

POLISHING HEAD, SUBSTRATE POLISHING DEVICE AND GRINDING METHOD

TECHNICAL FIELD

The present disclosure relates to the technical field of chemical mechanical polishing, and in particular to a polishing head, a substrate polishing device and a grinding method.

BACKGROUND

The integrated circuit manufacturing process usually refers to the deposition of conductors, semiconductors, and insulating layers on a specific substrate, such as a silicon-based wafer, in a certain process sequence. In manufacturing process, Chemical Mechanical Polishing or Chemical Mechanical Planarization (CMP) is a global planarization ultra-precision surface processing technology. CMP equipment is mainly used to globally planarize the microscopic rough surface of the substrate after the membrane deposition process. In chemical mechanical polishing, the substrate is usually sucked at the bottom surface of the polishing head, and the side of the substrate with the deposition layer is pressed against the upper surface of the polishing pad. The polishing head driven by a driving component rotates in the same direction as the polishing pad and provides the substrate with a downward load; at the same time, the slurry is supplied to the upper surface of the polishing pad through a delivery system and distributed between the substrate and the polishing pad, so that chemical mechanical polishing of the substrate may be completed under combined chemical and mechanical actions.

As the diameter of semiconductor substrates increases and the size of key chip features shrinks, in the chemical mechanical polishing process, the requirements for high flatness, uniformity, consistency of the substrate surface and the amount of wear on the edge of the substrate become increasingly stringent. The CMP polishing head in the prior art usually uses a multi-chamber multi-region flexible membrane. The multiple chambers of the flexible membrane are integrally formed. The structure is complex and the manufacturing cost is high. Moreover, the traditional flexible membrane has to be adapted to the structure and function for transferring, loading and unloading of substrates; the relative position of the substrate cannot be fixed; and there are significant differences in uniformity during the process. Certain differences exist in the process of transferring, loading and unloading the substrates, thus resulting in risk of substrate processing failure. A cooperative installation

structure of the flexible membrane and a retaining ring may be formed, usually, with the flexible membrane and the retaining ring matching its outer peripheral wall. Since the flexible membrane and the retaining ring are high-cost consumables, the maintenance cycle is short and the maintenance cost is high. In addition, the grinding pressure on the edge area of substrate relies only on indirect transmission between flexible membrane air bags, resulting in poor area adjustment controllability, poor application feedback timeliness, poor edge pressure control effect, and the phenomenon of uneven polishing at the edge of the substrate.

SUMMARY

Therefore, the technical problem to be solved by the present disclosure is to overcome defects of complex structure and high processing and manufacturing costs due to the use of multi-chamber multi-region flexible membrane for CMP polishing heads in the prior art, and defects of poor area adjustment controllability, poor application feedback timeliness, poor edge pressure control effect, and uneven polishing at the edge of the substrate caused by the grinding pressure on the edge area of substrate relying only on indirect transmission between flexible membrane air bags.

In a first aspect, embodiments of the present disclosure provide a polishing head, which comprises:

- a main body;

- a suction holding component fixed to a bottom centre of the main body for sucking a substrate and pressing the substrate on a polishing surface; and

- an edge force exerting component on outer peripheral side of the suction holding component and below the main body, wherein the edge force exerting component has a bottom wall for pressing on edge area of the substrate to adjust polishing pressure on the edge area of the substrate.

Optionally, the suction holding component comprises:

- a pressing disk, fixed to bottom wall of the main body, for pressing the substrate; and

- a vacuum suction structure, comprising a ventilation groove on bottom wall of the pressing disk and a sealing ring on outer peripheral side of the ventilation groove; wherein the ventilation groove is suitable for connection with an external vacuum device;

wherein, when the pressing disk is pressed on the substrate, the sealing ring is in sealing contact with the substrate to form a closed suction chamber between the pressing disk and the substrate and connected with the ventilation groove.

Optionally, the vacuum suction structure comprises a plurality of groups of ventilation grooves arranged at intervals along a radial direction of the pressing disk;

each group of the ventilation grooves corresponds to at least one sealing ring; and the sealing rings are of annular shape and are arranged on the outer peripheral sides of the corresponding ventilation grooves at intervals along the radial direction of the pressing disk.

Optionally, the ventilation grooves are annular grooves opened on the bottom wall of the pressing disk; the annular ventilation grooves and the pressing disk are coaxially arranged; and along the radial direction of the pressing disk, the plurality of ventilation grooves are nested from inside to outside at intervals.

Optionally, each group of the ventilation grooves comprises an annular ventilation groove, and each ventilation groove corresponds to an annular sealing ring;

the plurality of sealing rings and the plurality of ventilation grooves are all coaxially arranged; and outer diameters of the plurality of sealing rings gradually increase along the radial direction of the pressing disk;

two sealing rings on inner and outer sides of the ventilation groove cooperate with the bottom wall of the pressing disk and the substrate being sucked to form the closed suction chamber.

Optionally, the edge force exerting component comprises:

a ring body, the ring body being provided with a first soft membrane chamber and a second soft membrane chamber in sequence along a force exerting direction, wherein the first soft membrane chamber and the second soft membrane chamber are independent of each other, and bottom of the second soft membrane chamber has an action surface for pressing the substrate; and

a force exerting structure, having one end located in the first soft membrane chamber and another end extending downward to a position close to the action surface of the second soft membrane chamber, wherein the force exerting structure is suitable for moving downward to exert force on the action surface of the second soft membrane chamber, when gas pressure in the first soft membrane chamber increases, to press the edge area of the substrate.

Optionally, the force exerting structure comprises:

a support member in the first soft membrane chamber, for moving toward and exerting force to the second soft membrane chamber when the pressure in the first soft membrane chamber changes; and

a pressing member in the second soft membrane chamber, wherein one end of the pressing member is fixedly mounted and connected to the support member, and another end extends toward the action surface of the second soft membrane chamber, and the pressing member is capable of moving in the second soft membrane chamber when subjected to force, to press the action surface of the second soft membrane chamber.

Optionally, an end of the pressing member closer to the action surface of the second soft membrane chamber is formed into a flat surface.

Optionally, the edge force exerting component further comprises:

a limiting member, covering outer peripheral wall of the first soft membrane chamber, for limiting radial deformation of the first soft membrane chamber under pressure.

Beneficial Effects:

1. The embodiment of the present disclosure is provided with an edge force exerting component, and the amount of grinding at the edge of the substrate may be adjusted by adjusting the gas pressure in the first soft membrane chamber. Besides, this embodiment is also provided with a suction holding component. By adjusting the gas pressure in each ventilation groove and each closed suction chamber connected thereto, the amount of grinding in the central part of the substrate may be adjusted. Thus, the uniformity and consistency of the substrate surface may be improved, thereby achieving high planarization.

2. In the embodiment of the present disclosure, multiple ventilation grooves and multiple matching sealing rings are provided at the bottom of the pressing disk, forming multiple sets of vacuum suction structures arranged at intervals along the radial direction of the pressing disk, which can suck the substrate firmly, preventing displacement of the substrate relative to the pressing disk during the grinding process. The suction is stronger without the need for a retaining ring. This solves the problems that due to the flexible membrane dynamically adaptively pressing the substrate in the process, the relative position of the substrate cannot be fixed and the process uniformity is low, and that the substrate may easily be scrapped after the process. Besides, the vacuum suction structure in this embodiment is composed of a ventilation groove and an annular sealing ring, which has a simple structure and low processing and maintenance costs.

In addition, a plurality of closed suction chambers that are connected to a plurality of ventilation grooves in a one-to-one correspondence are formed in this embodiment. During the grinding and polishing process, the gas pressure in each ventilation groove and each closed suction chamber connected thereto may be controlled, so as to adjust the suction force or pressing force of each closed suction chamber on each radial area of the substrate. When there is a positive pressure in a certain closed suction chamber, the radial area of the substrate corresponding to the closed suction chamber may be pressed. When there is a negative pressure in a certain closed suction chamber, the radial area of the substrate corresponding to the closed suction chamber may be sucked. By reducing the suction force of a certain closed suction chamber or increasing the positive pressing force, the position on the substrate corresponding to the closed suction chamber may be ground more adequately; similarly, by increasing the suction force of a certain closed suction chamber or reducing the positive pressing force, the amount of grinding on the substrate at the position corresponding to the closed suction chamber is reduced. This can effectively control the amount of grinding in the central area of the substrate during the substrate grinding process, thereby improving the uniformity and consistency of the substrate surface, and achieving high planarization.

3. In the embodiment of the present disclosure, during grinding of the substrate, the force exerting structure cooperates with the second soft membrane chamber to press the edge of the substrate, so that the bottom surface of the second soft membrane chamber is in complete contact with the substrate, and the grinding is more uniform. Compared with downward pressure generated by vacuum pressure contact, the downward pressure generated by the hard force exerting structure is transmitted faster, with no lag, and high timeliness, so that the substrate may be ground to be more planarized.

4. In the embodiment of the present disclosure, an end of the pressing member adjacent to the action surface of the second soft membrane chamber is formed into a flat surface. With the flat surface, the contact area between the pressing member and the second soft membrane chamber is increased, so that the downward pressure generated by the longitudinal deformation of the first soft membrane chamber is transmitted to the pressing member, and evenly distributed on the substrate, avoiding damage of the substrate due to concentration of the downward pressure on one point.

5. In the embodiment of the present disclosure, the limiting member effectively restricts the radial deformation of the first soft membrane chamber, so that the first soft membrane

chamber generates constant longitudinal deformation under pressure, and the longitudinal deformation generates a uniform downward pressure, which is effectively transmitted through the limiting member to the pressing member. The timeliness of force transmission is further improved; the edge of the substrate is effectively pressed; and the pressing uniformity is ensured.

In a second aspect, embodiments of the present disclosure also provide a substrate polishing device, which comprises the polishing head described in any one of the preceding embodiments.

Beneficial Effects:

The substrate polishing device provided by the present disclosure comprises the aforementioned polishing head. The technical advantages and effects achieved by the substrate polishing device also include the technical advantages and effects achieved by the polishing head, which will not be repeated here.

In a third aspect, embodiments of the present disclosure also provide a grinding method. The grinding method is performed using the polishing head described in any one of the above embodiments, and comprises the following steps:

installing the polishing head on a substrate polishing device;

using the suction holding component on the polishing head to press a substrate on a polishing surface; and during grinding process, adjusting amount of grinding in the central area of the substrate by adjusting suction force or pressing force of the suction holding component on the central area of the substrate, and adjusting amount of grinding in the edge area of the substrate by adjusting pressing force of the edge force exerting component on the substrate.

Beneficial Effects:

The grinding method provided by the present disclosure uses the polishing head in the aforementioned embodiment. The technical advantages and effects achieved by the grinding method also include the technical advantages and effects achieved by the polishing head, which will not be repeated here.

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 diagram of a polishing head of the present disclosure;

Fig. 2 is a schematic structural diagram of multiple groups of vacuum suction structures.

Reference numerals:

100. substrate;

1. main body; 2. pressing disk;

3. vacuum suction structure; 31. ventilation groove; 32. sealing ring;

4. ring body; 41. first soft membrane chamber; 42. second soft membrane chamber;

5. support member; 6. pressing member; 7. limiting member.

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.

As shown in Fig. 1 and Fig. 2, embodiments of the present disclosure provide a polishing head, which comprises a main body 1, a suction holding component and an edge force exerting component.

The suction holding component is fixedly installed at the bottom centre of the main body 1 for sucking the substrate 100 and pressing the substrate 100 on the upper surface of the polishing pad. The main body 1 may drive the suction holding component to rotate around its own rotation axis.

The suction holding component comprises a pressing disk 2 and a vacuum suction structure 3. The pressing disk 2 is fixedly installed on the bottom wall of the main body 1 for pressing the substrate 100. The pressing disk 2 is coaxial with the main body 1, and may be driven by the main body 1 to rotate around a central axis. The vacuum suction structure 3 comprises a ventilation groove 31 on the bottom wall of the pressing disk 2, and a sealing ring 32 at the outer peripheral side of the ventilation groove 31. The ventilation groove 31 is suitable for communicating with an external vacuum device. When the pressing disk 2 is pressed on the substrate 100, the sealing ring is in sealing contact with the substrate 100 to form a closed suction chamber between the pressing disk 2 and the substrate 100 and connected to the ventilation groove 31. The ventilation groove 31 and the vacuum device are connected through a vacuum channel. Optionally, the vacuum channel is a hose that runs through the pressing disk 2. When the external vacuum device evacuates the ventilation groove 31, the air in the ventilation groove 31 and the closed suction chamber is evacuated through the vacuum channel, forming a negative pressure environment, thereby sucking the substrate 100.

In the embodiment of the present disclosure, multiple ventilation grooves 31 and multiple matching sealing rings 32 are provided at the bottom of the pressing disk 2, forming multiple sets of vacuum suction structures 3 arranged at intervals along the radial direction of the pressing disk 2, which can suck the central area of the substrate 100 firmly, preventing displacement of the substrate 100 relative to the pressing disk 2 during the grinding process. The suction is stronger without the need for a retaining ring. This solves the problems that

due to the flexible membrane dynamically adaptively pressing the substrate in the process, the relative position of the substrate cannot be fixed and the process uniformity is low, and that the substrate may easily be scrapped after the process. Besides, the vacuum suction structure 3 in this embodiment is composed of a ventilation groove 31 and an annular sealing ring 32, which has a simple structure and low processing and maintenance costs.

In addition, a plurality of closed suction chambers that are connected to a plurality of ventilation grooves 31 in a one-to-one correspondence are formed in this embodiment. During the grinding and polishing process, the gas pressure in each ventilation groove 31 and each closed suction chamber connected thereto may be controlled, so as to adjust the suction force or pressing force of each closed suction chamber on each radial area of the substrate 100. When there is a positive pressure in a certain closed suction chamber, the radial area of the substrate 100 corresponding to the closed suction chamber may be pressed. When there is a negative pressure in a certain closed suction chamber, the radial area of the substrate 100 corresponding to the closed suction chamber may be sucked. By reducing the suction force of a certain closed suction chamber or increasing the positive pressing force, the position on the substrate 100 corresponding to the closed suction chamber may be ground more adequately; similarly, by increasing the suction force of a certain closed suction chamber or reducing the positive pressing force, the amount of grinding on the substrate 100 at the position corresponding to the closed suction chamber is reduced. This can effectively control the amount of grinding in the central area of the substrate during the substrate grinding process, thereby improving the uniformity and consistency of the substrate surface, and achieving high planarization. In the embodiment of the present disclosure, the Chuck/Dechuck function is removed to avoid the risk of abnormal functions and to improve efficiency.

The edge force exerting component is on the outer peripheral side of the suction holding component and below the main body 1, and the edge force exerting component has a bottom wall for pressing on the edge area of the substrate 100 to adjust polishing pressure on the edge area of the substrate 100, such that the edge of the substrate 100 may be ground to be more planarized.

Optionally, the vacuum suction structure 3 comprises multiple sets of ventilation grooves 31 arranged at intervals along the radial direction of the pressure disk. Each group of ventilation grooves 31 corresponds to at least one sealing ring 32, and the sealing rings

are of annular shape and are arranged on the outer peripheral sides of the corresponding ventilation grooves at intervals along the radial direction of the pressing disk.

Optionally, the ventilation grooves 31 are annular grooves opened on the bottom wall of the pressing disk 2; the annular ventilation grooves 31 and the pressing disk 2 are coaxially arranged; and along the radial direction of the pressing disk 2, the plurality of ventilation grooves 31 are nested from inside to outside at intervals. With this arrangement, during the rotational grinding process of the substrate 100, the polishing head can uniformly grind the annular areas on the substrate 100 corresponding to the plurality of annular grooves 31, so that the grinding of the substrate at the same circumferential position 100 is more uniform.

Each group of the ventilation grooves 31 comprises an annular ventilation groove 31, and each ventilation groove 31 corresponds to an annular sealing ring 32; the plurality of sealing rings 32 and the plurality of ventilation grooves 31 are all coaxially arranged, and the outer diameters of the plurality of sealing rings gradually increase along the radial direction of the pressing disk 2; the two sealing rings 32 located on inner and outer sides of the ventilation groove 31 cooperate with the bottom wall of the pressing disk 2 and the substrate 100 being sucked to form the closed suction chamber.

Of course, the ventilation grooves may also be of non-annular shape; each group of ventilation grooves may also include multiple ventilation grooves arranged at intervals along a circumference to achieve suction of the substrate at different positions on the circumference. The shape of the ventilation groove is not limited in the embodiment, and may be adjusted by those skilled in the art according to actual needs.

In the embodiment of the present disclosure, the edge force exerting component comprises a ring body 4 and a force exerting structure. The ring body 4 is sequentially provided with a first soft membrane chamber 41 and a second soft membrane chamber 42 along the direction of force application, wherein the first soft membrane chamber 41 and the second soft membrane chamber 42 are independent of each other. The bottom of the chamber 42 has an action surface suitable for pressing the substrate 100. The force exerting structure is provided at the connecting position between the first soft membrane chamber 41 and the second soft membrane chamber 42, with one end located inside the first soft membrane chamber 41, and the other end extending downward to a position close to the action surface of the second soft membrane chamber 42. The force exerting structure is suitable for moving downward to exert force on the action surface of the second soft

membrane chamber, when the pressure in the first soft membrane chamber increases, to press the edge area of the substrate 100.

In the embodiment of the present disclosure, during grinding of the substrate 100, the force exerting structure cooperates with the second soft membrane chamber 42 to press the edge of the substrate 100, so that the bottom surface of the second soft membrane chamber 42 is in complete contact with the substrate 100, and the grinding is more uniform. Compared with downward pressure generated by vacuum pressure contact, the downward pressure generated by the hard force exerting structure is transmitted faster, with no lag, and high timeliness, so that the substrate 100 may be ground to be more planarized.

The force exerting structure comprises a support member 5 and a pressing member 6. The support member 5 is inside the first soft membrane chamber 41 and is suitable for moving toward the second soft membrane chamber 42 and exerting force thereto, when the pressure in the first soft membrane chamber 41 changes. The pressing member 6 is provided in the second soft membrane chamber 42, with one end of the pressing member 6 being fixedly mounted and connected to the support member 5, and another end extending toward the action surface of the second soft membrane chamber 42, and the pressing member 6 is capable of moving in the second soft membrane chamber 42 when subjected to force, to press the action surface of the second soft membrane chamber 42.

Optionally, an end of the pressing member 6 adjacent to the action surface of the second soft membrane chamber 42 is formed into a flat surface. With the flat surface, the contact area between the pressing member 6 and the second soft membrane chamber 42 is increased, so that the downward pressure generated by the longitudinal deformation of the first soft membrane chamber 41 is transmitted to the pressing member 6, and evenly distributed on the substrate 100, avoiding damage of the substrate 100 due to concentration of the downward pressure on one point.

Optionally, the edge force exerting component further comprises a limiting member 7 covering the outer peripheral wall of the first soft membrane chamber 41. The limiting member 7 is suitable for limiting the radial deformation of the first soft membrane chamber 41 under pressure. The limiting member 7 effectively restricts the radial deformation of the first soft membrane chamber 41, so that the first soft membrane chamber 41 generates constant longitudinal deformation under pressure, and the longitudinal deformation generates a uniform downward pressure, which is effectively transmitted through the limiting member 7 to the pressing member 6. The timeliness of force transmission is further

improved; the edge of the substrate 100 is effectively pressed; and the pressing uniformity is ensured. The support member 5 and the pressing member 6 are connected through a fastener. The fastener may be a screw. The limiting member 7 encloses the fastener. The limiting member 7 is a T-shaped structure and is connected to the support member 5 and the pressing member 6 with the screw. The T-shaped limiting member is placed horizontally so that its included angle wraps over the lower side wall of the first soft membrane chamber 41. The pressing member 6 comprises a supporting part with a groove body, and a force exerting part below the supporting part. The lower end of the screw is fixed in the groove of the supporting part.

When using the polishing head, the soft membrane chambers contacting the substrate are first filled with gas of different pressures. When the first soft membrane chamber 41 is filled with gas, the first soft membrane chamber 41 deforms. Since the upper part of the limiting member 7 limits the radial deformation of the first soft membrane chamber 41, constant longitudinal deformation of the first soft membrane chamber 41 is generated. The downward pressure generated by the longitudinal deformation of the first soft membrane chamber 41 drives the support member 5 to move downward. Since the support member 5 and the pressing member 6 are connected through a fixed installation, the downward force generated by the longitudinal deformation of the first soft membrane chamber 41 is transmitted to the pressing member 6, so that the pressing member 6 moves in the second soft membrane. The bottom end of the pressing member 6 presses the outer edge of the action surface of the second soft membrane chamber 42, and the action surface of the second soft membrane chamber 42 contacts and presses the edge of the substrate.

In the embodiment, the amount of grinding at the edge of the substrate may be adjusted by adjusting the gas pressure in the first soft membrane chamber 41; and by adjusting the gas pressure in each ventilation groove 31 and each closed suction chamber connected thereto, the amount of grinding in the central part of the substrate may be adjusted. Thus, the uniformity and consistency of the substrate surface may be improved, and thereby achieving high planarization.

Embodiments of the present disclosure also provide a substrate polishing device, which comprises the polishing head described in any one of the preceding embodiments.

The substrate polishing device provided by the present disclosure comprises the aforementioned polishing head. The technical advantages and effects achieved by the

substrate polishing device also include the technical advantages and effects achieved by the polishing head, which will not be repeated here.

Embodiments of the present disclosure also provide a grinding method, using the polishing head according to any one of the embodiments above, comprising: installing the polishing head on a substrate polishing device; using the suction holding component on the polishing head to press a substrate 100 on the polishing surface; and during grinding process, adjusting amount of grinding in the central area of the substrate 100 by adjusting suction force or pressing force of the suction holding component on the central area of the substrate 100, and adjusting amount of grinding in the edge area of the substrate 100 by adjusting pressing force of the edge force exerting component on the substrate 100.

Specifically, during the grinding and polishing process, the gas pressure in each ventilation groove 31 and each closed suction chamber connected thereto may be controlled, so as to adjust the suction force or pressing force of each closed suction chamber on each radial area of the substrate 100. When there is a positive pressure in a certain closed suction chamber, the radial area of the substrate 100 corresponding to the closed suction chamber may be pressed. When there is a negative pressure in a certain closed suction chamber, the radial area of the substrate 100 corresponding to the closed suction chamber may be sucked. By reducing the suction force of a certain closed suction chamber or increasing the positive pressing force, the position on the substrate 100 corresponding to the closed suction chamber may be ground more adequately; similarly, by increasing the suction force of a certain closed suction chamber or reducing the positive pressing force, the amount of grinding on the substrate 100 at the position corresponding to the closed suction chamber is reduced. This can effectively control the amount of grinding in the central area of the substrate during the substrate grinding process, thereby improving the uniformity and consistency of the substrate surface, and achieving high planarization.

Beneficial Effects:

The grinding method provided by the present disclosure uses the polishing head in the aforementioned embodiment. The technical advantages and effects achieved by the grinding method also include the technical advantages and effects achieved by the polishing head, which will not be repeated here.

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 polishing head, comprising:

a main body (1);

a suction holding component fixed to a bottom centre of the main body (1) for sucking a substrate (100) and pressing the substrate (100) on a polishing surface; and

an edge force exerting component on outer peripheral side of the suction holding component and below the main body (1), wherein the edge force exerting component has a bottom wall for pressing on edge area of the substrate (100) to adjust polishing pressure on the edge area of the substrate (100).

2. The polishing head according to claim 1, wherein the suction holding component comprises:

a pressing disk (2), fixed to bottom wall of the main body (1), for pressing the substrate (100); and

a vacuum suction structure (3), comprising a ventilation groove (31) on bottom wall of the pressing disk (2) and a sealing ring (32) on outer peripheral side of the ventilation groove (31); wherein the ventilation groove (31) is suitable for connection with an external vacuum device;

wherein, when the pressing disk (2) is pressed on the substrate (100), the sealing ring (32) is in sealing contact with the substrate (100) to form a closed suction chamber between the pressing disk (2) and the substrate (100) and connected with the ventilation groove (31).

3. The polishing head according to claim 2, wherein the vacuum suction structure (3) comprises a plurality of groups of ventilation grooves (31) arranged at intervals along a radial direction of the pressing disk (2);

each group of the ventilation grooves (31) corresponds to at least one sealing ring (32); and the sealing rings (32) are of annular shape and are arranged on outer peripheral sides of the corresponding ventilation grooves (31) at intervals along the radial direction of the pressing disk (2).

4. The polishing head according to claim 3, wherein the ventilation grooves (31) are annular grooves opened on the bottom wall of the pressing disk (2); the annular ventilation grooves (31) and the pressing disk (2) are coaxially arranged; and along the radial direction of the pressing disk (2), the plurality of ventilation grooves (31) are nested from inside to outside at intervals.

5. The polishing head according to claim 3 or 4, wherein each group of the ventilation grooves (31) comprises an annular ventilation groove (31), and each ventilation groove (31) corresponds to an annular sealing ring (32);

the plurality of sealing rings (32) and the plurality of ventilation grooves (31) are all coaxially arranged; and outer diameters of the plurality of sealing rings (32) gradually increase along the radial direction of the pressing disk (2);

two sealing rings (32) on inner and outer sides of the ventilation groove (31) cooperate with the bottom wall of the pressing disk (2) and the substrate (100) being sucked to form the closed suction chamber.

6. The polishing head according to any one of claims 1 to 4, wherein the edge force exerting component comprises:

a ring body (4), the ring body (4) being provided with a first soft membrane chamber (41) and a second soft membrane chamber (42) in sequence along a force exerting direction, wherein the first soft membrane chamber (41) and the second soft membrane chamber (42) are independent of each other, and bottom of the second soft membrane chamber (42) has an action surface for pressing the substrate (100); and

a force exerting structure, having one end located in the first soft membrane chamber (41) and another end extending downward to a position close to the action surface of the second soft membrane chamber (42), wherein the force exerting structure is suitable for moving downward to exert force on the action surface of the second soft membrane chamber (42), when pressure in the first soft membrane chamber (41) increases, to press the edge area of the substrate (100).

7. The polishing head according to claim 6, wherein the force exerting structure comprises:

a support member (5) in the first soft membrane chamber (41), for moving toward and exerting force to the second soft membrane chamber (42) when the pressure in the first soft membrane chamber (41) changes; and

a pressing member (6) in the second soft membrane chamber (42), wherein one end of the pressing member (6) is fixedly mounted and connected to the support member (5), and another end extends toward the action surface of the second soft membrane chambers (42), and the pressing member (6) is capable of moving in the second soft membrane chamber (42) when subjected to force, to press the action surface of the second soft membrane chamber (42).

8. The polishing head according to claim 7, wherein an end of the pressing member (6) close to the action surface of the second soft membrane chamber (42) is formed into a flat surface.

9. The polishing head according to claim 7 or 8, wherein the edge force exerting component further comprises:

a limiting member (7), covering outer peripheral wall of the first soft membrane chamber (41), for limiting radial deformation of the first soft membrane chamber (41) under pressure.

10. A substrate polishing device, comprising the polishing head according to any one of claims 1 to 9.

11. A grinding method, using the polishing head according to any one of claims 1 to 9, comprising:

installing the polishing head on a substrate polishing device;

using the suction holding component on the polishing head to press a substrate (100) on a polishing surface; and during grinding process, adjusting amount of grinding in a central area of the substrate (100) by adjusting suction force or pressing force of the suction holding component on the central area of the substrate (100); and adjusting amount of grinding in an edge area of the substrate (100) by adjusting pressing force of the edge force exerting component on the substrate (100).