CLAIMS

1. An apparatus, comprising:

a multi-station processing chamber including a top plate and a bottom portion, the multi-station processing chamber configured to enclose a plurality of stations each including a pedestal assembly for supporting a substrate for processing;

a spindle centrally located between the plurality of stations and configured to rotate about a central axis, wherein the spindle is electrically connected to the bottom portion;

a first actuator coupled to the spindle and configured for controlling movement of the spindle in the Z-direction;

an indexer connected to the spindle and configured to rotate with the spindle, wherein the indexer includes a plurality of extensions each configured to interface with a corresponding substrate for transfer to and from a station;

an electrically conductive interface movably connected to the top plate; and

a second actuator coupled to the electrically conductive interface and configured for controlling movement of the electrically conductive interface in the Z-direction;

wherein the electrically conductive interface is configured to move downwards in the Z-direction to make contact with the indexer when each of the plurality of extensions is parked and the spindle is moved to a lower position during plasma processing.

2. The apparatus of claim 1, wherein the electrically conductive interface comprises one or more solid cylindrical tubes.

3. The apparatus of claim 1, wherein the electrically conductive interface comprises a convoluted cylindrical tube including a plurality of interstitial beams horizontally oriented connected by a plurality of vertical links.

4. The apparatus of claim 3, wherein the electrically conductive interface provides for a non-helical electrical conductive path between the top plate and the bottom portion when the electrically conductive interface is in contact with the indexer.

5. The apparatus of claim 1,

wherein the multi-station processing chamber includes four stations.

6. The apparatus of claim 1, further comprising:

a pocket in the top plate that is configured to receive the electrically conductive interface when the spindle is moved to an upper position so that the plurality of extensions of the indexer can engage with one or more substrates at the plurality of stations.

7. The apparatus of claim 1, further comprising:

a contact interface positioned on the indexer to facilitate an RF return path between the electrically conductive interface and the indexer,

wherein the contact interface is pliable.

8. The apparatus of claim 1,

wherein an RF return path to the bottom portion is generated through the electrically conductive interface, indexer, and spindle.

9. The apparatus of claim 1,

wherein the electrically conductive interface is configured to move downwards in the Z-direction to make contact with an outer wall of a channel within which the spindle moves in the Z-direction.

10. The apparatus of claim 1, wherein the indexer comprises:

an upper indexer part; and

a lower indexer part.

11. The apparatus of claim 1, wherein each of the plurality of extensions is configured to rotate the corresponding substrate.

12. An apparatus, comprising:

a multi-station processing chamber including a top plate and a bottom portion, the multi-station processing chamber configured to enclose a plurality of stations each including a pedestal assembly for supporting a substrate for processing;

a spindle centrally located between the plurality of stations and configured to rotate about a central axis;

a first actuator coupled to the spindle and configured for controlling movement of the spindle in the Z-direction;

an indexer connected to the spindle and configured to rotate with the spindle about the central axis, wherein the indexer includes a plurality of extensions each configured to interface with a corresponding substrate for transfer to and from a station;

an electrically conductive interface movably connected to the top plate; and

a second actuator coupled to the electrically conductive interface and configured for controlling movement of the electrically conductive interface in the Z-direction;

wherein the electrically conductive interface has a lower end portion that spans a diameter of the indexer,

wherein the electrically conductive interface is configured to move downwards in the Z-direction to make contact with a conductive structure adjacent to the spindle and indexer when each of the plurality of extensions is parked and the spindle is moved to a lower position during plasma processing,

wherein the electrically conductive structure is electrically coupled to the bottom portion.

13. The apparatus of claim 12, wherein the conductive structure is an RF liner configured to surround a plurality of pedestals of the plurality of stations.

14. The apparatus of claim 12, wherein the conductive structure is one or more conductive rods.

15. The apparatus of claim 12, wherein the electrically conductive interface comprises one or more solid cylindrical tubes.

16. The apparatus of claim 12,

wherein the electrically conductive interface comprises a convoluted cylindrical tube including a plurality of interstitial beams horizontally oriented connected by a plurality of vertical links,

wherein the electrically conductive interface provides for a non-helical electrical conductive path between the top plate and the bottom portion when the electrically conductive interface is in contact with the indexer.

17. The apparatus of claim 12,

wherein the multi-station processing chamber includes four stations.

18. The apparatus of claim 12, further comprising:

a pocket in the top plate that is configured to receive the electrically conductive interface when the spindle is moved to an upper position so that the plurality of extensions of the indexer can engage with one or more substrates at the plurality of stations.

19. The apparatus of claim 12,

wherein an RF return path to the bottom portion is generated through the electrically conductive interface and the conductive structure.

20. The apparatus of claim 12, wherein the indexer comprises:

an upper indexer part; and

a lower indexer part.

21. The apparatus of claim 12, wherein each of the plurality of extensions is configured to rotate the corresponding substrate.

22. An apparatus, comprising:

a multi-station processing chamber including a top plate and a bottom portion, the multi-station processing chamber configured to enclose a plurality of stations each including a pedestal assembly for supporting a substrate for processing;

a spindle centrally located between the plurality of stations and configured to rotate about a central axis, wherein the spindle is electrically connected to the bottom portion;

an actuator coupled to the spindle and configured for controlling movement of the spindle in the Z-direction; and

an indexer connected to the spindle and configured to rotate with the spindle, wherein the indexer includes a plurality of extensions each configured to interface with a corresponding substrate for transfer to and from a station;

an electrically conductive interface connected to the indexer,

wherein the spindle is configured to move upwards in the Z-direction to a higher position so that the electrically conductive interface makes contact with the top portion during plasma processing,

wherein each of the plurality of extensions is parked when the spindle is in the higher position.

23. The apparatus of claim 22, wherein the electrically conductive interface comprises a solid cylindrical tube.

24. The apparatus of claim 22, wherein the electrically conductive interface comprises a convoluted cylindrical tube including a plurality of interstitial beams horizontally oriented connected by a plurality of vertical links.

25. The apparatus of claim 23, wherein the electrically conductive interface provides for a non-helical electrical conductive path between the top plate and the bottom portion when the electrically conductive interface is in contact with the indexer.

26. The apparatus of claim 22,

wherein the multi-station processing chamber includes four stations.

27. The apparatus of claim 22, further comprising:

a contact interface positioned on the top plate to facilitate an RF return path between the electrically conductive interface and the top plate,

wherein the contact interface is pliable.

28. The apparatus of claim 22,

wherein an RF return path to the bottom portion is generated through the top plate, electrically conductive interface, indexer, and spindle.

29. The apparatus of claim 22, wherein the indexer comprises:

an upper indexer part; and

a lower indexer part.

30. The apparatus of claim 22, wherein each of the plurality of extensions is configured to rotate the corresponding substrate.

31. An apparatus, comprising:

a multi-station processing chamber including a top plate and a bottom portion, the multi-station processing chamber configured to enclose a plurality of stations each including a pedestal assembly for supporting a substrate for processing;

a spindle centrally located between the plurality of stations and configured to rotate about a central axis, wherein the spindle is movably and electrically connected to the top plate;

an actuator coupled to the spindle and configured for controlling movement of the spindle in the Z-direction;

an indexer connected to the spindle and configured to rotate with the spindle, wherein the indexer includes a plurality of extensions each configured to interface with a corresponding substrate for transfer to and from a station;

an electrically conductive interface connected to the indexer; and

a grounding structure electrically connected to the bottom portion;

wherein the spindle is configured to move downwards in the Z-direction to a lower position so that the electrically conductive interface makes contact with the grounding structure during plasma processing,

wherein each of the plurality of extensions is parked when the spindle is in the lower position.

32. The apparatus of claim 31, wherein the electrically conductive interface comprises one or more solid cylindrical tubes.

33. The apparatus of claim 31, wherein the electrically conductive interface comprises a convoluted cylindrical tube including a plurality of interstitial beams horizontally oriented connected by a plurality of vertical links.

34. The apparatus of claim 33, wherein the electrically conductive interface provides for a non-helical electrical conductive path between the top plate and the bottom portion when the electrically conductive interface is in contact with the indexer.

35. The apparatus of claim 31,

wherein the multi-station processing chamber includes four stations.

36. The apparatus of claim 31, further comprising:

a contact interface positioned on the conductive structure to facilitate an RF return path between the electrically conductive interface and the conductive structure,

wherein the contact interface is pliable.

37. The apparatus of claim 31,

wherein an RF return path to a ground of the bottom portion is generated through the top plate, indexer, spindle, electrically conductive interface, and conductive structure.

38. The apparatus of claim 31,

wherein the conductive structure includes one or more conductive rods connected to the bottom structure.

39. An apparatus, comprising:

a multi-station processing chamber including a top plate and a bottom portion, the multi-station processing chamber configured to enclose a plurality of stations each including a pedestal assembly for supporting a substrate for processing;

a spindle centrally located between the plurality of stations and configured to rotate about a central axis, wherein the spindle is electrically connected to the bottom portion;

an actuator coupled to the spindle and configured for controlling movement of the spindle in the Z-direction;

an indexer connected to the spindle and configured to rotate with the spindle, wherein the indexer includes a plurality of extensions each configured to interface with a corresponding substrate for transfer to and from a station;

an electrically conductive interface connected to the indexer, wherein an end of the electrically conductive interface extends into a travel space of the top plate, wherein the electrically conductive interface moves with the spindle; and

an electrically conductive seal and bellows assembly connected to the top plate around an opening of the travel space,

wherein the end of the electrically conductive interface engages with the electrically conductive seal and bellows assembly through bearings to make continuous contact with the top plate when the spindle is parked or moving in the Z-direction,

wherein each of the plurality of extensions is parked when the spindle is moved to a lower position during plasma processing.

40. The apparatus of claim 39, wherein the electrically conductive interface comprises one or more solid cylindrical tubes.

41. The apparatus of claim 39,

wherein the electrically conductive interface comprises a convoluted cylindrical tube including a plurality of interstitial beams horizontally oriented connected by a plurality of vertical links.

42. The apparatus of claim 41,

wherein the electrically conductive interface provides for a non-helical electrical conductive path between the top plate and the bottom portion when the electrically conductive interface is in contact with the indexer.

43. The apparatus of claim 39,

wherein the multi-station processing chamber includes four stations.

44. The apparatus of claim 39,

wherein an RF return path to the bottom portion is generated through the top plate, electrically conductive seal and bellows assembly, electrically conductive interface, indexer, and spindle.

45. The apparatus of claim 39, wherein the indexer comprises:

an upper indexer part; and

a lower indexer part.

46. The apparatus of claim 39, wherein each of the plurality of extensions is configured to rotate the corresponding substrate.