Claims:

1. A method for removing particles or photoresist on substrates, comprising:

transferring one or more substrates into a DIO_3 solution accommodated in a DIO_3 bath to soften a crust on a surface of the one or more substrates;

after the one or more substrates are processed in the DIO_3 bath, taking the one or more substrates out from the DIO_3 bath and transferring the one or more substrates into a SPM solution accommodated in a SPM bath;

after the one or more substrates are processed in the SPM bath, taking the one or more substrates out from the SPM bath and rinsing the one or more substrates; and

transferring the one or more substrates to one or more single chambers to perform single substrate cleaning and drying process;

wherein before the one or more substrates are transferred to the DIO_3 bath, liquid in the DIO_3 bath is DIW, and further comprising:

opening a shutter of the DIO_3 bath, transferring the one or more substrates into the DIW in the DIO_3 bath, closing the shutter of the DIO_3 bath;

overflowing a DIO_3 solution from a bottom of the DIO_3 bath to replace the DIW in the DIO_3 bath, wherein ozone concentration of the DIO_3 solution is 30 ppm to 120 ppm;

after the DIO_3 bath is full of the DIO_3 solution, keeping the DIO_3 solution overflowing for 5 to 15 min;

quick dump drain the DIO_3 solution;

filling the DIO_3 bath with pure DIW; and

opening the shutter of the DIO_3 bath, taking the one or more substrates out from the DIO_3 bath.

2. The method as claimed in claim 1, further comprising:

transferring the one or more substrates into a HF formulation solution accommodated in a HF formulation bath before the one or more substrates are transferred to the DIO_3 bath.

3. The method as claimed in claim 2, wherein the HF formulation solution is a mixture of HF and DIW, and HF and DIW mix ratio is 100:1 to 1000:1.

4. The method as claimed in claim 2, wherein the HF formulation solution is a BOE mixture, HF weight percentage of the BOE mixture is 0.05% to 10%, NH_4F weight percentage of the BOE mixture is 10% to 40%.

5. The method as claimed in claim 1, wherein the DIO_3 flow rate supplied to the DIO_3 bath is 10 LPM to 30 LPM.

6. The method as claimed in claim 1, wherein the SPM solution is a mixture of H_2SO_4 and H_2O_2, and H_2SO_4 and H_2O_2 mix ratio is 3:1 to 50:1, the temperature of the mixture is 80 ℃ to 150 ℃.

7. The method as claimed in claim 1, wherein the step of rinsing the one or more substrates comprises QDR (Quick dump drain) and overflow rinse.

8. The method as claimed in claim 1, further comprising after the one or more substrates are

taken out from the SPM bath, keeping the one or more substrates being in wet state before the one or more substrates are transferred to the one or more single chambers.

9. The method as claimed in claim 1, wherein the process in the one or more single chambers comprises:

at least one HF formulation surface etching process, at least one DIO_3 oxidizing process, at least one SC1 particle removal process, at least one DIW rinsing process and at least one drying process.

10. The method as claimed in claim 9, wherein after the SC1 particle removal process, further comprises at least one SC2 metal removal process.

11. The method as claimed in claim 1, wherein the process in the one or more single chambers comprises:

at least one DIO_3 oxidizing process, at least one SC1 particle removal process, at least one DIW rinsing process and at least one drying process.

12. The method as claimed in claim 11, wherein after the SC1 particle removal process, further comprises at least one SC2 metal removal process.

13. The method as claimed in claim 1, wherein the process in the one or more single chambers comprises:

at least one HF formulation surface etching process, at least one DIO_3 oxidizing process, at least one DIW rinsing process and at least one drying process.

14. The method as claimed in claim 13, wherein after the DIO_3 oxidizing process, further comprises at least one SC2 metal removal process.

15. The method as claimed in claim 1, wherein the process in the one or more single chambers comprises:

at least one SC1 particle removal process, at least one DIW rinsing process and at least one drying process.

16. The method as claimed in claim 15, wherein after the SC1 particle removal process, further comprises at least one SC2 metal removal process.

17. A method for removing particles or photoresist on substrates, comprising:

transferring one or more substrates into a SPM solution accommodated in a SPM bath;

after the one or more substrates are processed in the SPM bath, taking the one or more substrates out from the SPM bath and rinsing the one or more substrates; and

transferring the one or more substrates to one or more single chambers to perform single substrate cleaning and drying process, wherein the single substrate cleaning and drying process comprises at least one DIO_3 oxidizing process to soften a crust on a surface of the one or more substrates;

wherein the at least one DIO_3 oxidizing process comprising:

opening a shutter of a DIO_3 bath, transferring the one or more substrates into a DIW in the DIO_3 bath, closing the shutter of the DIO_3 bath;

overflowing a DIO_3 solution from a bottom of the DIO_3 bath to replace the DIW in the DIO_3 bath, wherein ozone concentration of the DIO_3 solution is 30 ppm to 120 ppm;

after the DIO_3 bath is full of the DIO_3 solution, keeping the DIO_3 solution overflowing for 5 to 15 min;

quick dump drain the DIO_3 solution;

filling the DIO_3 bath with pure DIW; and

opening the shutter of the DIO_3 bath, taking the one or more substrates out from the DIO_3 bath.

18. The method as claimed in claim 17, further comprising:

transferring the one or more substrates into a HF formulation solution accommodated in a HF formulation bath, taking the one or more substrates out from the HF formulation bath and rinsing the one or more substrates before the one or more substrates are transferred to the SPM bath.

19. The method as claimed in claim 18, wherein the HF formulation solution is a mixture of HF and DIW, and HF and DIW mix ratio is 100:1 to 1000:1.

20. The method as claimed in claim 18, wherein the HF formulation solution is a BOE mixture, HF weight percentage of the BOE mixture is 0.05% to 10%, NH_4F weight percentage of the BOE mixture is 10% to 40%.

21. The method as claimed in claim 17, wherein the SPM solution is a mixture of H_2SO_4 and H_2O_2, and H_2SO_4 and H_2O_2 mix ratio is 3:1 to 50:1, the temperature of the mixture is 80 ℃ to 150 ℃.

22. The method as claimed in claim 17, wherein the step of rinsing the one or more substrates comprises QDR (Quick dump drain) and overflow rinse.

23. The method as claimed in claim 17, further comprising after the one or more substrates are taken out from the SPM bath, keeping the one or more substrates being in wet state before the one or more substrates are transferred to the one or more single chambers.

24. The method as claimed in claim 17, wherein the process in the one or more single chambers further comprises:

at least one HF formulation surface etching process before the DIO_3 oxidizing process, at least one SC1 particle removal process, at least one DIW rinsing process and at least one drying process.

25. The method as claimed in claim 24, wherein after the SC1 particle removal process, further comprises at least one SC2 metal removal process.

26. The method as claimed in claim 17, wherein the process in the one or more single chambers further comprises:

at least one SC1 particle removal process, at least one DIW rinsing process and at least one drying process.

27. The method as claimed in claim 26, wherein after the SC1 particle removal process, further comprises at least one SC2 metal removal process.

28. The method as claimed in claim 17, wherein the process in the one or more single chambers further comprises:

at least one HF formulation surface etching process before the DIO_3 oxidizing process, at least

one DIW rinsing process and at least one drying process.

29. The method as claimed in claim 28, wherein after the DIO_3 oxidizing process, further comprises at least one SC2 metal removal process.

30. A method for removing particles or photoresist on substrates, comprising:

transferring one or more substrates to one or more single chambers to perform single substrate cleaning and drying process, wherein the single substrate cleaning and drying process comprises at least one DIO_3 oxidizing process to soften a crust on a surface of the one or more substrates;

after the one or more substrates are processed in the one or more single chambers, transferring the one or more substrates into a SPM solution accommodated in a SPM bath;

after the one or more substrates are processed in the SPM bath, taking the one or more substrates out from the SPM bath and rinsing the one or more substrates; and

transferring the one or more substrates to the one or more single chambers to perform single substrate cleaning and drying process;

wherein the at least one DIO_3 oxidizing process comprising:

opening a shutter of a DIO_3 bath, transferring the one or more substrates into a DIW in the DIO_3 bath, closing the shutter of the DIO_3 bath;

overflowing a DIO_3 solution from a bottom of the DIO_3 bath to replace the DIW in the DIO_3 bath, wherein ozone concentration of the DIO_3 solution is 30 ppm to 120 ppm;

after the DIO_3 bath is full of the DIO_3 solution, keeping the DIO_3 solution overflowing for 5 to 15 min;

quick dump drain the DIO_3 solution;

filling the DIO_3 bath with pure DIW; and

opening the shutter of the DIO_3 bath, taking the one or more substrates out from the DIO_3 bath.

31. The method as claimed in claim 30, further comprising transferring the one or more substrates into a HF formulation solution accommodated in a HF formulation bath, taking the one or more substrates out from the HF formulation bath and rinsing the one or more substrates before the one or more substrates are transferred to the SPM bath.

32. The method as claimed in claim 30, further comprising after the one or more substrates are taken out from the SPM bath, keeping the one or more substrates being in wet state before the one or more substrates are transferred to the one or more single chambers.

33. An apparatus for removing particles or photoresist on substrates, comprising:

a bench module, configured to implement one or more substrates bench cleaning process;

a single module, having multiple single chambers configured to implement single substrate cleaning and drying process; and

a process robot, configured to transfer the one or more substrates between the bench module and the single module;

wherein the bench module has at least one DIO_3 bath configured to accommodate DIO_3 solution for processing the one or more substrates to soften a crust on a surface of the one or more

substrates, at least one SPM bath configured to accommodate SPM solution for processing the one or more substrates, at least one DIW bath configured to accommodate DIW for rinsing the one or more substrates, and at least one second substrate transfer robot configured to transfer the one or more substrates among the DIO_3 bath, the SPM bath and the DIW bath;

wherein the DIO_3 bath comprises:

an outer bath, a bottom of the outer bath sets at least one exhaust port;

an inner bath, the inner bath is set in the outer bath and configured to accommodate DIO_3 solution, the inner bath has a substrate holding pedestal configured to supporting and holding the one or more substrates, at least one liquid inlet pipe set in the inner bath and configured to supply liquid to the inner bath, and a drain port set at the bottom of the inner bath and configured to drain the liquid in the inner bath to the outside of the DIO_3 bath, there is a gap between the top of the inner bath and the top the outer bath, the gap is configured to prevent the ozone gas from leaking from the outer bath;

two overflow grooves, the two overflow grooves are set at both sides of the inner bath, each overflow groove has at least one drain hole configured to drain the liquid in the overflow groove to the outside of the DIO_3 bath;

a shutter, the shutter is set on the outer bath to seal the outer bath, the shutter has at least one gas intake set on the top side of the shutter and a plurality of exhaust holes on the bottom side of the shutter;

a driving device, the driving device is connected to the shutter and configured to open or close the shutter.

34. The apparatus as claimed in claim 33, wherein the bench module further comprises at least one HF formulation bath configured to accommodate HF formulation solution for processing the one or more substrates.

35. The apparatus as claimed in claim 34, wherein the bench module has two DIO_3 baths and two HF formulation baths, the two DIO_3 baths and the two HF formulation baths are arranged in two rows, and each row has one HF formulation bath and one adjacent DIO_3 bath.

36. The apparatus as claimed in claim 35, wherein the bench module further comprises:

a substrate loader, configured to hold and rotate the one or more substrates;

a first lifter and a second lifter, the first lifter and the second lifter being corresponding to the two HF formulation baths and configured to hold the one or more substrates; and

a first substrate transfer robot;

wherein the first substrate transfer robot gets the one or more substrates from the substrate loader and transfers the one or more substrates to the first lifter or the second lifter, the first lifter or the second lifter brings the one or more substrates to immerse into the HF formulation solution accommodated in the corresponding HF formulation bath, after the one or more substrates are processed in the HF formulation bath, the second substrate transfer robot gets the one or more substrates from the HF formulation bath and transfers the one or more substrates to the adjacent

DIO_3 bath, the first lifter or the second lifter rises to be above the two HF formulation baths.

37. The apparatus as claimed in claim 34, wherein the bench module has two DIO_3 baths and one HF formulation baths, the HF formulation baths is arranged between the two DIO_3 baths.

38. The apparatus as claimed in claim 33, wherein the bench module has a wetting buffer area to keep the one or more substrates being in wet status before the one or more substrates are transferred to the one or more single chambers.

39. The apparatus as claimed in claim 33, wherein the bench module has a cleaning bath configured to clean the second substrate transfer robot.

40. The apparatus as claimed in claim 33, further comprising a seal ring set on the top of the outer bath, at least one pair of locking devices are set on the outer bath to lock the shutter while the shutter is closed.

41. The apparatus as claimed in claim 40, wherein each locking device has a lock head and an actuator connected to the lock head and driving the lock head to rotate and rise and fall.

42. The apparatus as claimed in claim 33, further comprising at least one exhaust line connected to the at least one exhaust port of the outer bath, at least one pressure monitor and at least one pressure damper are respectively set on the at least one exhaust line.