CLAIMS

1. A physical vapor deposition (PVD) chamber comprising:

a plurality of cathode assemblies;

each of the plurality of cathode assemblies comprising a motor which rotationally drives a motor shaft which rotates a magnet assembly coupled to the motor shaft, the magnet assembly comprising a plurality of outer peripheral magnets surrounding an inner magnet, the magnet assembly mounted to a mounting plate and configured to rotate during a physical vapor deposition process, the magnet assembly being slidably mounted to the mounting plate to allow the magnet assembly to be moved toward and away from a peripheral edge of the mounting plate;

each of the plurality of cathode assemblies further comprising a housing surrounding a conductor which surrounds the magnet assembly and the mounting plate, the conductor including a coolant channel to cool each of the plurality of cathode assemblies; and

a balancing weight mounted to the mounting plate opposite the magnet assembly.

2. The PVD chamber of claim 1, further comprising:

a rotating shield below the plurality of cathode assemblies to expose one of the plurality of cathode assemblies through a shield hole of the rotating shield;

a target below each of the plurality of cathode assemblies; and

a rotating pedestal to support a carrier, wherein each of the plurality of cathode assemblies further comprises an insulator plate secured to the mounting plate and between the mounting plate and the motor shaft.

3. The PVD chamber of claim 1, wherein the plurality of outer peripheral magnets comprises at least three outer peripheral magnets surrounding the inner magnet.

4. The PVD chamber of claim 1, wherein the plurality of outer peripheral magnets comprises at least seven outer peripheral magnets surrounding the inner magnet.

5. The PVD chamber of claim 4, wherein the outer peripheral magnets are in contact

with the inner magnet.

6. The PVD chamber of claim 1, wherein the plurality of outer peripheral magnets comprises twenty-three magnets.

7. The PVD chamber of claim 1, wherein the plurality of outer peripheral magnets are of a first polarity and the inner magnet is of a second polarity opposite the first polarity.

8. The PVD chamber of claim 1, wherein the mounting plate comprises mounting slots, which permit the magnet assembly to be slidably mounted to the mounting plate.

9. The PVD chamber of claim 1, wherein the plurality of outer peripheral magnets comprises at least twenty magnets.

10. The PVD chamber of claim 1, wherein the plurality of cathode assemblies comprises at least twelve cathode assemblies.

11. A physical vapor deposition (PVD) chamber comprising:

a plurality of rotating cathode assemblies;

each of the rotating cathode assemblies comprising a motor which rotationally drives a motor shaft which rotates a magnet assembly coupled to the motor shaft, the magnet assembly comprising a plurality of outer peripheral magnets surrounding an inner magnet;

a mounting plate comprising mounting slots, the magnet assembly being slidably mounted to the mounting plate to allow the magnet assembly to be moved toward and away from a peripheral edge of the mounting plate, the mounting plate configured to rotate during a physical vapor deposition process; and

a balancing weight mounted to the mounting plate opposite the magnet assembly.

12. The PVD chamber of claim 11, each of the plurality of rotating cathode assemblies further comprising a housing surrounding a conductor which surrounds the magnet assembly and the mounting plate, the conductor including a coolant channel to cool each of the plurality of cathode assemblies.

13. The PVD chamber of claim 11, wherein the magnet assembly comprises seven outer peripheral magnets in contact with the inner magnet.

14. The PVD chamber of claim 11, wherein the magnet assembly comprises at least twenty peripheral magnets.

15. A method of depositing a material layer comprising:

placing a substrate in a multi-cathode PVD chamber comprising a plurality of cathode assemblies;

rotating a portion of each of the plurality of cathode assemblies using a motor to rotationally drive a motor shaft which rotates a mounting plate, a magnet assembly, and a balancing weight mounted to the mounting plate opposite the magnet assembly, the magnet assembly comprising a plurality of outer peripheral magnets surrounding an inner magnet, the outer peripheral magnets and the inner magnet mounted to the mounting plate, the mounting plate comprising a plurality of mounting slots, and the magnet assembly being slidably mounted to the mounting plate to allow the magnet assembly to be moved toward and away from a peripheral edge of the mounting plate;

cooling each of the plurality of the cathode assemblies with coolant in a coolant channel within a conductor surrounded by a housing, the conductor surrounding the magnet assembly and the mounting plate; and

depositing the material layer on the substrate.

16. The method of claim 15, wherein each of the plurality of cathode assemblies

further comprises an insulator plate secured to the mounting plate and between the mounting plate and the motor shaft.

17. The method of claim 16, wherein the substrate comprises an extreme ultraviolet mask blank.

18. The method of claim 17, further comprising depositing a plurality of alternating material layers, the plurality of alternating material layers comprising a first layer comprising molybdenum and a second layer comprising silicon.