Claims

1. An integrated CMP system for polishing substrates, the CMP system comprising:

a polishing station configured to polish a substrate;

a spin rinse dry (SRD) station configured to clean and dry the substrate;

a metrology station configured to measure parameters of the substrate;

a robot configured to move the substrate in to and out of the SRD station;

an effector rinse and dry (EERD) station configured to clean and dry the end effector of the robot; and

a wet tank configured to maintain the substrates in a wet state while in queue for cleaning or polishing.

2. The integrated CMP system of claim 1 wherein the EERD station further comprises:

a body having a top, a bottom, and sidewalls defining an interior volume;

an opening formed in the body, the opening sized to allow the end effector of the robot to access the interior volume of the body.

3. The integrated CMP system of claim 2 wherein the EERD station further comprises:

rinse nozzles configured to spray a fluid at the end effector when positioned in the interior volume; and

an air knife disposed adjacent the opening and configured flow gas against the end effector as the end effector is extracted from the interior volume.

4. The integrated CMP system of claim 3 wherein the EERD station further comprises:

a vent formed in the sidewalls of the body, the vent connected to a factory exhaust through an exhaust pump, the vent configured to remove all gas provided by the air knife from the interior volume; and

a drain disposed in the body and configured to allow the fluid from the rinse nozzles to exit the interior volume, wherein the vent is elevated relative to the drain.

5. The integrated CMP system of claim 1 wherein the metrology station further comprises:

a support frame;

a substrate holder disposed on the support frame and configured to support the substrate;

a camera disposed above the substrate holder; and

a scale for weighing coupled between the support frame and the substrate holder.

6. The integrated CMP system of claim 5 wherein the metrology station further comprises:

a vibration isolator disposed between the support frame and the scale;

a lighting system disposed between the scale and the support frame; and

a shield disposed about the camera, the support frame and the lighting system.

7. The integrated CMP system of claim 5 wherein the camera is configured to measure a surface area and detect the substrate ID of the substrate.

8. The integrated CMP system of claim 5 wherein the substrate is translucent or opaque.

9. The integrated CMP system of claim 1 wherein SRD further comprises:

a rotary gripper configured with a plurality of fingers and standoffs, wherein the fingers and standoffs center and align the substrate on the rotary gripper.

10. The integrated CMP system of Claim 1 wherein the substrate holder can handle flatted or notched substrates of various thicknesses.

11. The integrated CMP system of Claim 1 wherein the substrate holder can handle substrates of elevated temperatures, up to 200C.

12. A method for polishing a substrate, the method comprising:

moving the substrate to a head clean load unload station in a polishing unit;

polishing the substrate in the polishing unit;

moving the substrate with an end effector of a robot to a spin rinse dry (SRD) station;

cleaning the substrate in the SRD station;

while the substrate is being cleaned by the SRD station, cleaning the end effector of the robot in an end effector rinse dry (EERD) station; and

moving the substrate cleaned by the SRD station with the cleaned end effector to a metrology station.

13. The method of claim 12 further comprising:

weighing the substrate in a metrology station; and

determining a surface area of the substrate in the metrology station.

14. The method of claim 13 further comprising:

calculating an amount of material removed from the substrate; and

recording the amount of material removed with an associated substrate ID for the substrate in a database.

15. The method of claim 14, wherein calculating the amount of material removed comprises:

subtracting a post-polish thickness from an initial thickness, wherein the initial thickness is equal to the weight of the substrate prior to polishing divided by a product of the surface area and the density, and wherein the post-polish thickness is the weight after polishing divided by the product of the surface area and the density.

16. The method of claim 13 further comprising:

illuminating a first side of the substrate while obtaining an image of a second side of the substrate, the first side being opposite to the second side.

17. The method of claim 15, wherein upon determining the post-polish thickness of the substrate is more than a target thickness, returning the substrate to the polishing unit and performing a new polishing recipe selected to remove an amount of material needed to reach the target thickness.

18. The method of claim 15, wherein upon determining the post-polish thickness of the substrate is equal to a target thickness, transferring the substrate to a dry cassette.

19. An integrated CMP system for polishing substrates, the CMP system comprising:

a polishing station configured to polish a substrate;

a spin rinse dry (SRD) station configured to clean and dry the substrate; and

a metrology station configured to measure parameters of the substrate, wherein the metrology station further comprises:

a support frame;

a substrate holder disposed on the support frame and configured to support the substrate;

a camera disposed above the substrate holder; and

a scale for weighing coupled between the support frame and the substrate holder; and

a lighting system disposed between the scale and the support frame.

20. The integrated CMP system of claim 19 further comprising:

an end effector rinse dry (EERD) station further comprising:

rinse nozzles configured to spray a fluid at an end effector of a substrate moving robot;

an air knife configured flow gas against the end effector;

a drain to collect the sprayed fluid; and

a vent configured to exhaust the flowed gas.