CLAIMS

1. An alloy for a soft magnetic thin film layer in a perpendicular magnetic recording medium, comprising:

- one or more selected from the group consisting of Ti, Zr, Hf, Nb, Ta, and B;
- one or two of W and Sn (wherein a part or all of one or two of W and Sn may be substituted by one or two of V and Mn);
- optionally, one or more selected from the group consisting of Al, Cr, Mo, Si, P, C, and Ge;
- optionally, one or two of Ni and Cu; and
- the balance Co and Fe,

and satisfying, in at.%, expressions described below:

(1) $6 \leq Ti\% + Zr\% + Hf\% + Nb\% + Ta\% + B\%/2 \leq 24$;

(2) $Zr\% + Hf\% \leq 14$;

(3) $3 \leq W\% + Sn\% \leq 19$;

(4) $0.20 \leq Fe\%/(Fe\% + Co\%) \leq 0.90$;

(5) $3 \leq W\% + Sn\% + V\% + Mn\% \leq 19$ (wherein V%+Mn% may be 0);

(6) $0 \leq Al\% + Cr\% + Mo\% + Si\% + P\% + C\% + Ge\% \leq 9$; and

(7) $0 \leq Ni\% + Cu\% \leq 5$.

2. The alloy according to claim 1, wherein a part or all of one or more of W and Sn are substituted by one or more of V and Mn, whereby $0 < V\% + Mn\%$ is satisfied.

3. The alloy according to claim 1 or 2, wherein the alloy comprises one or more selected from the group consisting of Al, Cr, Mo, Si, P, C, and Ge, whereby $0 < Al\% + Cr\% + Mo\% + Si\% + P\% + C\% + Ge\% \leq 9$ is satisfied.

4. The alloy according to any one of claims 1 to 3, wherein the alloy comprises one or two of Ni and Cu, whereby $0 < Ni\% + Cu\% \leq 5$ is satisfied.

5. The alloy according to any one of claims 1 to 4, wherein the alloy consists of:

- one or more selected from the group consisting of Ti, Zr, Hf, Nb, Ta, and B;
- one or two of W and Sn (wherein some or all of one or two of W and Sn may be substituted by one or two of V and Mn);
- optionally, one or more selected from the group consisting of Al, Cr, Mo, Si, P, C, and Ge;
- optionally, one or two of Ni and Cu; and
- the balance Co and Fe.

6. A sputtering target material comprising the alloy according to any one of claims 1 to 5.

Claims

1. An alloy for a soft magnetic thin film layer in a perpendicular magnetic recording medium, comprising:

- one or more selected from Ti, Zr, Hf, Nb, Ta, and B;
- one or two of W and Sn; and
- the balance Co and Fe, and

satisfying, in at.%, expressions described below:

(1) $6 \leq Ti\% + Zr\% + Hf\% + Nb\% + Ta\% + B\%/2 \leq 24$;

(2) $Zr\% + Hf\% \leq 14$;

(3) $3 \leq W\% + Sn\% \leq 19$; and

(4) $0.20 \leq Fe\%/(Fe\% + Co\%) \leq 0.90$, and

having amorphous properties,

wherein a ratio of a reduction in coercive force to a reduction in saturation magnetic flux density:

[(reduction in coercive force (A/m)) / (reduction in saturation magnetic flux density (T))]

is 8 or more,

wherein the reduction in coercive force is a difference between a coercive force of the alloy satisfying the above expressions (1) to (4) and a coercive force of an alloy satisfying the above expressions (1), (2) and (4), and

the reduction in saturation magnetic flux density is a difference between a saturation magnetic flux density of the alloy satisfying the above expressions (1) to (4) and a saturation magnetic flux density of an alloy satisfying the above expressions (1), (2) and (4), and

wherein a saturation magnetic flux density is 0.3 T or more.

2. The alloy for a soft magnetic thin film layer in a perpendicular magnetic recording medium according to claim 1,

wherein a part or all of one or more of W and Sn are substituted by one or two of V and Mn, and

the alloy satisfies the expression (5):

(5) $3 \leq W\% + Sn\% + V\% + Mn\% \leq 19$.

3. The alloy for a soft magnetic thin film layer in a perpendicular magnetic recording medium according to claim 1 or 2,

wherein the alloy comprises one or more than two of Al, Cr, Mo, Si, P, C, and Ge, and

the alloy satisfies expression (6):

(6) Al%+Cr%+Mo%+Si%+P%+C%+Ge%≤9.

4. The alloy for a soft magnetic thin film layer in a perpendicular magnetic recording medium according to any one of claims 1 to 3,

wherein the alloy comprises one or two of Ni and Cu in an amount of 5 % or less.

5. A sputtering target material for producing the thin film layer according to any one of claims 1 to 4.