

CLAIMS

1. A magnetic disk substrate being a disk-shaped substrate and having a generally flat main surface, an end face, a chamfered face formed between the main surface and the end face, and an offset portion, at a periphery of the main surface, raised or lowered with respect to a flat surface, other than the periphery, of the main surface, wherein:

when measuring said offset portion of said substrate at 12 points per 30° in a circumferential direction of said substrate, a change in magnitude of the offset of said offset portion is 5nm or less.

2. A magnetic disk substrate according to claim 1, wherein an extreme portion where rising or lowering is maximum in said offset portion is located at substantially the same distance from a center of said substrate.

3. A magnetic disk substrate according to claim 1, wherein, in said main surface, a circularity of a circle formed by an extreme portion where rising or lowering is maximum in said offset portion is 600μm or less.

4. A magnetic disk substrate according to claim 1, wherein:

said substrate has a circular hole in its center, and

in said main surface, a concentricity between a circle formed by an extreme portion where rising or lowering is maximum in said offset portion and said circular hole is 1200μm or less.

5. A magnetic disk substrate being a disk-shaped substrate and having a generally flat main surface, an end face, a chamfered face formed between the main surface and the end face, and an offset portion, at a periphery of the main surface, raised or lowered with respect to a flat surface, other than the periphery, of the main surface, wherein:

said offset portion is formed over the entire circumference of said substrate, and

an extreme portion where rising or lowering is maximum in said offset portion is located over the entire circumference of said offset portion in a range of 92.0 to 97.0% with respect to a radial distance from the center of said substrate to its outer diameter.

6. A magnetic disk substrate being a disk-shaped substrate and having a

generally flat main surface, an end face, a chamfered face formed between the main surface and the end face, and an offset portion, at a periphery of the main surface, raised or lowered with respect to a flat surface, other than the periphery, of the main surface, wherein:

said offset portion is formed over the entire circumference of said substrate, and

in said main surface, a circularity of a circle formed by an extreme portion where rising or lowering is maximum in said offset portion is $600\mu\text{m}$ or less.

7. A magnetic disk substrate being a disk-shaped substrate and having a generally flat main surface, an end face, a chamfered face formed between the main surface and the end face, and an offset portion, at a periphery of the main surface, raised or lowered with respect to a flat surface, other than the periphery, of the main surface, wherein:

said offset portion is formed over the entire circumference of said substrate, and

said substrate has a circular hole in its center, and

in said main surface, a concentricity between a circle formed by an extreme portion where rising or lowering is maximum in said offset portion and said circular hole is $1200\mu\text{m}$ or less.

8. A magnetic disk substrate according to any one of claims 5 to 7, wherein a change in magnitude of offset in said offset portion is 5nm or less.

9. A magnetic disk substrate being a disk-shaped substrate and having a generally flat main surface, an end face, a chamfered face formed between the main surface and the end face, and an offset portion, at a periphery of the main surface, raised or lowered with respect to a flat surface, other than the periphery, of the main surface, wherein:

said offset portion is formed over the entire circumference of said substrate, and

a change in magnitude of offset in said offset portion is 5nm or less.

10. A magnetic disk substrate being a disk-shaped substrate and having a generally flat main surface, an end face, a chamfered face formed between the main surface and the end face, and an offset portion, at a periphery of the main

surface, raised or lowered with respect to a flat surface, other than the periphery, of the main surface, wherein:

a magnitude of offset of said offset portion is substantially uniform over the entire circumference of said substrate.

11. A magnetic disk wherein at least a magnetic layer is formed on the substrate according to any one of claims 1, 5, 6, 7, 9 and 10.

12. A magnetic disk according to claim 11, wherein a touch-down height is 4nm or less.

13. A magnetic disk device mounted with the magnetic disk according to claim 11 or 12.

CLAIMS

1. A magnetic disk substrate being a disk-shaped substrate for use in a magnetic disk and having a main surface, an end face, and a chamfered face formed between the main surface and the end face,

the main surface having a flat surface and an offset portion, the offset portion being raised or lowered with respect to the flat surface,

the offset portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, wherein:

when a distance from a center of the disk-shaped substrate to the end face in a radial direction of the disk-shaped substrate is 100% and two points are set on the main surface at positions of 92.0% and 97.0% from the center, a distance from a virtual straight line connecting the two points to the offset portion in a direction perpendicular to the virtual straight line is defined as a maximum offset value, and

when measuring the maximum offset value at 12 points per 30° in a circumferential direction of said substrate, a change in magnitude of the maximum offset value is 5nm or less.

2. A magnetic disk substrate according to claim 1, wherein an extreme portion where rising or lowering is maximum in said offset portion is located at substantially the same distance from a center of said substrate.

3. A magnetic disk substrate according to claim 1, wherein, in said main surface, a circularity of a circle formed by an extreme portion where rising or lowering is maximum in said offset portion is 600 μ m or less.

4. A magnetic disk substrate according to claim 1, wherein:

said substrate has a circular hole in its center, and

in said main surface, a concentricity between a circle formed by an extreme portion where rising or lowering is maximum in said offset portion and said circular hole is 1200 μ m or less.

5. A magnetic disk substrate being a disk-shaped substrate for use in a magnetic disk to be mounted to a magnetic disk device and having a main surface, an end face, and a chamfered face formed between the main surface and the end face,

the main surface having a flat surface and an offset portion,

the offset portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, the offset portion being raised

with respect to the flat surface, wherein:

when a distance from a center of the disk-shaped substrate to the end face is 100%, an extreme portion where rising is maximum in a radial direction in said offset portion is located in a range of 92.0 to 97.0% from the center, and

when measuring the extreme portion at 12 points per 30° in a circumferential direction of said substrate, a change in radial position of adjacent extreme portions is 0.3mm or less.

6. A magnetic disk substrate being a disk-shaped substrate for use in a magnetic disk to be mounted to a magnetic disk device and having a main surface, an end face, and a chamfered face formed between the main surface and the end face,

the main surface having a flat surface and an offset portion the offset portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, the offset portion being raised with respect to the flat surface, wherein:

an extreme portion where rising is maximum in a radial direction in said offset portion is located in a range of 92.0% to 97.0% from a center of said disk-shaped substrate when a distance from the center of the disk-shaped substrate to the end face is 100%, and

in said main surface, a circularity of a circle formed by the extreme portion is 400 μ m or less.

7. A magnetic disk substrate being a disk-shaped substrate for use in a magnetic disk to be mounted to a magnetic disk device and having a main surface, an end face, and a chamfered face formed between the main surface and the end face,

the main surface having a flat surface and an offset portion the offset portion being raised or lowered with respect to the flat surface,

the offset portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, wherein:

said substrate has a circular hole in its center, and

when a distance from a center of the disk-shaped substrate to the end face in a radial direction of the disk-shaped substrate is 100% and two points are set on the main surface at positions of 92.0% and 97.0% from the center, a concentricity between a circle formed by an extreme portion where a distance from a virtual straight line connecting the two points to said offset portion in a direction

perpendicular to the virtual straight line is maximum, and said circular hole is 1200 μ m or less.

8. A magnetic disk substrate according to any one of claims 5 to 7, wherein a change in magnitude of offset in said offset portion is 5nm or less.

9. A magnetic disk substrate being a disk-shaped substrate and having a main surface, an end face, and a chamfered face formed between the main surface and the end face,

the main surface having a flat surface and a lowered portion,

the lowered portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, the lowered portion being lowered with respect to the flat surface, wherein:

when a depth of the lowered portion from the flat surface is specified at a position spaced by a predetermined distance from a center of the disk-shaped substrate, a change in depth is 5nm or less in a circumferential direction of the disk-shaped substrate.

10. The magnetic disk substrate according to claim 9, wherein,

when a distance from the center of the disk-shaped substrate to the end face is 100%, the position spaced by the predetermined distance is located in a range of 92.0% to 97.0% from the center.

11. The magnetic disk substrate according to claim 9, wherein the change in depth in the circumferential direction of the disk-shaped substrate is a difference between maximum and minimum when the lowered portion is measured at 12 points per 30° in the circumferential direction.

12. A magnetic disk substrate being a disk-shaped substrate for use in a magnetic disk to be mounted to a magnetic disk device and having a main surface, an end face, and a chamfered face formed between the main surface and the end face,

the main surface having a flat surface and an offset portion, the offset portion being raised or lowered with respect to a flat surface, the offset portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface; wherein:

when a distance from a center of the disk-shaped substrate to the end face in a radial direction of the disk-shaped substrate is 100% and two points are set at positions of 92.0% and 97.0% from the center, a circularity of a circle formed by an extreme portion where a distance from a virtual straight line connecting the two

points to said offset portion in a direction perpendicular to the virtual straight line is maximum is 600 μ m or less.

13. The magnetic disk substrate according to claim 12, wherein the extreme portion is measured at 12 points per 30° in a circumferential direction of the disk-shaped substrate.

14. A magnetic disk wherein at least a magnetic layer is formed on the substrate according to any one of claims 1, 5, 6, 7, 9 and 12.

15. A magnetic disk according to claim 14, wherein a touch-down height is 4nm or less.

16. A magnetic disk device mounted with the magnetic disk according to claim 14 or 15.

17. A magnetic disk substrate being a disk-shaped substrate for use in a magnetic disk to be mounted to a magnetic disk device and having a main surface, an end face, and a chamfered surface formed between the main surface and the end face,

the main surface having a flat surface and an offset portion, the offset portion being raised or lowered with respect to the flat surface,

the offset portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, wherein:

when a distance from a center of the disk-shaped substrate to the end face in a radial direction of the disk-shaped substrate is 100% and two points are set at positions of 92.0% and 97.0% from the center,

when measuring an extreme portion, where a distance from the virtual straight line connecting the two points to the offset portion in a perpendicular direction to the virtual straight line is maximum, at 12 points per 30° in a circumferential direction of the disk-shaped substrate, a change in radial position of the adjacent extreme portions is 0.3mm or less.

18. A magnetic disk substrate being a disk-shaped substrate and having a main surface, an end face, and a chamfered surface formed between the main surface and the end face,

the main surface having a flat surface and a raised portion,

the raised portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, the raised portion being raised with respect to the flat surface, wherein:

when a height of the raised portion from the flat surface is specified at a position spaced by a predetermined distance from a center of the disk-shaped

substrate,

a change in height in a circumferential direction of the disk-shaped substrate is 5nm or less.

19. The magnetic disk substrate according to claim 18, wherein the position spaced by the predetermined distance is located in a range of 92.0% to 97.0% from the center of the disk-shaped substrate when a distance from the center of the disk-shaped substrate to the end face is 100%.

20. The magnetic disk substrate according to claim 18, wherein the change in height in the circumferential direction of the disk-shaped substrate is a difference between maximum and minimum when the raised portion is measured at 12 points per 30° in the circumferential direction.

21. A magnetic disk substrate being a disk-shaped substrate and having a main surface, an end face, and a chamfered surface formed between the main surface and the end face,

the main surface having a flat surface and a lowered portion,

the lowered portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, the lowered portion being lowered with respect to the flat surface, wherein:

when a depth of the lowered portion from the flat surface is specified at a position spaced by a predetermined distance from a center of the disk-shaped substrate,

a change in depth between the adjacent lowered portions in a circumferential direction of the disk-shaped substrate is 1.55nm or less when the lowered portion is measured at 12 points per 30° in the circumferential direction.

22. A magnetic disk substrate being a disk-shaped substrate and having a main surface, an end face, and a chamfered surface formed between the main surface and the end face,

the main surface having a flat surface and a raised portion,

the raised portion being located at a periphery of the main surface and formed between the flat surface and the chamfered surface, the raised portion being raised with respect to the flat surface, wherein:

when a height of the raised portion from the flat surface is specified at a position spaced by a predetermined distance from a center of the disk-shaped substrate,

a change in height between the adjacent raised portions in a circumferential direction of the substrate is 1.55nm or less when the raised portion is measured at 12 points per 30° in the circumferential direction.