

Claims

1. A method for manufacturing a glass substrate for a magnetic disk,
wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surfaces of the glass substrate containing at least one component of sodium and potassium in a glass component; and
wherein the cleaning processing is performed on the plurality of the glass substrates by using a cleaning liquid containing an alkaline agent that is free of sodium and potassium, and maintaining a condition in which a total concentration of sodium ions and potassium ions in the cleaning liquid is 4.00×10^{-3} mol/L or less.
2. The method for manufacturing a glass substrate for a magnetic disk according to claim 1, wherein the main surface of the glass substrate has a surface roughness Ra of 0.15 nm or less.
3. The method for manufacturing a glass substrate for a magnetic disk according to claim 1 or 2, wherein a difference between the surface roughness (Ra) of the main surface of the glass substrate after being subjected to the cleaning processing and the surface roughness (Ra) of the main surface of the glass substrate immediately before being subjected to the cleaning processing is within 0.06 nm.
4. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 3, wherein a total concentration of sodium ions and potassium ions in the cleaning liquid is 2.00×10^{-3} mol/L or less.
5. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 4, wherein the alkaline agent is tetraalkyl ammonium hydroxide.
6. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 5, wherein the cleaning liquid further contains a surfactant that is free of sodium and potassium.
7. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 6, wherein glass constituting the glass substrate is aluminosilicate glass containing at least one of Na_2O and K_2O .
8. A method for manufacturing a glass substrate for a magnetic disk,

wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surface of the glass substrate containing at least one component of sodium and potassium in a glass component,

wherein a relationship between an amount of increase in surface roughness (Ra) of a main surface of the glass substrate after being subjected to the cleaning processing with respect to that before being subjected to the cleaning processing and a total concentration of sodium ions and potassium ions in a cleaning liquid used in the cleaning processing is obtained in advance,

the total concentration of sodium ions and potassium ions in the cleaning liquid is determined based on the obtained relationship such that the amount of increase in the surface roughness (Ra) is 0.06 nm or less, and

the cleaning processing is performed on the glass substrate by maintaining a condition in which the total concentration of sodium ions and potassium ions in the cleaning liquid is less than or equal to the determined concentration.

9. A method for manufacturing a glass substrate for a magnetic disk,

wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surface of the glass substrate containing at least one component of sodium and potassium in a glass component, and

wherein the cleaning processing is performed on the glass substrate by using a cleaning liquid containing an alkaline agent that is free of sodium and potassium, and performing replacement of the cleaning liquid if a total concentration of sodium ions and potassium ions in the cleaning liquid exceeds 4.00×10^{-3} mol/L.

10. A method for manufacturing a glass substrate for a magnetic disk,

wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surfaces of the glass substrate containing at least one component of sodium and potassium in a glass component; and

wherein the cleaning processing comprises processing of bringing the glass substrate into contact with a cleaning liquid containing tetramethyl ammonium ions, and

the cleaning processing is performed while suppressing a total amount of sodium ions and potassium ions in the cleaning liquid to less than 200 ppm.

11. The method for manufacturing a glass substrate for a magnetic disk according to claim 10, wherein the cleaning liquid further contains at least one substance of a surfactant, a chelating agent and a dispersing agent, and

the cleaning processing is performed while suppressing the total amount of sodium ions and potassium ions in the cleaning liquid to less than 200 ppm.

12. The method for manufacturing a glass substrate for a magnetic disk according to claim 10 or 11, wherein a difference between surface roughness (Ra) of a main surface of the glass substrate after being subjected to the cleaning processing and the surface roughness (Ra) of the main surface of the glass substrate immediately before being subjected to the cleaning processing is within 0.06 nm.

13. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 10 to 12, wherein the surface roughness (Ra) of the main surface of the glass substrate immediately before being subjected to the cleaning processing is 0.13 nm or less.

14. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 10 to 13, wherein the cleaning liquid has a pH of 10 or more.

15. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 10 to 14, wherein the cleaning processing is cleaning processing that is performed after a final polishing step among polishing steps of polishing the main surface of the glass substrate by using polishing abrasive grains.

16. A method for manufacturing a magnetic disk, comprising forming at least a magnetic recording layer on the glass substrate for a magnetic disk obtained by the method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 15.

17. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 15,

wherein the polishing processing is performed using a polishing liquid prepared by dispersing colloidal silica serving as an abrasive adjusted to be acidic;

wherein cleaning processing is performed by sequentially immersing the

plurality of glass substrates after polishing processing in a cleaning bath holding the cleaning liquid containing an organic alkaline agent.

18. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 8 and claims 10 to 15,

wherein the cleaning liquid is replaced if a total concentration of sodium ions and potassium ions in the cleaning liquid exceeds 4.00×10^{-3} mol/L by increasing of the concentration of sodium ions or potassium ions in the cleaning liquid due to be eluted from the glass substrates.

Claims

1. A method for manufacturing a glass substrate for a magnetic disk,
wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surfaces of the glass substrate containing at least one component of sodium and potassium in a glass component; and
wherein the cleaning processing is performed on the plurality of the glass substrates by using a cleaning liquid containing an alkaline agent so that concentration of sodium ions or potassium ions in the cleaning liquid increase due to be eluted from the glass substrates,
wherein the cleaning processing is performed on the plurality of the glass substrates by maintaining a condition in which a total concentration of the sodium ions and the potassium ions in the cleaning liquid is 4.00×10^{-3} mol/L or less,
performing replacement of the cleaning liquid if the total concentration exceeds 4.00×10^{-3} mol/L.
2. The method for manufacturing a glass substrate for a magnetic disk according to claim 1, wherein the main surface of the glass substrate has a surface roughness Ra of 0.15 nm or less.
3. The method for manufacturing a glass substrate for a magnetic disk according to claim 1 or 2, wherein a difference between the surface roughness (Ra) of the main surface of the glass substrate after being subjected to the cleaning processing and the surface roughness (Ra) of the main surface of the glass substrate immediately before being subjected to the cleaning processing is within 0.06 nm.
4. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 3, wherein a total concentration of sodium ions and potassium ions in the cleaning liquid is 2.00×10^{-3} mol/L or less.
5. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 4, wherein the alkaline agent is tetraalkyl ammonium hydroxide.
6. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 5, wherein the cleaning liquid further contains a surfactant that is free of sodium and potassium.

7. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 6, wherein glass constituting the glass substrate is aluminosilicate glass containing at least one of Na_2O and K_2O .

8. A method for manufacturing a glass substrate for a magnetic disk,
wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surface of the glass substrate containing at least one component of sodium and potassium in a glass component,

wherein a relationship between an amount of increase in surface roughness (Ra) of a main surface of the glass substrate after being subjected to the cleaning processing with respect to that before being subjected to the cleaning processing and a total concentration of sodium ions and potassium ions in a cleaning liquid used in the cleaning processing is obtained in advance,

the total concentration of sodium ions and potassium ions in the cleaning liquid is determined based on the obtained relationship such that the amount of increase in the surface roughness (Ra) is 0.06 nm or less, and

the cleaning processing is performed on the glass substrate by maintaining a condition in which the total concentration of sodium ions and potassium ions in the cleaning liquid is less than or equal to the determined concentration while concentration of the sodium ions and the potassium ions in the cleaning liquid increase due to be eluted from the glass substrates,

performing replacement of the cleaning liquid if the total concentration exceeds the determined concentration.

9. A method for manufacturing a glass substrate for a magnetic disk,

wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surface of the glass substrate containing at least one component of sodium and potassium in a glass component, and

wherein the cleaning processing is performed on the glass substrate by using a cleaning liquid containing an organic alkaline agent, and

when a total concentration of sodium ions and potassium ions in the cleaning liquid increases due to be eluted from the glass substrates, performing replacement of the cleaning liquid so as to maintain a condition where the total concentration is 4.00×10^{-3} mol/L or less.

10. A method for manufacturing a glass substrate for a magnetic disk,
wherein cleaning processing is performed by sequentially cleaning a plurality of glass substrates after polishing processing of polishing main surfaces of the glass substrate containing at least one component of sodium and potassium in a glass component; and
wherein the cleaning processing comprises processing of bringing the glass substrate into contact with a cleaning liquid containing tetramethyl ammonium ions, and
when an amount of sodium ions and potassium ions in the cleaning liquid increases due to be eluted from the glass substrates by performing the cleaning processing of the plurality of the glass substrates, the cleaning processing is performed by performing replacement of the cleaning liquid so as to maintain a condition where a total amount of the sodium ions and the potassium ions in the cleaning liquid is less than 200 ppm.
11. The method for manufacturing a glass substrate for a magnetic disk according to claim 10, wherein the cleaning liquid further contains at least one substance of a surfactant, a chelating agent and a dispersing agent, and
the cleaning processing is performed while suppressing the total amount of sodium ions and potassium ions in the cleaning liquid to less than 200 ppm.
12. The method for manufacturing a glass substrate for a magnetic disk according to claim 10 or 11, wherein a difference between surface roughness (Ra) of a main surface of the glass substrate after being subjected to the cleaning processing and the surface roughness (Ra) of the main surface of the glass substrate immediately before being subjected to the cleaning processing is within 0.06 nm.
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13. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 10 to 12, wherein the surface roughness (Ra) of the main surface of the glass substrate immediately before being subjected to the cleaning processing is 0.13 nm or less.
14. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 10 to 13, wherein the cleaning liquid has a pH of 10 or more.
15. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 10 to 14, wherein the cleaning processing is cleaning processing that is performed after a final polishing step among polishing steps of polishing the main surface of the glass

substrate by using polishing abrasive grains.

16. A method for manufacturing a magnetic disk, comprising forming at least a magnetic recording layer on the glass substrate for a magnetic disk obtained by the method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 15.

17. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 15,

wherein the polishing processing is performed using a polishing liquid prepared by dispersing colloidal silica serving as an abrasive adjusted to be acidic;

wherein cleaning processing is performed by sequentially immersing the plurality of glass substrates after polishing processing in a cleaning bath holding the cleaning liquid containing an organic alkaline agent.

18. The method for manufacturing a glass substrate for a magnetic disk according to any one of claims 1 to 8 and claims 1 to 15,

wherein the cleaning liquid is replaced if a total concentration of sodium ions and potassium ions in the cleaning liquid exceeds 4.00×10^{-3} mol/L by increasing of the concentration of sodium ions or potassium ions in the cleaning liquid due to be eluted from the glass substrates.