What is claimed is:

1. A magnetic thin film deposition chamber, comprising:

a main chamber, wherein a base pedestal is disposed in the main chamber for carrying a to-be-processed workpiece; and further comprising:

a bias magnetic field device, wherein the bias magnetic field device is configured for forming a horizontal magnetic field above the base pedestal, and the horizontal magnetic field is used to provide an in-plane anisotropy to a magnetized film layer deposited on the to-be-processed workpiece; and

the bias magnetic field device includes a magnet assembly disposed around the base pedestal, wherein the magnet assembly is configured for forming the horizontal magnetic field above the base pedestal; and

the magnet assembly includes two sub-magnet groups each having an arc shape, wherein the two sub-magnet groups are symmetrically disposed around the base pedestal; and

each sub-magnet group includes a plurality of magnetic cylinders, and the plurality of magnetic cylinders is arranged at intervals along a circumferential direction of the base pedestal.

2. The magnetic thin film deposition chamber according to claim 1, wherein:

in each sub-magnet group, directions of magnetic poles of the plurality of magnetic cylinders are parallel to each other.

3. The magnetic thin film deposition chamber according to claim 1, wherein:

in each sub-magnet group, directions of magnetic poles of the plurality of magnetic cylinders are radial directions of the base pedestal.

4. The magnetic thin film deposition chamber according to claim 2 or 3, wherein:

the plurality of magnetic cylinders are disposed horizontally; and an N pole of each magnetic cylinder in one of the two sub-magnet groups as well as an S pole of each magnetic cylinder in the other of the two sub-magnet groups all point to the base pedestal.

5. The magnetic thin film deposition chamber according to claim 2 or 3, wherein:

the plurality of magnetic cylinders are disposed vertically; and an N pole of each magnetic cylinder in one of the two sub-magnet groups as well as an S pole of each magnetic cylinder in the other of the two sub-magnet groups all vertically point up.

6. The magnetic thin film deposition chamber according to claim 2 or 3, wherein:

the plurality of magnetic cylinders are disposed obliquely, and an N pole of each magnetic cylinder in one of the two sub-magnet groups and an S pole of each magnetic cylinder in the other of the two sub-magnet groups all obliquely point up along a direction toward the base pedestal.

7. The magnetic thin film deposition chamber according to claim 1, wherein:

in the plurality of magnetic cylinders of each sub-magnet group, a distribution density of the magnetic cylinders in a portion adjacent to two ends of the arc shape is smaller than a

distribution density of the magnetic cylinders in a portion adjacent to a middle of the arc shape.

8. The magnetic thin film deposition chamber according to claim 1, wherein:

the magnetic cylinders in the two sub-magnet groups are arranged: such that a distance between an N pole of any magnetic cylinder pointing to the base pedestal and an S pole, pointing to the base pedestal, of a magnetic cylinder that receives magnetic field lines emitted from the N pole is larger than or equal to a diameter of the to-be-processed workpiece.

9. The magnetic thin film deposition chamber according to any one of claims 1-3 and 7-8,

wherein the bias magnetic field device includes:

a support plate, configured to support the bias magnetic field device;

an inner fixing plate and an outer fixing plate, disposed on the support plate and respectively located inside and outside of the magnet assembly for fixing two ends of the bias magnetic field device, respectively;

an upper cover, located above the bias magnetic field device, and fixedly connected to the outer fixing plate and the inner fixing plate, respectively, wherein:

the bias magnetic field device is located in a space surrounded by the support plate, the outer fixing plate, the inner fixing plate, and the upper cover.

10. The magnetic thin film deposition chamber according to any one of claims 1-3 and 7-8,

wherein:

the magnetic thin film deposition chamber further includes a shielding assembly, and the shielding assembly is used to shield the bias magnetic field device, preventing a target material deposition on the bias magnetic field device.

11. The magnetic thin film deposition chamber according to claim 10, wherein the shielding assembly includes:

a shielding element, the shielding element including a first vertical portion, a horizontal portion, and a second vertical portion, the first vertical portion disposed around an inner side of a sidewall of the main chamber, an outer circumference of the horizontal portion connected to a lower end of the first vertical portion, and an inner circumference of the horizontal portion connected to an upper end of the second vertical portion, wherein:

the horizontal portion and the second vertical portion are located above and inside the bias magnetic field device, respectively.

12. The magnetic thin film deposition chamber according to claim 11, wherein:

the magnetic thin film deposition chamber further includes a support component and a pressing ring, wherein:

the pressing ring is used to press down an edge region of an upper surface of the to-be-processed workpiece; and

the support component is connected to a lower end of the second vertical portion, and is used to support the pressing ring.

13. The magnetic thin film deposition chamber according to claim 12, wherein:

an annular boss is disposed on the inner side of the sidewall of the main chamber, and the annular boss is located below the horizontal portion and on an outer side of the second vertical portion; and

the bias magnetic field device is located in an annular space formed by the sidewall of the main chamber, the annular boss, the horizontal portion, and the second vertical portion.

14. The magnetic thin film deposition chamber according to claim 13, wherein:

the bias magnetic field device is in contact with an upper surface of the annular boss.

15. The magnetic thin film deposition chamber according to claim 14, wherein:

a cooling channel is disposed around the inner side of the sidewall of the main chamber and/or the annular boss along a circumferential direction, wherein the cooling channel is used to introduce a cooling medium to cool the annular boss and the bias magnetic field device.

16. The magnetic thin film deposition chamber according to claim 14, wherein:

a horizontal gap is formed between an inner wall of the bias magnetic field device and an outer wall of the second vertical portion.

17. The magnetic thin film deposition chamber according to claim 16, wherein:

the horizontal gap is larger than or equal to 0.5 mm.

18. The magnetic thin film deposition chamber according to claim 14, wherein:

a vertical gap is between an upper surface of the bias magnetic field device and a lower surface of the horizontal portion.

19. The magnetic thin film deposition chamber according to claim 16, wherein:

the vertical gap is smaller than or equal to 5 mm.

20. A thin film deposition apparatus, comprising at least one first deposition chamber for depositing magnetized film layers, wherein:

each first deposition chamber adopts the magnetic thin film deposition chamber according to any one of claims 1-19.

21. The thin film deposition apparatus according to claim 20, wherein:

the thin film deposition apparatus is configured to deposit a magnetic thin film stack, wherein:

the magnetic thin film stack includes a magnetism-isolation unit; the magnetism-isolation unit includes one or multiple film-layer groups; the film-layer groups include magnetized film layers and isolation layers; and the magnetized film layers and the isolation layers of multiple film-layer groups are alternately disposed, wherein the thin film deposition apparatus further includes:

at least one second deposition chamber for depositing the isolation layers.

22. The thin film deposition apparatus according to claim 21, wherein:

the magnetic thin film stack further includes an adhesive layer; and

the thin film deposition apparatus further includes at least one third deposition chamber for depositing the adhesive layer.

23. The thin film deposition apparatus according to claim 21, wherein:

the thin film deposition apparatus further includes a transfer chamber for transferring the to-be-processed workpiece between the first deposition chamber and the second deposition chamber.

24. The thin film deposition apparatus according to claim 22, wherein:

the thin film deposition apparatus further includes a transfer chamber for transferring the to-be-processed workpiece between the first deposition chamber, the second deposition chamber, and the third deposition chamber.