Claims

1. A multiple disk pad conditioner for conditioning a polishing pad, comprising:

a conditioning arm; and

a plurality of conditioning head bases attached to the conditioning arm, wherein:

each conditioning head base comprises a pivot arm;

each pivot arm comprises a plurality of conditioning heads;

each of the plurality of conditioning heads has a conditioning disk affixed thereto,

each of the plurality of conditioning head bases comprise a rotational axis, and

each of the rotational axes are disposed a distance apart in a first direction that extends along a length of the conditioning arm.

2. The multiple disk pad conditioner of claim 1, wherein the conditioning arm is affixed to a rotatable base able to sweep a first end of the conditioning arm across the polishing pad.

3. The multiple disk pad conditioner of claim 1, wherein the plurality of conditioning heads are configured to rotate at the same revolutions-per-minute (RPM) about their respective rotational axis during a conditioning process.

4. The multiple disk pad conditioner of claim 1, wherein the plurality of conditioning heads are configured to rotate at different revolutions-per-minute (RPM) about their respective rotational axis during a pad conditioning process.

5. The multiple disk pad conditioner of claim 1, further comprising one or more down-force actuators to maintain a uniform pressure between the plurality of conditioning heads and the polishing pad.

6. The multiple disk pad conditioner of claim 1, further comprising one or more down-force actuators to independently regulate pressure between each of the plurality of conditioning heads and the polishing pad.

7. The multiple disk pad conditioner of claim 1, wherein the multiple disk pad conditioner is disposed within a polishing station that comprises a cleaning station for cleaning the plurality of conditioning heads.

8. The multiple disk pad conditioner of claim 1, wherein

each of the conditioning disks comprise a support plate, a flexible member, and a flexible backing element,

the flexible backing element comprises abrasive regions for conditioning the polishing pad, and

the flexible member is disposed between the support plate and the flexible backing element.

9. The multiple disk pad conditioner of claim 8, wherein the abrasive regions comprise diamond particles.

10. The multiple disk pad conditioner of claim 8, wherein the abrasive regions comprise silicon carbide.

11. The multiple disk pad conditioner of claim 8,

wherein the flexible backing element of each of the conditioning disks is configured to cause substantially uniform contact between abrasive particles and the polishing pad while the multiple pad conditioner is conditioning the polishing pad.

12. The multiple disk pad conditioner of claim 11, wherein the support plate is comprised of a metal or a ceramic material.

13. The multiple disk pad conditioner of claim 11, wherein the flexible member is comprised of an elastomeric material.

14. The multiple disk pad conditioner of claim 11, wherein the flexible backing member is comprised of an elastomeric material or a metal plate.

15. A method of conditioning a polishing pad, comprising:

conditioning the polishing pad using a multiple disk pad conditioner, wherein:

the multiple disk pad conditioner comprises a conditioning arm for carrying a plurality of pad conditioning head bases,

each conditioning head base comprising a pivot arm,

each pivot arm comprising a plurality of pad conditioning heads,

each of the plurality of conditioning heads has a conditioning disk affixed thereto,

each of the plurality of conditioning head bases comprise a rotational axis,

each of the rotational axes is disposed a distance apart in a first direction that extends along a length of the conditioning arm, and

conditioning the polishing pad comprises urging the plurality of pad conditioning heads against a surface of a polishing pad.

16. The method of claim 15, wherein conditioning the polishing pad further comprises:

rotating the polishing pad at a first revolutions-per-minute (RPM); and

rotating each of the conditioning disks at the first revolutions-per-minute (RPM).

17. The method of claim 15, wherein the conditioning the polishing pad further comprises rotating at least one of the conditioning disks at different RPMs about their respective rotational axis during a conditioning process.

18. The method of claim 15, wherein conditioning the polishing pad further comprises maintaining a constant pressure between the conditioning disks and the polishing pad while urging the plurality of pad conditioning heads against the surface of a polishing pad.

19. The method of claim 15, wherein conditioning the polishing pad further comprises maintaining independent pressure control between at least one of the conditioning disks and the polishing pad.

20. A polishing system, comprising:

a plurality of polishing modules, each comprising:

a carrier support module comprising a carrier platform, and one or more carrier assemblies comprising one or more corresponding carrier heads which are suspended from the carrier platform;

a carrier loading station for transferring substrates to and from the one or more carrier heads;

a polishing station comprising a polishing platen, wherein the carrier support module is positioned to move the one or more carrier assemblies between a substrate polishing position disposed above the polishing platen and a substrate transfer position disposed above the carrier loading station; and

a multiple disk pad conditioner having a plurality of conditioning head bases attached to a conditioning arm and disposed a distance apart in a first direction that extends along a length of the conditioning arm; wherein:

each conditioning head base comprises a pivot arm;

each pivot arm comprises a plurality of conditioning heads; and

each of the plurality of conditioning heads has a conditioning disk affixed thereto.