CLAIMS:

1. A liquid supply device, having a nozzle with a cavity inside, the nozzle comprising:

a liquid inlet, for introducing liquid into the cavity;

a liquid outlet, provided in a lower portion of the cavity, for discharging liquid from the cavity;

an exhaust port, provided in an upper portion of the cavity, for discharging gas from the cavity;

a separating section, in the shape of a cylinder, located above the liquid outlet and located in the cavity, the separating section comprising a cylinder body with a plurality of slanted holes being provided on the sidewall of the cylinder body, the plurality of slanted holes being provided at an inclined upward direction when viewed from the inner side of the cylinder body to the outer side, and the bottom of the cylinder body being open and connected to the liquid outlet.

2. A liquid supply device according to claim 1, wherein the top of cylinder body is sealed, or the top of cylinder body is open, or the top of cylinder body is set with at least one through-hole.

3. A liquid supply device according to claim 2, wherein at least one through-hole is a vertical hole or inclined towards the direction of the exhaust port.

4. A liquid supply device according to claim 1, wherein the liquid inlet comprises:

a first liquid inlet, for introducing a first liquid into the cavity;

a second liquid inlet, for introducing a second liquid into the cavity.

5. A liquid supply device according to claim 1, wherein the liquid inlet comprises:

a mixture liquid inlet, for introducing a mixture of a first liquid and a second liquid into the cavity.

6. A liquid supply device according to claim 1, wherein the cavity is further provided with a buffer plate for blocking the liquid inlet, and a gap is provided between the buffer plate and the liquid inlet.

7. A liquid supply device according to claim 1, wherein the bottom of cavity is provided with a deflector surface being inclined downwardly towards the direction of the cylinder body, and the lowest row of slanted holes of cylinder body are connected to the lowest point of the deflector surface.

8. A liquid supply device, having a nozzle with a cavity inside, the nozzle comprising:

a liquid inlet, for introducing liquid into the cavity;

a liquid outlet, provided in a lower portion of the cavity, for discharging liquid from the cavity;

an exhaust port, provided in an upper portion of the cavity, for discharging gas from the cavity;

a liquid level sensor, for detecting the height of the liquid level in the cavity;

an exhaust line, connected to the exhaust port, for discharging gas from the cavity, the exhaust line being configured with a regulating valve;

a controller, connected to the liquid level sensor and the regulating valve via signals, to form a closed-loop control to maintain the liquid level in the cavity at a predetermined height.

9. A liquid supply device according to claim 8, wherein the liquid level within the cavity is maintained above the liquid inlet.

10. A liquid supply device according to claim 8, wherein the liquid level within the cavity is maintained below the liquid inlet.

11. A liquid supply device according to claim 8, wherein the nozzle further comprises a separating section provided within the cavity, and the separating section is located above the liquid outlet.

12. A liquid supply device according to claim 11, wherein the separating section is in the form of a plate, and the separating section comprises a plate body being disposed above the liquid outlet.

13. A liquid supply device according to claim 11, wherein the separating section is in the shape of a cylinder and comprises a cylinder body, a plurality of slanted holes are provided on the sidewall of the cylinder body, the plurality of slanted holes are provided inclined upwardly when viewed from the inner side of the cylinder body to the outer side, and the bottom of cylinder body is open and connected to the liquid outlet.

14. A liquid supply device according to claim 13, wherein the top of cylinder body is sealed, or the top of cylinder body is open, or the top of cylinder body is set with at least one through-hole.

15. A liquid supply device according to claim 14, wherein at least one through-hole is a vertical hole or inclined towards the direction of the exhaust port.

16. A liquid supply device according to claim 13, wherein the bottom of cavity is provided with a deflector surface being inclined downwardly towards the direction of the cylinder body, and the lowest row of slanted holes of the cylinder body are connected to the lowest point of the deflector surface.

17. A liquid supply device according to claim 8, wherein the liquid inlet is tangential to the sidewall of the cavity, for enabling liquid to enter the cavity of the nozzle in a tangential direction.

18. A liquid supply device according to claim 8, wherein the liquid comprises at least one kind of liquid, each kind of liquid is configured with a separate liquid inlet, or a mixture of at least two kinds of liquid is introduced into the cavity through a liquid inlet.

19. A liquid supply device, having a nozzle with an upper chamber and a lower chamber inside, wherein,

the upper chamber, comprising:

an upper liquid inlet, for introducing liquid into the upper chamber;

an upper exhaust port, provided in an upper portion of the upper chamber, for discharging gas from the upper chamber;

an upper liquid outlet, provided between the upper chamber and the lower chamber, for introducing liquid in the upper chamber into the lower chamber;

the lower chamber, comprising:

a lower exhaust port, provided in an upper portion of the lower chamber, for discharging gas from the lower chamber;

a lower liquid outlet, provided in a lower portion of the lower chamber, for discharging liquid from the lower chamber.

20. A liquid supply device according to claim 19, wherein the upper liquid inlet comprises:

a first upper liquid inlet, for introducing a first liquid into the upper chamber;

a second upper liquid inlet, for introducing a second liquid into the upper chamber.

21. A liquid supply device according to claim 19, wherein the upper liquid inlet comprises:

an upper mixture liquid inlet, for introducing a mixture of a first liquid and a second liquid into the upper chamber.

22. A liquid supply device according to claim 19, wherein the upper liquid inlet is tangential to the sidewall of the upper chamber, so that the liquid introduced through the upper liquid inlet enter the upper chamber in a tangential direction.

23. A liquid supply device according to claim 19, wherein the upper chamber and/or lower chamber are/is provided with a separating section located above the liquid outlet of the chamber in which the separating section is located.

24. A liquid supply device according to claim 23, wherein the separating section is in the form of a plate and comprises a plate body disposed above the liquid outlet of the chamber in which the plate body is located.

25. A liquid supply device according to claim 23, wherein the separating section is in the shape of a cylinder and comprises a cylinder body, a plurality of slanted holes are provided on the sidewall of the cylinder body, the plurality of slanted holes are provided at an inclined upward direction when viewed from the inner side of the cylinder body to the outer side, and the bottom of cylinder body is open and connected to the liquid outlet of the chamber in which the cylinder body is located.

26. A liquid supply device according to claim 25, wherein the top of cylinder body is sealed, or the top of cylinder body is open, or the top of cylinder body is set with at least one through-hole.

27. A liquid supply device according to claim 26, wherein at least one through-hole is a vertical hole or inclined towards the direction of the exhaust port.

28. A liquid supply device according to claim 25, wherein the bottom of the chamber in which the cylinder body is located is provided with a deflector surface, the deflector surface is inclined downwardly towards the direction of the cylinder body, and the lowest row of slanted holes of cylinder body are connected to the lowest point of the deflector surface.

29. A liquid supply device according to claim 19, wherein the upper chamber is provided with a buffer plate that blocks the upper liquid inlet, and a gap is provided between the buffer plate and the upper liquid inlet.

30. A liquid supply device according to claim 19, further comprising:

an upper liquid level sensor, for detecting the height of the liquid level in the upper chamber;

an upper exhaust line, connected to the upper exhaust port, for discharging gas from the upper chamber, the upper exhaust line being configured with an upper regulating valve;

a lower liquid level sensor, for detecting the height of the liquid level in the lower chamber;

a lower exhaust line, connected to the lower exhaust port, for discharging gas from the lower chamber, the lower exhaust line being configured with a lower regulating

valve;

a controller, connected to the upper liquid level sensor and the upper regulating valve via signals, to form a first closed-loop control, for maintaining the liquid level within the upper chamber at a predetermined height, and the controller connected to the lower liquid level sensor and the lower regulating valve via signals, to form a second closed-loop control, for maintaining the liquid level within the lower chamber at a predetermined height.

31. A liquid supply device according to claim 30, wherein the lower chamber further comprises:

a lower liquid inlet, for introducing the liquid into the lower chamber.

32. A liquid supply device according to claim 31, wherein the upper chamber and/or lower chamber are/is provided with a buffer plate that blocks the liquid inlet of the corresponding chamber, and a gap is provided between the buffer plate and the liquid inlet of the corresponding chamber.

33. A liquid supply device according to claim 31, wherein the upper liquid inlet is used for introducing a first liquid and a second liquid into the upper chamber, and the lower liquid inlet is used for introducing the first liquid into the lower chamber.

34. A liquid supply device according to claim 33, wherein the first liquid is H_2O_2, and the second liquid is H_2SO_4.

35. A liquid supply device according to claim 31, wherein the lower liquid inlet is tangential to the sidewall of the lower chamber, so that the liquid introduced through the lower liquid inlet enters the lower chamber in a tangential direction.

36. A liquid supply device according to claim 31, wherein,

the liquid level within the upper chamber is maintained below the upper liquid inlet;

the liquid level within the lower chamber is maintained above the lower liquid

inlet.

37. A liquid supply device according to claim 31, further comprising:

a suction line, connecting the upper exhaust port to a negative pressure generator, for reducing the pressure in the upper chamber after cutting off the liquid intake into the upper chamber.

38. A method for cleaning a substrate, comprising a SPM cleaning process on the substrate by means of a liquid supply device according to claim 37, the SPM being a mixture of H_2SO_4 and H_2O_2, the SPM cleaning process comprising the following steps:

Step S1, H_2O_2 pre-supply stage: supplying H_2O_2 to the lower chamber of the nozzle, to supply H_2O_2 to the surface of the substrate to clean the substrate, and to maintain a stable liquid level in the lower chamber;

Step S2, SPM supply stage: supplying H_2SO_4 and H_2O_2 to the upper chamber of the nozzle while supplying H_2O_2 to the lower chamber of the nozzle, maintaining a stable liquid level within the upper chamber and lower chamber, mixing the liquid of the upper chamber and lower chamber and then supplying the mixture to the surface of the substrate for cleaning the substrate;

Step S3, H_2O_2 post-supply stage: cutting off the supply of H_2SO_4 and H_2O_2 to the upper chamber of the nozzle, continuing to supply H_2O_2 to the lower chamber of the nozzle, maintaining the liquid level stability in the lower chamber to supply H_2O_2 to the surface of the substrate and to displace the mixture of H_2SO_4 and H_2O_2 on the surface of the substrate.

39. A method for cleaning a substrate according to claim 38, wherein in step S3, after cutting off the supply of H_2SO_4 and H_2O_2 to the upper chamber of the nozzle, maintain the stability of liquid level in the lower chamber while stopping the control of the liquid level height in the upper chamber, turn off the upper regulating valve, so as to reduce the pressure in the upper chamber to a predetermined pressure.