Claims

1. A vacuum suction system, for sucking and releasing a wafer located on a bearing surface of a vacuum suction heater (200) in a reaction chamber (100), wherein the reaction chamber (100) has an extraction port (101), the vacuum suction heater (200) has a ventilation port (201), and the system comprises:

a first pipeline (A), for fluid coupling the extraction port (101) of the reaction chamber (100) with a vacuum pump (300);

a second pipeline (B), for fluid coupling the ventilation port (201) of the vacuum suction heater (200) with the vacuum pump (300); and

a third pipeline (C), connected to the second pipeline (B), wherein a pressure controller (401) for adjusting gas flow rate supplied to the vacuum suction system is further set on the third pipeline (C), so as to supply gas from the gas source (400) to a suction pipeline inside the vacuum suction heater (200) through the second pipeline (B) and the third pipeline (C), meanwhile continuously suctioning gas from the suction pipeline through the second pipeline (B), to maintain pressure on a back side of the wafer lower than that on a front side thereof, and the suction pipeline is fluid connected to the ventilation port (201).

2. The vacuum suction system according to claim 1, wherein a first valve (CHCV-1) is set near the ventilation port (201) on the second pipeline (B), and the third pipeline (C) is connected to downstream of the first valve (CHCV-1) on the second pipeline (B).

3. The vacuum suction system according to claim 2, wherein a second valve (CHCV-2) is set on the third pipeline (C).

4. The vacuum suction system according to claim 1, wherein the pressure controller (401) comprises a mass flow controller (MFM), an adjustable flow valve (402) and a pressure measuring device (403).

5. The vacuum suction system according to claim 3, wherein:

a throttle valve (TV) is set on the first pipeline (A);

the second pipeline (B) bifurcates downstream of the first valve (CHCV-1) into a first manifold (B1) and a second manifold (B2);

another end of the first manifold (B1) is connected to the first pipeline (A) between the extraction port (101) and the throttle valve (TV) of the reaction chamber (100), and a third valve (CHCV-3) is set on the first manifold (B1);

another end of the second manifold (B2) is connected to the vacuum pump (300), and a fourth valve (CHCV-4) is set on the second manifold (B2).

6. The vacuum suction system according to claim 5, wherein a second pressure measuring device (500) is further set on the second manifold (B2).

7. The vacuum suction system according to claim 5, wherein the first valve (CHCV-1), the second valve (CHCV-2), the third valve (CHCV-3) and the fourth valve (CHCV-4) are all electromagnetic pneumatic valves.

8. A method for sucking a wafer by the vacuum suction system according to claim 1, comprising: during a process of sucking wafer, supplying gas from a gas source (400) to a suction pipeline inside the vacuum suction heater (200) through the second pipeline (B) and the third pipeline (C), meanwhile continuously suctioning gas from the suction pipeline through the second pipeline (B), to maintain pressure on a back side of the wafer lower than that on a front side thereof, wherein the suction pipeline is fluid connected to the ventilation port (201).

9. The method according to claim 8, wherein: during the process of sucking wafer, the pressure on the back side of the wafer is maintained 30-150 Torr lower than that on the front side thereof.

10. The method according to claim 8, further comprising: during the process of

releasing wafer, supplying gas from the gas source (400) to the suction pipeline through the second pipeline (B) and the third pipeline (C), for increasing the pressure on the back side of the wafer to greater than or equal to the pressure on the front side thereof.

11. The method according to claim 8, wherein: supplying gas from the gas source (400) to the suction pipeline through the second pipeline (B) and the third pipeline (C) during the process of releasing the wafer, for increasing the pressure on the back side of the wafer to 5-10 Torr greater than the pressure on the front side thereof.

12. A method for sucking a wafer by the vacuum suction system according to claim 1, comprising following steps:

(a) placing the wafer: placing the wafer on a bearing surface of the vacuum suction heater (200) in a reaction chamber (100) when the vacuum suction system is in an OFF state;

(b) sucking the wafer: turning on the vacuum suction system, and supplying gas from a gas source (400) to a suction pipeline inside the vacuum suction heater (200) through the second pipeline (B) and the third pipeline (C), meanwhile continuously suctioning gas from the suction pipeline through the second pipeline (B), for maintaining pressure on a back side of the wafer lower than that on a front side thereof, thereby sucking the wafer onto the bearing surface of the vacuum suction heater (200), wherein the suction pipeline is fluid connected to the ventilation port (201); and

(c) releasing the wafer: stop suctioning gas from the suction pipeline inside the vacuum suction heater (200) after processing the wafer, and supplying gas from a gas source (400) to the suction pipeline through the second pipeline (B) and the third pipeline (C), for increasing the pressure on the back side of the wafer to greater than or equals to the pressure on the front side thereof, therefore releasing the wafer.

13. The method according to claim 12, further comprising at least one of the following steps:

(a1) heating the bearing surface of the vacuum suction heater (200) and sucking

the reaction chamber (100) to vacuum state by the vacuum pump (300) before the step (a); and

(a2) injecting gas into the reaction chamber (100), for increasing pressure (Pc) inside the reaction chamber (100) after the step (a) and before the step (b).

14. The method according to claim 13, wherein:

in the step (a2), the step (b) will start when the pressure (Pc) inside the reaction chamber (100) increased above a threshold.

15. The method according to claim 14, wherein the threshold is 100Torr.

16. The method according to claim 12, wherein:

in the step (b), at the same time of continuously suctioning gas from the suction pipeline inside the vacuum suction heater (200) by the vacuum pump (300), gas from the gas source (400) is supplied to the suction pipeline through the second pipeline (B) and third pipeline (C), thereby maintaining the pressure on the back side of the wafer 30-150 Torr lower than the pressure on the front side thereof.

17. The method according to claim 12, wherein:

a throttle valve (TV) is set on the first pipeline (A);

a first valve (CHCV-1) is set near the ventilation port (201) on the second pipeline (B);

the third pipeline (C) is connected downstream of the first valve (CHCV-1) on the second pipeline (B), and a second valve (CHCV-2) is set on the third pipeline (C);

the second pipeline (B) bifurcates downstream of the first valve (CHCV-1) into a first manifold (B1) and a second manifold (B2);

another end of the first manifold (B1) is connected to the first pipeline (A) between the extraction port (101) and the throttle valve (TV) of the reaction chamber (100), and a third valve (CHCV-3) is set on the first manifold(B1); and

another end of the second manifold (B2) is connected to the vacuum pump (300), and a fourth valve (CHCV-4) is set on the second manifold (B2).

18. The method according to claim 17, wherein:

during performing the step (a), the first valve (CHCV-1), the second valve (CHCV-2), the third valve (CHCV-3) and the fourth valve (CHCV-4) are all closed, and the throttle valve (TV) is open.

19. The method according to claim 17, wherein:

during performing the step (b), the first valve (CHCV-1), the second valve (CHCV-2) and the fourth valve (CHCV-4) are all open, and the third valve (CHCV-3) is closed.

20. The method according to claim 19, wherein in the step (b), gas flow rate in the third pipeline (C) is adjusted, for maintaining the pressure on the back side of the wafer 30-150 Torr lower than the pressure on the front side thereof.

21. The method according to claim 17, wherein:

during performing the step (c), the first valve (CHCV-1), the second valve (CHCV-2) and the third valve (CHCV-3) are all open, and the fourth valve (CHCV-4) is closed.

22. The method according to claim 21, wherein in the step (c), gas flow rate in the third pipeline (C) is adjusted, for increasing the pressure on the back side of the wafer to equals to or greater than the pressure on the front side thereof.

23. The method according to claim 22, wherein in the step (c), the gas flow rate in the third pipeline (C) is adjusted, for increasing the pressure on the back side of the wafer to 5-10 Torr greater than the pressure on the front side thereof.