WAFER CLEANING APPARATUS AND CLEANING METHOD

FIELD OF THE INVENTION

The present invention relates to the field of semiconductor equipment, and in particular to a wafer cleaning apparatus and a cleaning method.

BACKGROUND

In the semiconductor manufacturing process, the cleaning process is an indispensable step. The batch wet cleaning machine has the significant advantages of high throughput and low cleaning liquid consumption, and has become the mainstream machine for current cyclic wafer cleaning. One of the significant differences between batch wet cleaning and single-wafer cleaning is the repeated use of cyclic chemical liquid. In order to ensure the relative cleanliness of the chemical liquid in a tank, it is necessary to continuously perform cyclic filtration on the chemical liquid to discharge pollutants such as particles and metal ions generated after the process out of the tank.

Most of the existing batch wet cleaning circulation systems still adopt a double-tanks (inner tank and outer tank) structure. After an inner tank reaches full liquid level, the liquid overflows into an outer tank by gravity. The cleaning liquid in the outer tank is filtered through a circulation filtration pipeline and finally returns to the inner tank. Most of the particles and other impurities can be removed through this cyclic filtration. However, only the particles generated in the inner tank process that reach the liquid surface can overflow into the outer tank, and most of the other particles will sink downward under the action of gravity. Therefore, with the increase in the number of wafers to be cleaned, more and more impurities accumulate in the tank bodies, resulting in a poor cleaning effect.

SUMMARY

The technical problems to be solved by the present invention are to overcome the defects of a lot of impurities in tank bodies and the poor cleaning effect of a batch wet cleaning apparatus in the prior art, and the present invention provides a wafer cleaning apparatus and a cleaning method.

The present invention solves the above technical problems through the following technical solutions:

The present application proposes a wafer cleaning apparatus, comprising:

a first tank, used for containing cleaning liquid and a wafer;

a second tank, used for containing cleaning liquid;

a spray mechanism, used for spraying cleaning liquid onto the wafer;

a second circulation filtration pipeline, a liquid inlet of the second circulation filtration pipeline being connected to the first tank, the second tank being arranged on the second circulation filtration pipeline, a liquid outlet of the second circulation filtration pipeline being connected to the spray mechanism, and the second circulation filtration pipeline discharging the cleaning liquid in the first tank into the second tank and transferring the cleaning liquid from the second tank to the spray mechanism.

Preferably, the second circulation filtration pipeline further includes an auxiliary circulation filtration pipeline, and the auxiliary circulation filtration pipeline is connected to the second tank and used for circularly filtering the cleaning liquid in the second tank.

Preferably, the second tank includes a second inner tank and a second outer tank, the auxiliary circulation filtration pipeline connects the second inner tank to the second outer tank, and the cleaning liquid in the second inner tank overflows into the second outer tank and returns to the second inner tank through the auxiliary circulation filtration pipeline.

Preferably, the second circulation filtration pipeline outputs the cleaning liquid from the middle region or the upper region of the second inner tank.

Preferably, the second tank is further provided with a second liquid discharge pipeline and a second liquid supplement pipeline, the second liquid discharge pipeline is connected to the second inner tank, and the second liquid supplement pipeline is connected to the second outer tank.

Preferably, the second circulation filtration pipeline includes a first section pipeline located between the first tank and the second tank and a second section pipeline located between the second tank and the spray mechanism, and at least one of the first section pipeline and the second section pipeline is provided with a circulation pump and a filter.

Preferably, the second circulation filtration pipeline includes a first section pipeline located between the first tank and the second tank, a section pipeline located between the second tank and the spray mechanism, and an auxiliary circulation filtration pipeline, and at least one of the first section pipeline, the second section pipeline, and the auxiliary circulation filtration pipeline is provided with a circulation pump and a filter.

Preferably, the second tank is of a single-tank structure, and the auxiliary circulation filtration pipeline shares the circulation pump and the filter with the second circulation filtration pipeline.

Preferably, the wafer cleaning apparatus further comprises a first circulation filtration pipeline, and the first circulation filtration pipeline is connected to the first tank and used for circularly filtering the cleaning liquid in the first tank.

Preferably, the first tank includes a first inner tank and a first outer tank, the first circulation filtration pipeline connects the first inner tank to the first outer tank, and the cleaning liquid in the first inner tank overflows into the first outer tank and returns to the first inner tank through the first circulation filtration pipeline.

Preferably, the first tank is further provided with a first liquid supplement pipeline and a first liquid discharge pipeline, the first liquid supplement pipeline is connected to the first outer tank, and the first liquid discharge pipeline is connected to the first inner tank.

Preferably, the wafer cleaning apparatus further comprises a liquid level sensor, and the liquid level sensor is arranged in the first tank and used for detecting the liquid level of the cleaning liquid in the first tank.

A wafer cleaning method adopts the above-mentioned wafer cleaning apparatus,

and the cleaning method comprises:

performing soak-cleaning on the wafer in the first tank;

draining the cleaning liquid from the first tank;

in the process of draining the cleaning liquid from the first tank, discharging at least part of the cleaning liquid in the first tank into the second tank through the second circulation filtration pipeline;

performing spray-cleaning on the wafer through the second circulation filtration pipeline and the spray mechanism.

Preferably, in the process of performing soak-cleaning on the wafer, the cleaning liquid in the first tank is discharged while the cleaning liquid is supplemented into the first tank, so as to replace the cleaning liquid in the first tank.

Preferably, the method further comprises:

performing self-circulation filtration on the cleaning liquid in the first tank and/or the cleaning liquid in the second tank.

Preferably, in the step of draining the cleaning liquid from the first tank, before the wafer is exposed to the cleaning liquid, the spray mechanism is used to perform immersion-spray on the wafer to ensure that the wafer can remain wet all the time.

A wafer cleaning method adopts the above-mentioned wafer cleaning apparatus, and the cleaning method comprises:

performing soak-cleaning on the wafer in the first tank;

draining the cleaning liquid from the first tank;

after the cleaning liquid in the first tank is drained, opening the second circulation filtration pipeline between the first tank and the second tank, and supplying cleaning liquid to the spray mechanism through the second circulation filtration pipeline to perform spray-cleaning on the wafer.

Preferably, the cleaning method further comprises:

performing self-circulation filtration on the cleaning liquid in the first tank and/or the cleaning liquid in the second tank.

Preferably, in the step of draining the cleaning liquid from the first tank, before the wafer is exposed to the cleaning liquid, the spray mechanism is used to perform immersion-spray on the wafer to ensure that the wafer can remain wet all the time.

The positive and progressive effects of the present invention are as follows: In the present invention, by arranging a second tank and a second circulation filtration pipeline, the cleaning liquid in a first tank can be discharged into the second tank through the second circulation filtration pipeline, and a wafer is spray-cleaned by means of the second circulation filtration pipeline and a spray mechanism. Before the cleaning liquid in the first tank is supplied to the spray mechanism, the cleaning liquid can be filtered again through the second circulation filtration pipeline, so that the impurities remaining in the first tank can be removed, the cleanliness can be improved, and the high-purity cleaning liquid filtered through the second circulation filtration pipeline is sprayed onto the wafer by the spray mechanism to perform spray-cleaning on the wafer, thereby improving the cleaning effect of the wafer.

BRIEF DESCRIPTION OF THE DRAWINGS

The features and performance of the present invention are further described by the following embodiments and the accompanying drawings of the embodiments.

FIG. 1 is a schematic structural view of the wafer cleaning apparatus according to Embodiment 1 of the present invention;

FIG. 2 is a schematic structural view of the wafer cleaning apparatus according to Embodiment 2 of the present invention;

FIG. 3 is a flow chart of the wafer cleaning method according to Embodiment 3 of the present invention;

FIG. 4 is a flow chart of the wafer cleaning method according to Embodiment 4

of the present invention.

PREFERRED EMBODIMENTS OF THE INVENTION

The present invention will be further described below through embodiments, but the present invention is not limited to the scope of the embodiments.

Embodiment 1

With the continuous development of semiconductor manufacturing processes, the application field of wafer cleaning apparatus is becoming more and more extensive. For different applications and chemical liquids, such as the application of photoresist stripping processes, the traditional operation mode of inner/outer-tank self-circulation or single-tank self-circulation can no longer meet the requirements. With the increase in the number of wafers to be cleaned, impurities such as photoresist remaining in tank bodies cannot be discharged, thereby affecting the wafer cleaning effect.

In view of this situation, the present embodiment provides a wafer cleaning apparatus. As shown in FIG. 1, the wafer cleaning apparatus comprises a first tank 110 and a first circulation filtration pipeline 120. The first tank 110 is used for containing cleaning liquid and a wafer, and the first circulation filtration pipeline 120 is connected to the first tank 110 and used for circularly filtering the cleaning liquid in the first tank 110. The wafer cleaning apparatus further comprises a second tank 210, a spray mechanism 300, and a second circulation filtration pipeline 220. The second tank 210 is used for containing cleaning liquid, and the spray mechanism 300 is used for spraying cleaning liquid onto the wafer. The liquid inlet of the second circulation filtration pipeline 220 can be connected to the first tank 110, the second tank 210 is arranged on the second circulation filtration pipeline 220, the liquid outlet of the second circulation filtration pipeline 220 is connected to the spray mechanism 300, and the second circulation filtration pipeline 220 can discharge the cleaning liquid in the first tank 110 into the second tank 210 and transfer the cleaning liquid from the second tank 210 to the spray mechanism 300.

Specifically, in this embodiment, the first tank 110 includes a first inner tank 111 and a first outer tank 112. The first circulation filtration pipeline 120 connects the first

inner tank 111 to the first outer tank 112, and the cleaning liquid in the first inner tank 111 overflows into the first outer tank 112 and returns to the first inner tank 111 through the first circulation filtration pipeline 120. The first circulation filtration pipeline 120 is provided with a circulation pump 410 and a filter 510. The liquid inlet of the first circulation filtration pipeline 120 is connected to the first outer tank 112, and the liquid outlet is connected to the first inner tank 111. Certainly, in other embodiments, the first tank 110 can also be of a single-tank structure.

The first tank 110 can be used for soaking and dissolving impurities such as photoresist on the wafer. The impurities floating in the first inner tank 111 will overflow into the first outer tank 112 when reaching the overflow position, and are filtered through the first circulation filtration pipeline 120 to remove most of the impurities, such as photoresist, and then return to the first inner tank 111. During the wafer cleaning process, more and more impurities will accumulate in the first tank 110, and some residual photoresist and other impurities that do not reach the overflow position will sink under the action of gravity and cannot be filtered, and accumulate at the bottom of the first tank 110, such as the bottom of the first inner tank 111, resulting in a poor soak-cleaning effect of the first tank 110 on the wafer. By arranging the second tank 210 and the second circulation filtration pipeline 220, the cleaning liquid in the first tank 110 can be discharged into the second tank 210 through the second circulation filtration pipeline 220, and the wafer is spray-cleaned by means of the second circulation filtration pipeline 220 and the spray mechanism 300. Before the cleaning liquid in the first tank 110 is supplied to the spray mechanism 300, the cleaning liquid can be filtered again through the second circulation filtration pipeline 220, so that the impurities, especially the impurities deposited in the first tank 110, can be removed, and the cleanliness of the cleaning liquid can be improved. Then, the high-purity cleaning liquid filtered through the second circulation filtration pipeline 220 is sprayed onto the wafer by the spray mechanism 300 to perform spray-cleaning on the wafer, thereby improving the cleaning effect of the wafer.

In this embodiment, a first section pipeline 220a between the first tank 110 and the second tank 210 is provided with a circulation pump 420 and a filter 520. The cleaning liquid in the first tank 110 is filtered by the filter 520 and then discharged into the second tank 210, which can remove the impurities in the cleaning liquid and

improve the spray-cleaning effect of the wafer.

In addition, a second section pipeline 220b between the second tank 210 and the spray mechanism 300 is also provided with a circulation pump 430 and a filter 530. The cleaning liquid in the second tank 210 is filtered by the filter 530 before reaching the spray mechanism 300 to clean the wafer, which can further improve the cleanliness of the cleaning liquid supplied to the spray mechanism 300, thereby improving the spray-cleaning effect of the wafer.

In order to further improve the cleanliness of the cleaning liquid supplied to the spray mechanism 300, the second circulation filtration pipeline 220 further includes an auxiliary circulation filtration pipeline 230. The auxiliary circulation filtration pipeline 230 is connected to the second tank 210 and used for circularly filtering the cleaning liquid in the second tank 210. The auxiliary circulation filtration pipeline 230 can further filter the impurities in the cleaning liquid in the second tank 210, so that the cleaning liquid supplied to the spray mechanism 300 has better cleanliness, and the high-purity cleaning liquid can better remove the impurities on the surface of the wafer, ensuring the cleanliness and quality of the wafer.

It should be noted that in other embodiments, the circulation pump and the filter can be only arranged on the first section pipeline 220a between the first tank 110 and the second tank 210; or only arranged on the second section pipeline 220b between the second tank 210 and the spray mechanism 300; or only arranged on the auxiliary circulation filtration pipeline 230. In addition, the circulation pumps and the filters can also be arranged on any two pipelines of the above-mentioned first section pipeline 220a, the second section pipeline 220b, and the auxiliary circulation filtration pipeline 230 at the same time. For example, both the auxiliary circulation filtration pipeline 230 and the first section pipeline 220a between the first tank 110 and the second tank 210 can be provided with the circulation pump and the filter at the same time.

In this embodiment, the second tank 210 includes a second inner tank 211 and a second outer tank 212. The auxiliary circulation filtration pipeline 230 connects the second inner tank 211 to the second outer tank 212, and the cleaning liquid in the second inner tank 211 overflows into the second outer tank 212 and returns to the second inner tank 211 through the auxiliary circulation filtration pipeline 230. The

cleaning liquid in the second inner tank 211 overflows into the second outer tank 212, and the impurities floating in the second inner tank 211 can be removed. The auxiliary circulation filtration pipeline 230 is provided with a circulation pump 440 and a filter 540, the liquid inlet of the auxiliary circulation filtration pipeline 230 is connected to the second outer tank 212, and the liquid outlet is connected to the second inner tank 211. Certainly, in other embodiments, the second tank 210 can also be of a single-tank structure. The second tank 210 with a single-tank structure occupies a small space.

Further, the second circulation filtration pipeline 220 outputs the cleaning liquid from the middle region or the upper region of the second inner tank 211. A part of the impurities in the second inner tank 211 will float upward and overflow into the second outer tank 212, and a part of the impurities will sink to the bottom of the second inner tank 211 under the action of gravity. Based on this situation, the cleanliness of the cleaning liquid in the middle region or the upper region of the second inner tank 211 is higher. Therefore, outputting the cleaning liquid from the middle region or the upper region of the second inner tank 211 helps to further improve the cleaning effect of the wafer.

In order to ensure that all impurities can be filtered in the second tank 210, the second tank 210 is further provided with a second liquid discharge pipeline 250 and a second liquid supplement pipeline 240. The second liquid discharge pipeline 250 is connected to the second inner tank 211, and the second liquid supplement pipeline 240 is connected to the second outer tank 212. By arranging the second liquid discharge pipeline 250 and the second liquid supplement pipeline 240, the cleaning liquid in the second tank 210 can be discharged while the cleaning liquid is supplemented into the second tank 210, so as to complete the replacement of the cleaning liquid in the second tank 210 and further improve the cleanliness of the cleaning liquid in the second tank 210. In addition, the second liquid supplement pipeline 240 is connected to the second outer tank 212, which can not only supplement the cleaning liquid in the second tank 210 in real time, but also allow the fresh cleaning liquid supplemented through the second liquid supplement pipeline 240 to flow into the second inner tank 211 through the auxiliary circulation filtration pipeline 230 after being buffered by the second outer tank 212, so that the concentration and temperature of the cleaning liquid in the second inner tank 211 are not easily changed. The second liquid discharge pipeline 250 is

provided with a valve 650.

In order to reduce the impurities in the cleaning liquid entering the second tank 210, the first tank 110 is further provided with a first liquid supplement pipeline 130 and a first liquid discharge pipeline 140. The first liquid supplement pipeline 130 is connected to the first outer tank 112, and the first liquid discharge pipeline 140 is connected to the first inner tank 111. When the soak-cleaning is performed on the wafer in the first tank 110, the first liquid discharge pipeline 140 and the first liquid supplement pipeline 130 can be arranged to discharge the cleaning liquid in the first tank 110 while supplementing the cleaning liquid into the first tank 110, so as to replace the cleaning liquid in the first tank 110 while performing soak-cleaning on the wafer, thereby reducing the impurities in the cleaning liquid entering the second tank 210. In addition, the first liquid supplement pipeline 130 is connected to the first outer tank 112, which can not only supplement the cleaning liquid in the first tank 110 in real time, but also allow the fresh cleaning liquid supplemented through the first liquid supplement pipeline 130 to flow into the first inner tank 111 through the first circulation filtration pipeline 120 after being buffered by the first outer tank 112, so that the concentration and temperature of the cleaning liquid in the first inner tank 111 are not easily changed.

The first liquid discharge pipeline 140 shares a circulation pump 410 with the first circulation filtration pipeline 120. By opening valves 610 and 620 and closing valves 630 and 640, liquid discharge can be accomplished.

In this embodiment, the above-mentioned filters are all arranged on the outlet side of the circulation pumps. The outlet side of the circulation pumps has higher pressure, which improves the filtering effect. Certainly, in other embodiments, the filters can also be arranged on the inlet side of the circulation pumps, so that the impurities entering the circulation pumps can be reduced, and the service life of the circulation pumps can be prolonged.

In this embodiment, the wafer cleaning apparatus further comprises a liquid level sensor (not shown in the figure), and the liquid level sensor is arranged in the first tank 110 and used for detecting the liquid level of the cleaning liquid in the first tank 110. The liquid level sensor can be used to obtain the liquid level of the cleaning liquid in

the first tank 110. On the one hand, during the soak-cleaning on the wafer in the first tank 110, it is convenient to supplement the cleaning liquid in real time according to the liquid level condition; on the other hand, when the valve 640 is opened to deliver the cleaning liquid in the first tank 110 into the second tank 210 for spray-cleaning on the wafer, it can be determined whether the cleaning liquid in the first tank 110 is completely drained.

Embodiment 2

As shown in FIG. 2, the present embodiment has basically the same structure as the structure in Embodiment 1, and the same parts will not be repeated here. The difference is that:

The circulation pump and the filter are only arranged on the second section pipeline 220b between the second tank 210 and the spray mechanism 300. In addition, the second tank 210 is of a single-tank structure, and the auxiliary circulation filtration pipeline 230 shares the circulation pump 530 and the filter 430 with the second section pipeline 220b, which helps to reduce the cost.

Embodiment 3

The present embodiment also provides a wafer cleaning method, and the wafer cleaning method adopts the wafer cleaning apparatus according to Embodiment 1 or Embodiment 2. As shown in FIG. 3, the cleaning method comprises the following steps:

S11. Perform soak-cleaning on the wafer in the first tank.

S12. Drain the cleaning liquid from the first tank.

S13. In the process of draining the cleaning liquid from the first tank, discharge at least part of the cleaning liquid in the first tank into the second tank through the second circulation filtration pipeline.

S14. Perform spray-cleaning on the wafer through the second circulation filtration pipeline and the spray mechanism.

Wherein, in the process of draining the cleaning liquid from the first tank, before the wafer is exposed to the cleaning liquid, the spray mechanism is used to perform immersion-spray on the wafer to ensure that the wafer can remain wet all the time.

In some embodiments, after the cleaning liquid in the first tank is drained, the spray mechanism continues to spray the wafer for a predetermined time to ensure that the impurities and residues on the surface of the wafer are effectively washed away.

The cleaning liquid is circularly filtered through the second circulation filtration pipeline, so that the impurities and pollutants in the cleaning liquid can be removed, the cleanliness of the cleaning liquid can be maintained, and the service life of the cleaning liquid can be prolonged, which not only saves the cost of the cleaning liquid, but also is more friendly to the environment. By performing soak-cleaning on the wafer in the first tank, most of the dirt and impurities on the surface of the wafer can be effectively removed. The soak-cleaning can make the cleaning liquid fully contact the wafer, thoroughly clean the dirt and impurities remaining on the surface of the wafer, and improve the cleaning effect. The cleaning liquid is discharged into the second tank through the second circulation filtration pipeline, so that the cleaning liquid can be further filtered and recycled, which helps to save the cleaning liquid. The filtered cleaning liquid is sprayed onto the wafer by the spray mechanism to perform spray-cleaning on the wafer, and the spray-cleaning can effectively wash away the impurities and residues on the surface of the wafer, thereby further improving the cleaning effect of the wafer.

In the process of executing step S11, the spent cleaning liquid in the first tank can also be discharged while the fresh cleaning liquid is supplemented into the first tank, so as to replace the old cleaning liquid in the first tank and improve the cleanliness of the cleaning liquid in the first tank.

In addition, the cleaning method further comprises: performing self-circulation filtration on the cleaning liquid in the second tank. Certainly, in some embodiments, the cleaning liquid in the first tank can also be self-circulated and filtered through the first circulation pipeline, or both the cleaning liquid in the first tank and the cleaning liquid in the second tank can be self-circulated and filtered. The above self-circulation filtration operations help to further improve the cleanliness of the cleaning liquid.

Embodiment 4

This embodiment provides a wafer cleaning method different from the wafer cleaning method in Embodiment 3, which adopts the wafer cleaning apparatus according to Embodiment 1 or Embodiment 2. As shown in FIG. 4, the cleaning method comprises:

S21. Perform soak-cleaning on the wafer in the first tank.

S22. Drain the cleaning liquid from the first tank.

S23. After the cleaning liquid in the first tank is drained, open the second circulation filtration pipeline between the first tank and the second tank, and supply cleaning liquid to the spray mechanism through the second circulation filtration pipeline to perform spray-cleaning on the wafer.

Wherein, in the process of draining the cleaning liquid from the first tank, before the wafer is exposed to the cleaning liquid, the spray mechanism is used to perform immersion-spray on the wafer.

The cleaning liquid is circularly filtered through the second circulation filtration pipeline, so that the impurities and pollutants in the cleaning liquid can be removed, the cleanliness of the cleaning liquid can be maintained, and the service life of the cleaning liquid can be prolonged, which not only saves the cost of the cleaning liquid, but also is more friendly to the environment. Before the cleaning liquid in the first tank is drained, the second circulation filtration pipeline between the first tank and the second tank is closed, which can prevent the cleaning liquid used for soaking the wafer in the first tank (the cleaning liquid contains a high content of impurities and pollutants) from being discharged into the second tank, thereby avoiding polluting the cleaning liquid used for spraying the wafer in the second tank (the cleaning liquid is either freshly supplied and clean, or the cleaning liquid is recycled after having been used to spray the wafer, and the content of impurities and contaminants is comparatively low). Before the cleaning liquid in the first tank is drained, the immersion-spray is performed on the wafer, so that the wafer can be kept in a wet state all the time. After the cleaning liquid in the first tank is drained, the second circulation filtration pipeline between the

first tank and the second tank is opened, the cleaning liquid (with high impurity content) after soaking the wafer in the first tank does not mix with the cleaning liquid (with no impurity or low impurity content) used for spraying the wafer in the second tank, so as to keep the cleaning liquid cleaner during the spray-cleaning on the wafer. In addition, after opening the second circulation filter pipeline between the first tank and the second tank, the cleaning liquid can form a circulation between the first tank and the second tank, which helps to save the cleaning liquid.

In addition, the cleaning method further comprises: performing self-circulation filtration on the cleaning liquid in the second tank. Certainly, in some embodiments, the cleaning liquid in the first tank can also be self-circulated and filtered, or both the cleaning liquid in the first tank and the cleaning liquid in the second tank can be self-circulated and filtered. The above self-circulation filtration operations help to further improve the cleanliness of the cleaning liquid.

Although the specific embodiments of the present invention have been described above, those skilled in the art should understand that the above-described embodiments are only examples, and the protection scope of the present invention is defined by the appended claims. Those skilled in the art can make various changes or modifications to these embodiments without departing from the principle and essence of the present invention, but these changes and modifications all fall within the protection scope of the present invention.

CLAIMS:

1. A wafer cleaning apparatus, comprising:

a first tank, used for containing cleaning liquid and a wafer;

a second tank, used for containing cleaning liquid;

a spray mechanism, used for spraying cleaning liquid onto the wafer;

a second circulation filtration pipeline, a liquid inlet of the second circulation filtration pipeline being connected to the first tank, the second tank being arranged on the second circulation filtration pipeline, a liquid outlet of the second circulation filtration pipeline being connected to the spray mechanism, and the second circulation filtration pipeline discharging the cleaning liquid in the first tank into the second tank and transferring the cleaning liquid from the second tank to the spray mechanism.

2. The wafer cleaning apparatus according to claim 1, wherein the second circulation filtration pipeline further includes an auxiliary circulation filtration pipeline, and the auxiliary circulation filtration pipeline is connected to the second tank and used for circularly filtering the cleaning liquid in the second tank.

3. The wafer cleaning apparatus according to claim 2, wherein the second tank includes a second inner tank and a second outer tank, the auxiliary circulation filtration pipeline connects the second inner tank to the second outer tank, and the cleaning liquid in the second inner tank overflows into the second outer tank and returns to the second inner tank through the auxiliary circulation filtration pipeline.

4. The wafer cleaning apparatus according to claim 3, wherein the second circulation filtration pipeline outputs the cleaning liquid from the middle region or the upper region of the second inner tank.

5. The wafer cleaning apparatus according to claim 3, wherein the second tank is further provided with a second liquid discharge pipeline and a second liquid supplement pipeline, the second liquid discharge pipeline is connected to the second inner tank, and the second liquid supplement pipeline is connected to the second outer

tank.

6. The wafer cleaning apparatus according to claim 1, wherein the second circulation filtration pipeline includes a first section pipeline located between the first tank and the second tank and a second section pipeline located between the second tank and the spray mechanism, and at least one of the first section pipeline and the second section pipeline is provided with a circulation pump and a filter.

7. The wafer cleaning apparatus according to claim 2, wherein the second circulation filtration pipeline includes a first section pipeline located between the first tank and the second tank, a second section pipeline located between the second tank and the spray mechanism, and the auxiliary circulation filtration pipeline, and at least one of the first section pipeline, the second section pipeline, and the auxiliary circulation filtration pipeline is provided with a circulation pump and a filter.

8. The wafer cleaning apparatus according to claim 7, wherein the second tank is of a single-tank structure, and the auxiliary circulation filtration pipeline shares the circulation pump and the filter with the second circulation filtration pipeline.

9. The wafer cleaning apparatus according to claim 1, wherein the wafer cleaning apparatus further comprises a first circulation filtration pipeline, and the first circulation filtration pipeline is connected to the first tank and used for circularly filtering the cleaning liquid in the first tank.

10. The wafer cleaning apparatus according to claim 9, wherein the first tank includes a first inner tank and a first outer tank, the first circulation filtration pipeline connects the first inner tank to the first outer tank, and the cleaning liquid in the first inner tank overflows into the first outer tank and returns to the first inner tank through the first circulation filtration pipeline.

11. The wafer cleaning apparatus according to claim 10, wherein the first tank is further provided with a first liquid supplement pipeline and a first liquid discharge pipeline, the first liquid supplement pipeline is connected to the first outer tank, and the first liquid discharge pipeline is connected to the first inner tank.

12. The wafer cleaning apparatus according to claim 1, wherein the wafer cleaning

apparatus further comprises a liquid level sensor, and the liquid level sensor is arranged in the first tank and used for detecting the liquid level of the cleaning liquid in the first tank.

13. A wafer cleaning method adopting the wafer cleaning apparatus according to any one of claims 1 to 12, comprising:

performing soak-cleaning on the wafer in the first tank;

draining the cleaning liquid from the first tank;

in the process of draining the cleaning liquid from the first tank, discharging at least part of the cleaning liquid in the first tank into the second tank through the second circulation filtration pipeline;

performing spray-cleaning on the wafer through the second circulation filtration pipeline and the spray mechanism.

14. The wafer cleaning method according to claim 13, wherein, in the process of performing soak-cleaning on the wafer, the cleaning liquid in the first tank is discharged while the cleaning liquid is supplemented into the first tank, so as to replace the cleaning liquid in the first tank.

15. The wafer cleaning method according to claim 13, wherein the method further comprises:

performing self-circulation filtration on the cleaning liquid in the first tank and/or the cleaning liquid in the second tank.

16. The wafer cleaning method according to claim 13, wherein, in the step of draining the cleaning liquid from the first tank, before the wafer is exposed to the cleaning liquid, the spray mechanism is used to perform immersion-spray on the wafer to ensure that the wafer can remain wet all the time.

17. A wafer cleaning method adopting the wafer cleaning apparatus according to any one of claims 1 to 12, comprising:

performing soak-cleaning on the wafer in the first tank;

draining the cleaning liquid from the first tank;

after the cleaning liquid in the first tank is drained, opening the second circulation filtration pipeline between the first tank and the second tank, and supplying cleaning liquid to the spray mechanism through the second circulation filtration pipeline to perform spray-cleaning on the wafer.

18. The wafer cleaning method according to claim 17, wherein the cleaning method further comprises:

performing self-circulation filtration on the cleaning liquid in the first tank and/or the cleaning liquid in the second tank.

19. The wafer cleaning method according to claim 17, wherein, in the step of draining the cleaning liquid from the first tank, before the wafer is exposed to the cleaning liquid, the spray mechanism is used to perform immersion-spray on the wafer to ensure that the wafer can remain wet all the time.