What is claimed is:

1. A system for processing magnetic media, comprising a substrate handling module, comprising:

a substrate carrier having a plurality of substrate support locations;

a loader assembly configured to position a substrate on each substrate support location of the substrate carrier;

a flipping assembly configured to retrieve the substrates from the substrate carrier, flip them over, and replace them on the substrate carrier; and

a factory interface coupled to the loader assembly and the flipping assembly.

2. The system of claim 1, further comprising a substrate processing module, comprising:

a plurality of plasma processing chambers configured to process substrates on the substrate carrier;

a transfer chamber configured to transport the substrate carrier loaded with substrates; and

a load-lock chamber coupled to the factory interface for transporting the loaded substrate carrier into and out of the substrate processing module.

3. The system of claim 2, wherein the factory interface comprises:

a stage configured to hold the loaded substrate carrier; and

a robot configured to retrieve the loaded substrate carrier from the stage and transport it to the load-lock chamber.

4. The system of claim 3, wherein the loader assembly comprises a carrier transfer module configured to transport the substrate carrier to and from a carrier

loading module, and a staging robot configured to transport a loaded substrate carrier between the stage, the carrier loading module, and the flipping assembly.

5. The system of claim 4, wherein the stage comprises an entry stack and an exit stack, and the carrier transfer module comprises an entry module and an exit module.

6. A loader for a substrate handling module, comprising:

a cassette station; and

a robot comprising an end effector configured to engage an edge of a substrate in a cassette on the cassette station and rotate the substrate between a first orientation and a second orientation orthogonal to the first orientation.

7. The loader of claim 6, wherein the end effector is configured to engage an inside edge of the substrate.

8. The loader of claim 6, wherein the end effector comprises at least two fingers, each finger having a substrate contact point and an actuator for moving the substrate contact point of the finger into contact with the edge of the substrate.

9. The loader of claim 6, wherein the robot further comprises an arm with a first end coupled to an actuator and a second end coupled to the end effector.

10. The loader of claim 9, wherein the actuator rotates the robot arm about two orthogonal axes.

11. A flipper assembly for a substrate handling module, comprising:

a stage for positioning one or more substrates to be flipped;

a static gripper head comprising one or more grippers; and

a dynamic gripper head comprising one or more grippers, wherein the dynamic gripper head is actuated to flip the substrates simultaneously.

12. The flipper assembly of claim 11, wherein the dynamic gripper head is actuated to move between an engaged position between the static gripper head and the stage and a non-engaged position leaving the space between the static gripper head and the stage clear.

13. The flipper assembly of claim 12, wherein the stage is actuated to engage the static gripper head.

14. The flipper assembly of claim 13, wherein the dynamic gripper head is actuated to engage the stage and the static gripper head.

15. The flipper assembly of claim 14, wherein a gripper of the dynamic gripper head and a gripper of the static gripper head simultaneously engage an inside edge of a substrate.

16. A method of processing substrates having magnetic surfaces, the method comprising:

disposing a plurality of substrates on a substrate carrier;

performing a plasma process simultaneously on a first side of each substrate disposed on the substrate carrier;

flipping the substrates on the substrate carrier simultaneously; and

performing a plasma process simultaneously on a second side of each substrate disposed on the substrate carrier.

17. The method of claim 16, wherein each operation of performing the plasma process comprises performing a plasma doping operation and performing a plasma stripping operation.

18. The method of claim 17, wherein each of the plasma doping operation and the plasma stripping operation is a plasma immersion operation.

19. The method of claim 16, wherein flipping the substrates on the substrate carrier simultaneously comprises simultaneously engaging a first gripper with an inner edge of each substrate and engaging a second gripper with the inner edge of each substrate.

20. The method of claim 16, wherein flipping the substrates on the substrate carrier simultaneously comprises engaging the substrates with a gripper head assembly and rotating the gripper head assembly.

CLAIMS

1. A system for processing magnetic media, comprising a substrate handling module, comprising:

a substrate carrier having a plurality of substrate support locations;

a loader assembly configured to position a substrate on each substrate support location of the substrate carrier, wherein the loader assembly comprises a cassette station and a first robot comprising an end effector configured to engage an edge of the substrate in a cassette on the cassette station and rotate the substrate between a first orientation and a second orientation orthogonal to the first orientation; and

a flipping assembly configured to retrieve the substrates from the substrate carrier, flip them over, and replace them on the substrate carrier, and wherein the flipping assembly comprises:

a stage for positioning one or more substrate to be flipped;

a static gripper head comprising one or more grippers; and

a dynamic gripper head comprising one or more grippers, wherein the dynamic gripper head is actuated to flip the substrates simultaneously, wherein each gripper of the static gripper head and the dynamic gripper head includes a first end effector and a second end effector, wherein the first end effector has a central protrusion and the second end effector has two peripheral protrusions, wherein the central protrusion of the first end effector of a gripper of the one or more grippers of the dynamic gripper head is adapted to fit between the two peripheral protrusions of the second end effector of a corresponding gripper of the one or more grippers of the static gripper head, and the central protrusion of the first end effector of the gripper of the one or more grippers of the dynamic gripper head and the peripheral protrusions of the second end effector of the gripper of the one or more grippers of the static gripper head are configured to concurrently engage an inside edge of an annular substrate by extending the first and second end effectors substantially horizontally so the protrusions are in contact with the inside edge.

2. The system of claim 1, further comprising a substrate processing module, comprising:

a plurality of plasma processing chambers configured to process substrates on the substrate carrier;

a transfer chamber configured to transport the substrate carrier loaded with substrates; and

a load-lock chamber for transporting the loaded substrate carrier into and out of the substrate processing module.

3. The system of claim 2, further comprising a stage configured to hold the loaded substrate carrier.

4. The system of claim 3, wherein the loader assembly comprises a carrier transfer module configured to transport the substrate carrier to and from a carrier loading module, and a staging robot configured to transport a loaded substrate carrier between the stage, the carrier loading module, and the flipping assembly.

5. The system of claim 4, wherein the stage comprises an entry stage and an exit stage, and the carrier transfer module comprises an entry module and an exit module.

6. The system of claim 1, wherein the end effector of the loader assembly comprises at least two fingers, each finger having a substrate contact point and an actuator for moving the substrate contact point of the finger into contact with the edge of the substrate.

7. The system of claim 1, wherein the first robot further comprises an arm with a first end coupled to an actuator and a second end coupled to the end effector.

8. The system of claim 7, wherein the actuator rotates the robot arm about two orthogonal axes.

9. The system of claim 1, wherein the dynamic gripper head is actuated to move from an engaged position between the static gripper head and the stage to a non-engaged position leaving the space between the static gripper head and the stage clear.

10. The system of claim 9, wherein the stage is actuated to engage the static gripper head.

11. The system of claim 10, wherein the dynamic gripper head is actuated to engage the stage and the static gripper head.

12. The system of claim 3, further comprising a factory interface coupled to the loader assembly and the flipping assembly, wherein the factory interface comprises a second robot configured to retrieve the loaded substrate carrier from the stage and transport it to the load-lock chamber.