

Claims:

1. A magnetron assembly for use in a PVD chamber, comprising:
 - a base plate having a first side, a second side opposite the first side, and a central axis;
 - a magnet plate rotatably coupled to the base plate on the first side of the base plate, wherein the magnet plate rotates with respect to the base plate about an offset axis;
 - a magnet assembly coupled to the magnet plate offset from the offset axis and configured to rotate about the central axis and the offset axis;
 - a first motor coupled to the base plate to rotate the magnet assembly about the central axis; and
 - a second motor coupled to the magnet plate to control an angular position thereof and to position the magnet assembly in each of a plurality of fixed angular positions defining a plurality of different fixed radii, wherein the magnet assembly is configured to rotate 360 degrees about the central axis at each of the plurality of fixed radii.
2. The magnetron assembly of claim 1, wherein the magnet assembly is configured to rotate about 180 degrees from a zero degree position about the offset axis to position the magnet assembly at each of the plurality of different fixed radii.
3. The magnetron assembly of claim 1, further comprising a counterweight coupled to the base plate opposite the magnet plate about the central axis.
4. The magnetron assembly of claim 1, further comprising a counterweight coupled to the magnet plate on a side opposite the magnet assembly about the offset axis.
5. The magnetron assembly of claim 1, wherein when the magnet assembly is disposed about 180 degrees from a position sensor with respect to the offset axis, the magnet assembly is disposed at a first fixed radius corresponding with a radially innermost position of the magnet assembly with respect to the central axis.

6. The magnetron assembly of any of claims 1 to 5, wherein the plurality of different fixed radii includes a first fixed radius of about 1.5 inches to about 2.6 inches, a second fixed radius of about 2.6 inches to about 3.5 inches, a third fixed radius of about 3.5 inches to about 4.5 inches, a fourth fixed radius of about 4.5 inches to about 5.5 inches, and a fifth fixed radius of about 5.9 inches to about 7.5 inches.
7. The magnetron assembly of any of claims 1 to 5, wherein a distance between the central axis and the offset axis is about 4.0 inches to about 5.0 inches.
8. The magnetron assembly of any of claims 1 to 5, wherein a distance between the offset axis and a center of the magnetic assembly is about 2.0 inches to about 3.0 inches.
9. A method of depositing metallic film on a substrate, comprising:
 - positioning a magnet assembly in a physical vapor deposition (PVD) chamber at a first fixed radius with respect to a central axis of a target;
 - depositing metallic film onto the substrate disposed opposite the target in the PVD chamber while rotating the magnet assembly with respect to the central axis at the first fixed radius for a first period of time;
 - positioning the magnet assembly at a second fixed radius with respect to the central axis by rotating the magnet assembly about an offset axis; and
 - depositing metallic film onto the substrate while rotating the magnet assembly with respect to the central axis at the second fixed radius for a second period of time.
10. The method of claim 9, further comprising:
 - positioning the magnet assembly at a third fixed radius with respect to the central axis by rotating the magnet assembly about the offset axis;
 - depositing metallic film onto the substrate while rotating the magnet assembly with respect to the central axis at the third fixed radius for a third period of time;

positioning the magnet assembly at a fourth fixed radius with respect to the central axis by rotating the magnet assembly about the offset axis;

depositing metallic film onto the substrate while rotating the magnet assembly with respect to the central axis at the fourth fixed radius for a fourth period of time;

positioning the magnet assembly at a fifth fixed radius with respect to the central axis by rotating the magnet assembly about the offset axis; and

depositing metallic film onto the substrate while rotating the magnet assembly with respect to the central axis at the fifth fixed radius for a fifth period of time.

11. The method of claim 10, wherein the metallic film is deposited onto the substrate at the first fixed radius, then the second fixed radius, then the third fixed radius, then the fourth fixed radius, then the fifth fixed radius.

12. The method of claim 10, wherein the first fixed radius is about 1.5 inches to about 2.6 inches, wherein the second fixed radius is about 2.6 inches to about 3.5 inches, wherein the third fixed radius is about 3.5 inches to about 4.5 inches, wherein the fourth fixed radius is about 4.5 inches to about 5.5 inches, and the fifth fixed radius is about 5.9 inches to about 7.5 inches.

13. The method of any of claims 9 to 12, further comprising applying an RF bias power at a frequency of about 2.0 kW to about 2.2 kW to a substrate support assembly of the PVD chamber while depositing metallic film at the first fixed radius.

14. The method of any of claims 9 to 12, further comprising supplying an upper magnet assembly disposed about a chamber body of the PVD chamber with about 6.0 amps to about 16.0 amps of current while depositing metallic film at the first fixed radius and the second fixed radius.

15. A non-transitory computer readable medium for storing computer instructions that, when executed by at least one processor causes the at least one processor to perform the method of any of claims 9 to 12.

16. The non-transitory computer readable medium of claim 15, further comprising applying an RF bias power at a frequency of about 2.0 kW to about 2.2 kW to a substrate support assembly of the PVD chamber while depositing metallic film at the first fixed radius.

17. The non-transitory computer readable medium of claim 15, further comprising supplying an upper magnet assembly disposed about a chamber body of the PVD chamber with about 6.0 amps to about 16.0 amps of current while depositing metallic film at the first fixed radius and the second fixed radius.