the polishing pad. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

8. The slurry dispensing system provided by the present disclosure includes a slurry dispensing mechanism, a platform, a polishing pad, a polisher, a dresser, and a washer. The polishing pad is rotatably mounted on the platform, suitable for placing a workpiece, and the main body is placed on the polishing pad; the polisher has one end mounted to the platform, and the other end suitable for polishing the workpiece; the dresser has one end mounted to the platform, and the other end suitable for trimming the surface of the polishing pad; the washer has one end mounted to the platform, the other end suitable for washing the surface of the polishing pad, wherein the washer is located in the movement direction of the main body.

In use, the polishing pad is rotatably mounted to the platform, and then the workpiece is placed on the polishing pad; one end of the polisher is mounted to the platform, and the other end is placed on the workpiece, and then the main body of the slurry dispensing mechanism is placed on the polishing pad; and the slurry is dispensed on the polishing pad through the inlet. When the polishing pad and the polisher rotate, the main body of the slurry dispensing mechanism scrapes the slurry on the surface of the polishing pad evenly in the grooves on the surface, reducing the difference in surface structural wear and tear between the centre and edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. After the slurry is evenly coated, the surface of the polishing pad is trimmed with the dresser, and then the workpiece may be

polished. After the polishing is completed, the impurities on the surface of the polishing pad may be washed away by the washer. Since the washer is mounted in the direction of the movement of the main body, the main body can scrape out the impurities from the washing to prevent the impurities from flowing into the polishing apparatus and causing mechanical damage to the surface of the workpiece.

9. The present disclosure provides a polishing method, utilizing the above slurry dispensing system, comprising:

assembling of equipment, by installing the polishing pad, polisher, dresser, washer and slurry dispensing mechanism to the platform;

pre-processing, by setting the polishing pad in a static state, and inputting slurry into the main body for a time period of 3~10s;

scraping, by rotating the polishing pad, such that the main body scrapes the slurry evenly on the surface of the polishing pad;

polishing, by starting the polisher to polish the workpiece; and

washing, by starting the washer to wash away particles on the surface of the polishing pad.

The slurry on the surface of the polishing pad may be scraped evenly in the grooves on the surface, reducing the difference in surface structural wear and tear between the centre and edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. During washing, the main body may scrape out the impurities from washing, preventing the impurities from flowing into the polishing apparatus and causing damage to the workpiece, and thereby ensuring the yield of the product.

BRIEF DESCRIPTION OF DRAWINGS

In order to more clearly illustrate embodiments of the present disclosure or the technical solutions in the prior art, the following will briefly describe the drawings used in the description of the embodiments or the prior art. Clearly, the drawings of the following descriptions are some embodiments of the present disclosure. Those of ordinary skill in the art may obtain other drawings based on these drawings without creative effort.

Fig. 1 is a schematic structural view of a slurry dispensing apparatus provided in Embodiment 1 of the present disclosure;

Fig. 2 is a cross-sectional view of the slurry dispensing apparatus provided in Embodiment 1 of the present disclosure;

Fig. 3 is a cross-sectional view of a slurry dispensing apparatus provided in Embodiment 2 of the present disclosure;

Fig. 4 is a schematic structural view of a slurry dispensing mechanism provided in Embodiment 3 of the present disclosure;

Fig. 5 is a schematic structural view of a connecting assembly in the slurry dispensing mechanism provided in Embodiment 3 of the present disclosure;

Fig. 6 is a top view of a slurry dispensing system provided in Embodiment 4 of the present disclosure;

Fig. 7 is a side view of the slurry dispensing system provided in Embodiment 4 of the present disclosure;

Fig. 8 is a schematic cross-sectional view of a wafer before polishing in the slurry dispensing apparatus provided in Embodiment 4 of the present disclosure;

Fig. 9 is a schematic cross-sectional view of a wafer after polishing in the slurry dispensing apparatus provided in Embodiment 4 of the present disclosure.

Reference numerals: 1. Main body; 2. Inlet; 3. Baffle; 4. Side plate; 5. Driver; 6. Clamp; 7. First connecting rod; 8. Second connecting rod; 9. First connector; 10. Second connector; 11. Third connector; 12. Polishing pad; 13. Workpiece; 14. Polisher; 15. Dresser; 16. Washer.

DETAILED DESCRIPTION

The technical solutions of the present disclosure will be more clearly and completely described below with reference to the drawings. Clearly, the described embodiments are only some of the embodiments of the present disclosure, not all of the embodiments. Based on the embodiments in the present disclosure, all other embodiments obtainable by those of ordinary skill in the art without creative efforts shall fall within the protection scope of the present disclosure.

In the description of the present disclosure, it should be noted that orientation or positional relationship indicated by the terms "centre", "upper", "lower", "left", "right", "vertical", "horizontal", "inner", "outer", etc. is based on the orientation or positional relationship as shown in the drawings, only for the convenience of describing and simplifying the description, and does not indicate or imply that the

referred apparatus or element must have a specific orientation, or constructed or operated in a specific orientation. Thus, it should not be construed as a limitation of the present disclosure. Further, the terms "first", "second", "third" are only used for descriptive purposes only and cannot be construed as indicating or implying relative importance.

In the description of the present disclosure, it should be noted that, unless otherwise expressly specified and limited, the terms "install", "connect" and "connection" should be construed in a broad sense. For example, it may be a fixed connection or a detachable connection, or integral connection. It may be mechanical connection or electrical connection. It may be direct connection, or indirect connection through an intermediate medium, or internal communication between two components. For those of ordinary skill in the art, the specific meanings of the above terms in the present disclosure can be understood in specific situations.

In addition, the technical features involved in the different embodiments of the present disclosure described below can be combined with each other as long as they do not conflict with each other.

Embodiment 1

As shown in Fig. 1 and Fig. 2, the slurry dispensing apparatus provided by the present disclosure incudes a strip-shaped main body 1, having a cavity in its interior, wherein the top of the main body 1 is provided with at least one inlet 2, and the bottom of the main body 1 is an opening and forms an outlet, wherein the inner side wall of the opening has an inclined surface that is inwardly inclined, and one end of the main body 1 in its longitudinal direction is a fixed end and the other end is a swinging end. The inwardly inclined surface forms a shape resembling a scraper, suitable for squeezing slurry into a polishing pad, such that the slurry is evenly distributed, so as to reduce wave pattern resulted on a workpiece for subsequent processing.

The embodiments do not specifically limit the workpiece 13. In order to conform to an actual scenario, the workpiece 13 in this embodiment may be a wafer.

The embodiments do not specifically limit the main body 1. In order to conform to an actual scenario, the main body 1 in this embodiment may adopt an arc-shaped strip structure, suitable for polishing 12-inch wafers. The length of the main body 1 is 280 mm to 300 mm, to meet the requirement that the distribution of the slurry on the

polishing pad 12 may cover the entire wafer, and the arc shape matches the shape of the concentric circular grooves on the polishing pad 12. The inner arc length of the main body 1 is 572.5 mm, and the width is $\leqslant$ 40 mm. In order to prevent the main body 1 from interfering with other components in use, the size of the inner arc of the main body 1 may be reduced, and the width of the main body 1 may be increased accordingly. The height of the main body 1 is $\leqslant$ 20 mm, and the wall thickness of the main body 1 is 5 mm. The main body 1 may be made of metal or polymer materials. In other embodiments, the main body 1 may also have a structure of a rectangle or cylinder having a cavity with an open bottom. The area formed by the cavity contacting the polishing pad 12 may achieve a liquid seal for the slurry.

The embodiments do not specifically limit the outlets. In order to conform to an actual scenario, four inlets 2 are provided in this embodiment. In other embodiments, the number of inlets 2 may be 3 to 6. The spacing between inlets 2 gradually increases along the length direction of the main body 1. The minimum spacing may be set to 5 mm, and the maximum spacing may be set to 20 mm, so that the dispensed slurry may be evenly distributed on the polishing pad 12 in the wafer polishing area.

During polishing of the wafer, the main body 1 is placed on the surface of the polishing pad 12; and the slurry is transported from the inlet 2 to the cavity of the main body 1 through delivery pipeline, and is dispensed or titrated on the surface of the polishing pad 12 through the bottom outlet. The terms “dispense” and “titrate” may be used interchangeably in the disclosure. The slurry is a water-like viscous liquid, which may form a short-term accumulation in the cavity. When the polishing pad 12 is rotating at a high speed, one end of the main body 1 is relatively fixed and the other end swings against the rotation direction of the polishing pad 12. The inwardly inclined surface of the inner side wall of the opening may evenly scrape the slurry into the grooves on the surface of the polishing pad 12, avoiding spreading of the slurry to the edge of the polishing pad 12 due to centrifugal force, so that the slurry is evenly distributed at the centre and the edge of the polishing pad 12. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. With the dispensing through the inlet 2, it may avoid the generation of waves on the surface of the polishing pad 12, which would affect the wafer polishing. It may also effectively control the amount of

slurry used, reduce the consumption of slurry, and save the cost of operation, and it has the advantages of being structurally simple and easy to operate.

As shown in Fig. 2, an arc-shaped baffle 3 is arranged in the cavity of the main body 1. The curvature of the baffle 3 matches the shape of the main body 1. The baffle 3 may be set to different thicknesses according to the viscosity of the slurry. In the embodiment, the thickness of the baffle 3 is 2 mm. The distances between the baffle 3 and the inner walls on the two sides of the cavity are not equal. The bottom surface of the baffle 3 is 0.5 mm higher than the bottom surface of the main body 1.

When the slurry is dispensed or titrated on the surface of the polishing pad 12, and after the inner wall of the main body 1 scrapes the slurry, the baffle 3 in the cavity of the main body 1 can scrape the slurry again, which improves the effect of scraping and makes the distribution of the slurry more uniform at the centre and edge of the polishing pad 12. This reduces the difference in the surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

In this embodiment, the baffle 3 has at its bottom an inclined surface on a side further away from the inner wall of the cavity, and the inclined surface is outwardly inclined. The outwardly inclined surface structure has a shape resembling a scraper and may, when scraping the slurry, gather the slurry on the inclined surface, thereby improving the scraping effect.

As shown in Fig. 4, a side plate 4 is mounted to the outer wall of the inner arc side of the main body 1. When the slurry is being scraped on the surface of the polishing pad 12, due to the high-speed rotation of the polishing pad 12, the slurry on the surface of the polishing pad 12 will, following the scraping by the inner side wall of the main body 1 and the inclined surface at the bottom of the baffle 3, spread along the inclined surface towards two sides. The side plate 4 on the outer wall of the main body 1 may block the slurry that spreads to the edge of the polishing pad 12, reducing the flow of the slurry out of the surface of the polishing pad 12, thereby increasing the retention time of the slurry on the polishing pad 12, improving the scraping effect, reducing the consumption of the slurry, and saving the cost of operation. It has the advantages of being simple in structure and convenient to operate.

Embodiment 2

As shown in Fig. 3, the difference between this embodiment and the above embodiment is that the bottom of the main body 1 is an opening and forms an outlet, and the inner side wall of the opening is an inclined surface that is outwardly inclined. The outwardly inclined surface structure has a shape resembling a scraper and may, when scraping the slurry, gather the slurry on the inclined surface, thereby improving the scraping effect.

Embodiment 3

As shown in Fig. 4 and Fig. 5, a slurry dispensing mechanism provided by the present disclosure adopts the slurry dispensing apparatus provided in Embodiment 1, including the slurry dispensing apparatus, a connecting assembly and a driver 5. The driver 5 is mounted to a platform. One end of the connecting assembly is connected to the main body 1, and the other end is connected to the driver 5, and the driver 5 is used to drive the main body 1 to evenly scrape the slurry on the surface of the polishing pad 12; the driver 5 has a swing state of driving the main body 1 to scrape on the surface of the polishing pad 12, and a reset state of being restored to its initial position. The driver 5 is suitable for driving the main body 1 to move to a predetermined position.

During polishing of the wafer, the main body 1 is driven by the driver 5 to scrape on the surface of the polishing pad 12, to evenly distribute or spread the slurry on the polishing pad 12, avoiding spreading of the slurry to the edge of the polishing pad 12 due to centrifugal force, so that the slurry is evenly distributed at the centre and the edge of the polishing pad 12. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

As shown in Fig. 5, the connecting assembly includes a clamp 6, a first connecting rod 7 and a second connecting rod 8. The clamp 6 is mounted to the driver 5. One end of the first connecting rod 7 is rotatably connected to the clamp 6, and the other end is rotatably connected to the main body 1. One end of the second connecting rod 8 is rotatably connected to the clamp 6, and the other end is rotatably connected to the main body 1. The first connecting rod 7, the second connecting rod 8, the main body 1 and the clamp 6 form a quadrilateral.

By forming a quadrilateral with the first connecting rod 7, the second connecting rod 8, the main body 1 and the clamp 6, the quadrilateral structure will be deformed when the driver 5 drives the main body 1 to scrape, which may cause the position of the main body 1 to change, so that the slurry may be scraped from different angles to make the slurry evenly distributed on the polishing pad 12. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad 12, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. By adjusting the position of the clamp 6 on the driver 5, the pressure between the main body 1 and the polishing pad 12 may be adjusted. In this embodiment, the contact pressure between the main body 1 and the polishing pad 12 is controlled between 0.1 psi and 0.5 psi. This may ensure that the area formed by the contact between the cavity of the main body 1 and the polishing pad 12 achieves a liquid seal for the slurry. It may also prevent the main body 1 from being too tightly contacted with the polishing pad 12, which may affect the movement of the polishing pad 12.

In this embodiment, the main body 1 is further provided with a first connector 9 and a second connector 10. The first connector 9 is on a side of the main body 1, and the second connector 10 is on the top of the main body 1; the clamp 6 is further provided with a third connector 11, wherein one end of the first connecting rod 7 is rotatably connected to the first connector 9, and the other end is rotatably connected to the third connector 11; and the second connecting rod 8 includes at least two sections of connecting rods that are movably connected.

The second connecting rod 8 including two sections movably connected, the first connecting rod 7, the main body 1, and the clamp 6 form a polygon. The first connecting rod 7 movably connects one side of the main body 1 and the clamp 6 through the first connector 9 and the third connector 11, respectively, and the second connecting rod 8 movably connects the top of the main body 1 and the clamp 6 through the second connector 10 and the third connector 11, respectively. The polygon structure will be deformed when the driver 5 drives the main body 1 to scrape, which may cause the position of the main body 1 to change, so that the slurry may be scraped from different angles to make the slurry evenly distributed on the polishing pad 12. This reduces the difference in surface structural wear and tear between the centre and the edge of the polishing pad 12, so that the polishing rate of the wafer

during polishing is more stable, and the yield of the product is improved. It has the advantages of being structurally simple and easy to operate.

In this embodiment, a controller may also be provided. Motion parameters may be input into the controller, and the controller is communicationally connected to the delivery pipeline and the driver 5. The driver 5 drives the main body 1 to move to the required position on the polishing pad 12, and controls the delivery pipeline to output the required amount of slurry at corresponding positions to the cavity of the main body 1. This ensures that the slurry can be more appropriately distributed on the polishing pad 12, reducing unnecessary waste of slurry and saving the cost of operation.

Embodiment 4

As shown in Fig. 6 and Fig. 7, a slurry dispensing system provided by the present disclosure adopts the slurry dispensing mechanism provided in Embodiment 3, including the slurry dispensing mechanism, a platform, a polishing pad 12, a polisher 14, a dresser 15 and a washer16. The polishing pad 12 is rotatably mounted on the platform, suitable for placing a wafer, and the main body 1 is placed on the polishing pad 12; the polisher 14 has one end mounted to the platform, and the other end suitable for polishing the wafer; the dresser 15 has one end mounted to the platform, and the other end suitable for trimming the surface of the polishing pad 12; the washer 16 has one end mounted to the platform, the other end suitable for washing the surface of the polishing pad 12, wherein the washer 16 is located in the movement direction of the main body 1. The washer 16 is suitable for preventing waste particles that are formed in the polishing process from flowing into the polishing pad 12 and causing mechanical damage to the surface of the wafer.

In use, the polishing pad 12 is rotatably mounted to the platform, and then the wafer is placed on the polishing pad 12; one end of the polisher 14 is mounted to the platform, and the other end is placed on the wafer, and then the main body 1 of the slurry dispensing mechanism is placed on the polishing pad 12; and the slurry is dispensed on the polishing pad 12 through the inlet 2. When the polishing pad 12 and the polisher 14 rotate, the main body 1 of the slurry dispensing mechanism scrapes the slurry on the surface of the polishing pad 12 evenly in the grooves on the surface, reducing the difference in surface structural wear and tear between the centre and edge of the polishing pad 12, so that the polishing rate of the wafer during polishing is

more stable, and the yield of the product is improved. After the slurry is evenly coated, the surface of the polishing pad 12 is trimmed with the dresser 15, and then the wafer may be polished. After the polishing is completed, the impurities on the surface of the polishing pad 12 may be washed away by the washer 16 using Ultra Pure Water (UPW) or De-Ionized Water (DIW). Since the washer 16 is installed in the direction of the movement of the main body 1, the main body 1 can scrape out the impurities from the washing to prevent the impurities from flowing into the polishing apparatus and causing mechanical damage to the surface of the wafer.

As shown in Fig. 8 and Fig. 9, the wafer surface can be ground and polished more evenly by using the slurry dispensing system.

Embodiment 5

The present disclosure provides a polishing method, utilizing the above slurry dispensing system of Embodiment 4, comprising:

S1: installing the polishing pad 12, polisher 14, dresser 15, washer 16 and slurry dispensing mechanism to the platform; placing the wafer on the polishing pad 12; pressing the polisher 14 on the wafer; arranging the slurry dispensing mechanism between the dresser 15 and the washer 16, and adjusting the pressure between the main body 1 and the polishing pad 12 such that the contact pressure is controlled between 0.1psi and 0.5psi;

S2: setting the polishing pad 12 in a static state, and inputting slurry into the main body 1 for a time period of 3s to 10s;

S3: rotating the polishing pad 12, and scraping, by the main body 1, the slurry evenly on the surface of the polishing pad 12;

S4: starting the polisher 14 to polish the workpiece 13;

S5: starting the washer 16 to wash away particles on the surface of the polishing pad 12.

With this slurry dispensing method, the slurry on the surface of the polishing pad 12 may be scraped evenly in the grooves on the surface, reducing the difference in surface structural wear and tear between the centre and edge of the polishing pad 12, so that the polishing rate of the wafer during polishing is more stable, and the yield of the product is improved. During washing, the main body 1 may scrape out the impurities from washing, preventing the impurities from flowing into the polishing

apparatus and causing damage to the workpiece 13, and thereby ensuring the yield of the product.

Clearly, the above embodiments are only examples for clear description, and are not intended to limit the manner of implementation. For those of ordinary skill in the art, there are other variations or changes that can be made in different forms based on the above description. It is not necessary or possible to exhaust all embodiments here. The obvious variations or changes derived therefrom are still within the protection scope of the present disclosure.

CLAIMS

1. A slurry dispensing apparatus, comprising:

a main body (1), being strip-shaped and having a cavity in its interior, wherein the top of the main body (1) is provided with at least one inlet (2), and the bottom of the main body (1) is an opening and forms an outlet; wherein an inner side wall of the opening has an inclined surface, and the inclined surface is inwardly or outwardly inclined, forming a shape resembling a scraper, suitable for squeezing slurry into a polishing pad (12), such that the slurry is evenly distributed, so as to reduce wave pattern resulted on a workpiece for subsequent processing; and one end of the main body (1) in its longitudinal direction is a fixed end and the other end is a swinging end.

2. The slurry dispensing apparatus according to claim 1, further comprising:

a baffle (3), wherein the baffle (3) is in the cavity, at different distances from inner walls on two sides of the cavity, and a bottom surface of the baffle (3) is higher than a bottom surface of the main body (1).

3. The slurry dispensing apparatus according to claim 2, wherein the baffle (3) has at its bottom an inclined surface on a side further away from the inner wall of the cavity, and the inclined surface is inwardly or outwardly inclined.

4. The slurry dispensing apparatus according to claim 2 or 3, further comprising:

a side plate (4) mounted to an outer wall of the main body (1) on a side distant from the baffle (3).

5. A slurry dispensing mechanism, comprising the slurry dispensing apparatus according to any one of claims 1-4.

6. The slurry dispensing mechanism according to claim 5, further comprising:

a connecting assembly, with one end connected to the main body (1); and

a driver (5) for mounting to a platform, wherein the driver (5) is connected to an end of the connection assembly distant from the main body (1), for driving the main body (1) to evenly scrape the slurry on the surface of the polishing pad; the driver (5) has a swing state of driving the main body (1) to scrape on the surface of the polishing pad, and a reset state of being restored to its initial position; and the driver (5) is suitable for driving the main body (1) to move to a predetermined position.

7. The slurry dispensing mechanism according to claim 6, wherein the connecting assembly further comprises:

a clamp (6), mounted to the driver (5);

a first connecting rod (7), with one end rotatably connected to the clamp (6), and the other end rotatably connected to the main body (1); and

a second connecting rod (8), with one end rotatably connected to the clamp (6), and the other end rotatably connected to the main body (1); wherein the first connecting rod (7), the second connecting rod (8), the main body (1) and the clamp (6) form a quadrilateral.

8. The slurry dispensing mechanism according to claim 7, wherein the main body (1) is further provided with a first connector (9) and a second connector (10), and the first connector (9) is on a side of the main body (1), and the second connector (10) is on the top of the main body (1);

the clamp (6) is further provided with a third connector (11), wherein one end of the first connecting rod (7) is rotatably connected to the first connector (9), and the other end is rotatably connected to the third connector (11); and

the second connecting rod (8) comprises at least two sections of connecting rods that are movably connected.

9. A slurry dispensing system, comprising the slurry dispensing mechanism according to any one of claims 5-8.

10. The slurry dispensing system according to claim 9, further comprising:

a platform;

a polishing pad (12), rotatably mounted on the platform, suitable for placing a workpiece (13), wherein the main body (1) is placed on the polishing pad (12);

a polisher (14), with one end mounted to the platform, and the other end suitable for polishing the workpiece (13);

a dresser (15), with one end mounted to the platform, and the other end suitable for trimming the surface of the polishing pad (12); and

a washer (16), with one end mounted to the platform, and the other end suitable for washing the surface of the polishing pad (12), wherein the washer (16) is located in the movement direction of the main body (1), and is suitable for preventing waste particles that are formed in the polishing process from flowing into the polishing pad (12) and causing mechanical damage to the surface of the workpiece.

11. A polishing method utilizing the slurry dispensing system of claim 9 or 10, comprising:

assembling of equipment, by installing a polishing pad (12), polisher (14), dresser (15), washer (16) and slurry dispensing mechanism to a platform;

pre-processing, by setting the polishing pad (12) in a static state, and inputting slurry into the main body (1) for a time period of 3~10s;

scraping, by rotating the polishing pad (12), such that the main body (1) scrapes the slurry evenly on the surface of the polishing pad;

polishing, by starting the polisher (14) to polish the workpiece; and

washing, by starting the washer (16) to wash away particles on the surface of the polishing pad (12).