What is claimed is:

1. A manufacturing method of a glass substrate for a magnetic disk, comprising:

a polishing step of polishing a principal face of the glass substrate using a slurry containing zirconium oxide abrasive grains, each of the abrasive grains having zirconium oxide as a principal component, with the zirconium oxide in each of the abrasive grains having crystallites of monoclinic crystalline structures and crystallites of tetragonal crystalline structures as an abrasive, and in each of the zirconium oxide abrasive grains, a ratio of the amount of the tetragonal crystalline structures with respect to the amount of the monoclinic crystalline structures falls in a range of 0.7 % to 3.0 %, where the ratio is obtained by x-ray diffraction and is defined as a ratio of a peak intensity of the tetragonal crystalline structures with respect to a peak intensity of the monoclinic crystalline structures, and the peak intensity is defined as an integrated peak intensity.

2. The manufacturing method of a glass substrate for a magnetic disk recited in claim 1, wherein the zirconium oxide abrasive grains are made of aggregates of primary particles of zirconium oxide and the primary particles of zirconium oxide have both the monoclinic crystalline structures and the tetragonal crystalline structures.

3. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 2, wherein the zirconium oxide abrasive grains do not contain stabilizing agent.

4. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 3 wherein the average particle size D50 of the zirconium oxide abrasive grains is set to be in a range of 0.2 to 0.5 μm.

5. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 4, wherein a polisher pad is used for polishing a principal face of the glass substrate in the polishing step, the polisher pad having hardness in a range of 80 to 100 in JIS-A hardness.

6. A manufacturing method of a glass substrate for a magnetic disk, comprising:

a polishing step of executing polishing using a slurry containing yttrium-contained partially stabilized zirconia abrasive grains, each of the abrasive grains having yttrium-contained partially stabilized zirconia as a principal component, wherein a peak intensity of cubic crystalline structures is the highest among crystallites of crystalline structures of zirconia included in the yttrium-contained partially stabilized zirconia.

7. The manufacturing method of a glass substrate for a magnetic disk recited in claim 6, wherein the abrasive contains yttrium in a range of 1 to 6 % by mole.

8. The manufacturing method of a glass substrate for a magnetic disk recited in claim 7, wherein the abrasive contains yttrium oxide in a range of 1 to 6 % by mole.

9. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 8, wherein the glass substrate is made of glass, the glass having the fracture toughness value in a range of 0.4 to 1.5 $MPa \cdot m^{1/2}$.

10. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 9, further comprising:

a post polishing step of polishing using a slurry containing colloidal silica as abrasive grains , the post polishing step configured to be executed after the polishing step.

11. The manufacturing method of a glass substrate for a magnetic disk recited in claim 10, wherein a removal stock is set to be less than or equal to 5 μm in the post polishing step.

12. The manufacturing method of a glass substrate for a magnetic disk recited in claim 10 or claim 11, further comprising:

an intermediate polishing step of polishing using a slurry containing cerium oxide abrasive grains, the intermediate polishing step being executed between the polishing step and the post polishing step.

13. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 10 to claim 12, further comprising:

a chemically strengthening step configured to be executed between the polishing step and the post polishing step.

14. A magnetic disk made of a glass substrate manufactured with the method recited in any of claims 1 to 12, wherein at least a magnetic layer is formed on a principal face of the glass substrate.

15. A magnetic recording/reproducing device, comprising:

the magnetic disk recited in claim 14; and

a magnetic head embedded with a DFH (Dynamic Flying Height) control mechanism.

What is claimed is:

1. A manufacturing method of a glass substrate for a magnetic disk, comprising:

a polishing step of polishing a principal face of the glass substrate using a slurry containing zirconium oxide abrasive grains, each of the abrasive grains having zirconium oxide as a principal component, with the zirconium oxide in each of the abrasive grains having crystallites of monoclinic crystalline structures and crystallites of tetragonal crystalline structures as an abrasive, and in each of the zirconium oxide abrasive grains, a ratio of the amount of the tetragonal crystalline structures with respect to the amount of the monoclinic crystalline structures falls in a range of 0.7 % to 3.0 %, where the ratio is obtained by x-ray diffraction and is defined as a ratio of a peak intensity of the tetragonal crystalline structures with respect to a peak intensity of the monoclinic crystalline structures, and the peak intensity is defined as an integrated peak intensity.

2. The manufacturing method of a glass substrate for a magnetic disk recited in claim 1, wherein the zirconium oxide abrasive grains are made of aggregates of primary particles of zirconium oxide and the primary particles of zirconium oxide have both the monoclinic crystalline structures and the tetragonal crystalline structures.

3. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 2, wherein the zirconium oxide abrasive grains do not contain stabilizing agent.

4. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 3 wherein the average particle size D50 of the zirconium oxide abrasive grains is set to be in a range of 0.2 to 0.5 μm.

5. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 4, wherein a polisher pad is used for polishing a principal face of the glass substrate in the polishing step, the polisher pad having hardness in a range of 80 to 100 in JIS-A hardness.

6. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 5, wherein the glass substrate is made of glass, the glass having the fracture toughness value in a range of 0.4 to 1.5 $MPa \cdot m^{1/2}$.

7. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 1 to 6, further comprising:

a post polishing step of polishing using a slurry containing colloidal silica as abrasive grains , the post polishing step configured to be executed after the polishing step.

8. The manufacturing method of a glass substrate for a magnetic disk recited in claim 7, wherein a removal stock is set to be less than or equal to 5 μm in the post polishing step.

9. The manufacturing method of a glass substrate for a magnetic disk recited in claim 7 or claim 8, further comprising:

an intermediate polishing step of polishing using a slurry containing cerium oxide abrasive grains, the intermediate polishing step being executed between the polishing step and the post polishing step.

10. The manufacturing method of a glass substrate for a magnetic disk recited in any of claims 7 to claim 9, further comprising:

a chemically strengthening step configured to be executed between the polishing step and the post polishing step.

11. A magnetic disk made of a glass substrate manufactured with the method recited in any of claims 1 to 9, wherein at least a magnetic layer is formed on a principal face of the glass substrate.

12. A magnetic recording/reproducing device, comprising:

the magnetic disk recited in claim 11; and

a magnetic head embedded with a DFH (Dynamic Flying Height) control mechanism.