Claims:

1. A magnetron assembly, comprising:

a body extending along and rotatable about a central axis of the magnetron assembly;

a coolant feed structure that is fixed and that extends through the body along the central axis to provide a coolant along the central axis to an area beneath the coolant feed structure; and

a rotatable magnet assembly coupled to a bottom of the body such that rotation of the body rotates the rotatable magnet assembly about the central axis and the coolant feed structure, the rotatable magnet assembly having a plurality of magnets, wherein the plurality of magnets are further configured to rotate about a magnet axis passing centrally through the plurality of magnets.

2. The magnetron assembly of claim 1, wherein the rotatable magnet assembly is rotationally coupled to a bottom portion of the coolant feed structure via a bearing so that the rotatable magnet assembly may rotate while the coolant feed structure remains stationary.

3. The magnetron assembly of claim 2, further comprising:

a first sensor configured to detect when the rotatable magnet assembly is rotating at a first distance; and

a second sensor configured to detect when the rotatable magnet assembly is rotating at a second distance.

4. The magnetron assembly of claim 3, wherein the rotatable magnet assembly further comprises:

an indicating element detectable by the first and second sensors to determine whether the plurality of magnets are being rotated at the first distance or the second distance.

5. The magnetron assembly of claim 1, wherein the plurality of magnets are disposed between an upper plate and a lower plate of the rotatable magnet assembly, wherein the upper plate includes an opening aligned with the central axis and wherein the lower plate is disposed radially outward of the central axis.

6. The magnetron assembly of claim 5, further comprising:

a third sensor configured to determine if the rotatable magnet assembly is rotating and to determine a vertical position of the rotatable magnet assembly.

7. The magnetron assembly of claim 1, wherein the rotatable magnet assembly includes a stopper on a side opposite the plurality of magnets about the central axis.

8. A substrate processing system, comprising:

a chamber;

a lid removably disposed atop the chamber;

a target assembly coupled to the lid, the target assembly including a target material to be sputtered from the target assembly and deposited on a substrate;

a substrate support disposed within the chamber to support a substrate during processing;

a coolant supply; and

the magnetron assembly of claim 1 disposed adjacent the target assembly on a side opposite the substrate support, wherein the coolant feed structure is configured to provide the coolant from the coolant supply along the central axis to a cavity above the target assembly to cool the target assembly, and wherein the rotatable magnet assembly is disposed in the cavity.

9. The substrate processing system of claim 8, further comprising:

a first motor coupled to the body via a coupling assembly to rotate the body and the rotatable magnet assembly; and

a second motor coupled to the body to vertically move the rotatable magnet assembly within the cavity.

10. The substrate processing system of claim 9, wherein the second motor is configured to vertically move the rotatable magnet assembly so that a vertical distance between a first lowermost surface of the plurality of magnets and a second lowermost surface of the target assembly remains substantially constant.

11. The substrate processing system of claim 8, wherein the rotatable magnet assembly is coupled to a bottom portion of the coolant feed structure via a bearing that is disposed in the cavity.

12. The substrate processing system of claim 8, further comprising:

a DC power source coupled to the target assembly; and

an RF power source coupled to the target assembly.

13. The substrate processing system of claim 8, wherein the target material comprises one of titanium, tantalum, or tungsten.

14. A magnetron assembly, comprising:

a body extending along and rotatable about a central axis of the magnetron assembly;

a coolant feed structure that is fixed and that extends through the body along the central axis to provide a coolant along the central axis to an area beneath the coolant feed structure; and

a rotatable magnet assembly coupled to a bottom of the body such that rotation of the body rotates the rotatable magnet assembly about the central axis and about the fixed coolant feed structure, the rotatable magnet assembly having a plurality of magnets, wherein the rotatable magnet assembly is configured to move vertically, and wherein all magnets of the rotatable magnet assembly are configured to further rotate about a common magnet axis disposed at a center of the plurality of magnets, and wherein the rotatable magnet assembly is rotatably coupled to the coolant feed structure.

15. The magnetron assembly of claim 14, wherein the rotatable magnet assembly is configured to rotate about the central axis at a first distance from the central axis and a second distance from the central axis.

16. The magnetron assembly of claim 15, further comprising:

a third sensor configured to determine if the rotatable magnet assembly is rotating and to determine a vertical position of the rotatable magnet assembly.

17. The magnetron assembly of claim 15, further comprising:

a first sensor configured to detect when the rotatable magnet assembly is rotating at the first distance; and

a second sensor configured to detect when the rotatable magnet assembly is rotating at the second distance.

18. The magnetron assembly of claim 17, wherein the rotatable magnet assembly further comprises:

an indicating element detectable by the first and second sensors to determine whether the plurality of magnets are being rotated at the first distance or the second distance.

19. A magnetron assembly, comprising:

a body extending along a central axis of the magnetron assembly;

a coolant feed structure extending through the body along the central axis to provide a coolant along the central axis to an area beneath the coolant feed structure;

a rotatable magnet assembly fixedly coupled to a bottom of the body and rotatably coupled to the coolant feed structure, the rotatable magnet assembly having a plurality of magnets, wherein the rotatable magnet assembly is configured to rotate about the central axis at a first distance from the central axis and a second distance from the central axis, wherein the rotatable magnet assembly includes a stopper on a side opposite the plurality of magnets about the central axis and wherein the rotatable magnet assembly is configured to move vertically;

a first sensor configured to detect when the rotatable magnet assembly is rotating at the first distance; and

a second sensor configured to detect when the rotatable magnet assembly is rotating at the second distance.

20. The magnetron assembly of claim 19, wherein the rotatable magnet assembly further comprises:

an indicating element detectable by the first and second sensors to determine whether the plurality of magnets are being rotated at the first distance or the second distance.