

DESCRIPTION

[Title of Invention]

GLASS SUBSTRATE, METHOD FOR MANUFACTURING MAGNETIC-DISK GLASS
5 SUBSTRATE, MAGNETIC-DISK SUBSTRATE, MAGNETIC DISK, METHOD FOR
MANUFACTURING MAGNETIC-DISK

[Technical Field]

[0001] The present invention relates to a magnetic-disk glass substrate and a
10 magnetic disk.

[Background Art]

[0002] Nowadays, personal computers, digital versatile disc (DVD) recorders, and the
like have a built-in hard disk drive (HDD) for data recording. In particular, a
magnetic disk in which a magnetic layer is provided on a glass substrate is used in a
15 hard disk drive that is used in a device premised on portability, such as a
notebook-type personal computer, and magnetic recording information is recorded on
or read from the magnetic layer with a magnetic head that flies slightly above the
surface of the magnetic disk. A glass substrate is unlikely to be plastically deformed
compared with a metal substrate (aluminum substrate) and the like, and thus is
20 preferably used as the substrate of magnetic disks.

[0003] Moreover, the density of magnetic recording has been increased to meet the
demand for an increase in the storage capacity of hard disk drives. For example, the
magnetic recording information area has been made smaller using a perpendicular
magnetic recording system that causes the direction of magnetization in the magnetic
25 layer to be perpendicular to the surface of the substrate. This makes it possible to
increase the storage capacity per disk substrate. In such a disk substrate, it is
preferable that the substrate surface is made as flat as possible and the direction in
which magnetic particles grow is arranged in the vertical direction such that the
direction of magnetization in the magnetic layer faces in a substantially perpendicular
30 direction relative to the substrate surface.

CLAIMS

1. A glass substrate which is an original substrate for a magnetic-disk glass substrate comprising:

a pair of main surfaces;

a side wall surface formed at an outer circumferential side edge portion;

and

chamfered surfaces interposed between the side wall surface and the main surfaces, respectively,

wherein the side wall surface has a roundness of $1.5\text{ }\mu\text{m}$ or less,

the difference between the radii of an inscribed circle and a circumcircle obtained by superimposing three outlines of the side wall surface, including the circumferential outline of the side wall surface at the center position of the thickness of the substrate and each of the circumferential outlines of the side wall surface at two thickness positions, each of which is a predetermined distance apart from the center position in the opposite direction in the thickness direction, and based on the superimposed outlines is $5\text{ }\mu\text{m}$ or less, and

if there is a position on the side wall that is $200\text{ }\mu\text{m}$ apart from the center position in each of the opposite directions in the thickness direction, then the predetermined distance is $200\text{ }\mu\text{m}$, and if there is no position on the side wall that is $200\text{ }\mu\text{m}$ apart from the center position in each of the opposite directions in the thickness direction, then the predetermined distance is $100\text{ }\mu\text{m}$.

2. The glass substrate according to claim 1,

wherein outlines in the circumferential direction are obtained at two positions on the side wall surface on an outer circumferential side spaced apart by $200\text{ }\mu\text{m}$ in the thickness direction, and a middle point between centers of two least square circles determined from these outlines is referred to as middle

point A,

outlines in the circumferential direction are obtained at positions that are located at centers of lengths of the two chamfered surfaces on the outer circumferential side in the thickness direction, and among centers of least square circles determined from these outlines, a center determined from one chamfered surface is referred to as center B, and a center determined from the other chamfered surface is referred to as center C, and

a sum of a distance between the middle point A and the center B and a distance between the middle point A and the center C is 1 μm or less.

3. The glass substrate according to claim 1 or 2,
wherein a thickness is 0.635 mm or less.
4. A glass substrate according to any one of claims 1 to 3,
wherein a difference in radius between an inscribed circle and a circumcircle is 3 μm or less.
5. A method for manufacturing a glass substrate for a magnetic disk, the method comprising a processing of polishing the main surfaces of the glass substrate according to any one of claims 1 to 4.
6. A method for manufacturing a magnetic disk, the method comprising a processing of forming a magnetic layer on each of main surfaces of the magnetic-disk glass substrate manufactured by the method according to claim 5.
7. A magnetic-disk substrate comprising:
a pair of main surfaces;
a side wall surface formed at an outer circumferential side edge portion;
and

chamfered surfaces interposed between the side wall surface and the main surfaces, respectively,

wherein the side wall surface has a roundness of $1.5\text{ }\mu\text{m}$ or less,

a thickness of the magnetic disk is 0.635 mm or less,

the difference between the radii of a inscribed circle and a circumcircle obtained by superimposing three outlines of the side wall surface, including the circumferential outline of the side wall surface at the center position of the thickness of the substrate and each of the circumferential outlines of the side wall surface at two thickness positions, each of which is a predetermined distance apart from the center position in the opposite direction in the thickness direction, and based on the superimposed outlines is $5\text{ }\mu\text{m}$ or less, and

if there is a position on the side wall that is $200\text{ }\mu\text{m}$ apart from the center position in each of the opposite directions in the thickness direction, then the predetermined distance is $200\text{ }\mu\text{m}$, and if there is no position on the side wall that is $200\text{ }\mu\text{m}$ apart from the center position in each of the opposite directions in the thickness direction, then the predetermined distance is $100\text{ }\mu\text{m}$.

8. A magnetic-disk substrate according to claim 7,

wherein a difference in radius between the inscribed circle and the circumcircle is $3\text{ }\mu\text{m}$ or less.

9. The magnetic-disk substrate according to claims 7 or 8,

wherein outlines in the circumferential direction are obtained at two positions on the side wall surface on an outer circumferential side spaced apart by $200\text{ }\mu\text{m}$ in the thickness direction, and a middle point between centers of two least square circles determined from these outlines is referred to as middle point A,

outlines in the circumferential direction are obtained at positions that

are located at centers of lengths of the two chamfered surfaces on the outer circumferential side in the thickness direction, and among centers of least square circles determined from these outlines, a center determined from one chamfered surface is referred to as center B, and a center determined from the other chamfered surface is referred to as center C, and

a sum of a distance between the middle point A and the center B and a distance between the middle point A and the center C is 1 μm or less.

10. The magnetic-disk substrate according to any one of claims 7 to 9, wherein a thickness is 0.5 mm or less.
11. The magnetic-disk substrate according to any one of claims 7 to 10 that is to be used as a magnetic disk for a shingle write system or for an energy-assisted magnetic recording method.
12. A magnetic disk comprising a magnetic layer on each of the main surfaces of the magnetic-disk substrate according to any one of claims 7 to 11.