CLAIMS

1. An FePt-C-based sputtering target containing Fe, Pt, and C, wherein

the FePt-C-based sputtering target has a structure in which primary particles of C that contain unavoidable impurities are dispersed in an FePt-based alloy phase containing 33 at% or more and 60 at% or less of Pt with the balance being Fe and unavoidable impurities, the primary particles of C being dispersed so as not to be in contact with each other.

2. An FePt-C-based sputtering target containing Fe, Pt, and C and further containing at least one metal element other than Fe and Pt, wherein

the FePt-C-based sputtering target has a structure in which primary particles of C that contain unavoidable impurities are dispersed in an FePt-based alloy phase containing 33 at% or more and less than 60 at% of Pt and more than 0 at% and 20 at% or less of the at least one metal element other than Fe and Pt with the balance being Fe and unavoidable impurities and with the total amount of Pt and the at least one metal element being 60 at% or less, the primary particles of C being dispersed so as not to be in contact with each other.

3. The FePt-C-based sputtering target according to claim 2, wherein

the one or more kinds of metal elements other than Fe and Pt are one or more kinds of Cu, Ag, Mn, Ni, Co, Pd, Cr, V, and B.

4. The FePt-C-based sputtering target according to any of claims 1 to 3, wherein

the primary particles have an average particle diameter of 1 μm or more and 30 μm or less.

5. The FePt-C-based sputtering target according to any of claims 1 to 4, wherein

the crystal structure of the C is an amorphous structure or a diamond structure.

6. The FePt-C-based sputtering target according to any of claims 1 to 5, wherein

a volume fraction of the C relative to a total volume of the target is 5 vol% or more and 60 vol% or less.

7. The FePt-C-based sputtering target according to any of claims 1 to 6, wherein

a ratio of a surface area of the C that is covered with

the FePt-based alloy phase to a total surface area of the C is 80% or more.

8. The FePt-C-based sputtering target according to any of claims 1 to 7, wherein

an oxide phase is further dispersed in the FePt-based alloy phase.

9. The FePt-C-based sputtering target according to claim 8, wherein

a volume fraction of the C relative to a total volume of the target is 5 vol% or more and less than 60 vol%, a volume fraction of the oxide phase relative to the total volume of the target is 3 vol% or more and less than 55 vol%, and a sum of the volume fractions of the C and the oxide phase relative to the total volume of the target is 8 vol% or more and 60 vol% or less.

10. The FePt-C-based sputtering target according to claim 8 or 9, wherein

the oxide phase contains at least one of SiO_2, TiO_2, Ti_2O_3, Ta_2O_5, Cr_2O_3, CoO, Co_3O_4, B_2O_3, Fe_2O_3, CuO, Cu_2O, Y_2O_3, MgO, Al_2O_3, ZrO_2, Nb_2O_5, MoO_3, CeO_2, Sm_2O_3, Gd_2O_3, WO_2, WO_3, HfO_2, and NiO_2.

11. The FePt-C-based sputtering target according to any of

claims 1 to 10, wherein

the C has an approximately spherical shape in which a value obtained by dividing a major axis of the approximately spherical shape by a minor axis thereof is 2 or less.

12. The FePt-C-based sputtering target according to any of claims 1 to 11, wherein

the FePt-based sputtering target has a relative density of 90% or larger.

13. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles to an FePt-based alloy powder having an average particle diameter of 20 μm or less and containing 33 at% or more and 60 at% or less of Pt with the balance being Fe and unavoidable impurities;

mixing the C powder and the FePt-based alloy powder such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

14. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

weighing a Pt powder containing unavoidable impurities and having an average particle diameter of 20 μm or less and an Fe powder containing unavoidable impurities and having an average particle diameter of 20 μm or less such that a ratio of an amount of the Pt to a total amount of the Fe and the Pt is 33 at% or more and 60 at% or less;

mixing the weighed Pt powder, the weighed Fe powder, and a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

15. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles to an FePt-based alloy powder having an average particle diameter of 20 μm or less and containing 33 at% or

more and less than 60 at% of Pt and more than 0 at% and 20 at% or less of at least one metal element other than Fe and Pt with the balance being Fe and unavoidable impurities and with a total amount of Pt and the at least one metal element being 60 at% or less;

mixing the C powder and the FePt-based alloy powder such that the primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

16. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

weighing an FePt-based alloy powder composed of Pt, Fe, and unavoidable impurities and having an average particle diameter of 20 μm or less and a metal powder containing at least one metal element other than Fe and Pt with the balance being unavoidable impurities and having an average particle diameter of 20 μm or less such that a ratio of an amount of the Pt to a total amount of the Pt, the Fe, and the at least one metal element is 33 at% or more and less than 60 at%, a ratio of an amount of the at least one metal element to the total amount is more than 0 at% and 20 at% or less, and a ratio of a

sum of the amounts of the Pt and the at least one metal element to the total amount is 60 at% or less;

mixing the weighed FePt-based alloy powder, the weighed metal powder containing the at least one metal element, and a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

17. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

weighing a Pt powder containing unavoidable impurities and having an average particle diameter of 20 μm or less, an Fe powder containing unavoidable impurities and having an average particle diameter of 20 μm or less, and a metal powder containing at least one metal element other than Fe and Pt with the balance being unavoidable impurities and having an average particle diameter of 20 μm or less such that a ratio of an amount of the Pt to a total amount of the Pt, the Fe, and the at least one metal element is 33 at% or more and less than 60 at%, a ratio of an amount of the at least one metal element

to the total amount is more than 0 at% and 20 at% or less, and a ratio of a sum of the amounts of the Pt and the at least one metal element to the total amount is 60 at% or less;

mixing the weighed Pt powder, the weighed Fe powder, the weighed metal powder containing the at least one metal element, and a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

18. The method for manufacturing an FePt-C-based sputtering target according to any of claims 13 to 17, wherein

a volume fraction of the C powder relative to a total volume of the powder mixture for pressure sintering is 5 vol% or more and 60 vol% or less.

19. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

adding an oxide powder containing unavoidable impurities to an FePt-based alloy powder containing 33 at% or more and 60 at% or less of Pt with the balance being Fe and unavoidable

impurities;

mixing the oxide powder and the FePt-based alloy powder such that mechanical alloying occurs to thereby produce a first powder mixture;

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles to the produced first powder mixture;

mixing the C powder and the first powder mixture such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

20. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

weighing a Pt powder containing unavoidable impurities and an Fe powder containing unavoidable impurities such that a ratio of an amount of the Pt to a total amount of the Fe and the Pt is 33 at% or more and 60 at% or less;

mixing the weighed Pt powder, the weighed Fe powder, and an oxide powder containing unavoidable impurities such that mechanical alloying occurs to thereby produce a first powder mixture;

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles to the produced first powder mixture;

mixing the C powder and the first powder mixture such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

21. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

adding an oxide powder containing unavoidable impurities to an FePt-based alloy powder containing 33 at% or more and less than 60 at% of Pt and more than 0 at% and 20 at% or less of at least one metal element other than Fe and Pt with the balance being Fe and unavoidable impurities and with a total amount of Pt and the at least one metal element being 60 at% or less;

mixing the oxide powder and the FePt-based alloy powder such that mechanical alloying occurs to thereby produce a first powder mixture;

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary

particles to the produced first powder mixture;

mixing the C powder and the first powder mixture such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

22. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

weighing an FePt-based alloy powder composed of Pt, Fe, and unavoidable impurities and a metal powder containing at least one metal element other than Fe and Pt with the balance being unavoidable impurities such that a ratio of an amount of the Pt to a total amount of the Pt, the Fe, and the at least one metal element is 33 at% or more and less than 60 at%, a ratio of an amount of the at least one metal element to the total amount is more than 0 at% and 20 at% or less, and a ratio of a sum of the amounts of the Pt and the at least one metal element to the total amount is 60 at% or less;

mixing the weighed FePt-based alloy powder, the weighed metal powder containing the at least one metal element, and an oxide powder containing unavoidable impurities such that mechanical alloying occurs to thereby produce a first powder

mixture;

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles to the produced first powder mixture;

mixing the C powder and the first powder mixture such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

23. A method for manufacturing an FePt-C-based sputtering target, the method comprising:

weighing a Pt powder containing unavoidable impurities, an Fe powder containing unavoidable impurities, and a metal powder containing at least one metal element other than Fe and Pt with the balance being unavoidable impurities such that a ratio of an amount of the Pt to a total amount of the Pt, the Fe, and the at least one metal element is 33 at% or more and less than 60 at%, a ratio of an amount of the at least one metal element to the total amount is more than 0 at% and 20 at% or less, and a ratio of a sum of the amounts of the Pt and the at least one metal element to the total amount is 60 at% or less;

mixing the weighed Pt powder, the weighed Fe powder, the weighed metal powder containing the at least one metal element, and an oxide powder containing unavoidable impurities such that mechanical alloying occurs to thereby produce a first powder mixture;

adding a C powder composed of primary particles containing unavoidable impurities and not forming secondary particles to the produced first powder mixture;

mixing the C powder and the first powder mixture such that a primary particle diameter of the C powder is not essentially reduced to thereby produce a powder mixture for pressure sintering; and then

molding the produced powder mixture for pressure sintering while the powder mixture is heated under application of pressure.

24. The method for manufacturing an FePt-C-based sputtering target according to any of claims 19 to 23, wherein

a volume fraction of the C powder relative to a total volume of the powder mixture for pressure sintering is 5 vol% or more and less than 60 vol%, a volume fraction of the oxide powder relative to the total volume of the powder mixture for pressure sintering is 3 vol% or more and less than 55 vol%, and a sum of the volume fractions of the C powder and the oxide powder relative to the total volume of the powder

mixture for pressure sintering is 8 vol% or more and 60 vol% or less.

25. The method for manufacturing an FePt-C-based sputtering target according to any of claims 15, 16, 17, 21, 22, 23, wherein

the at least one metal element other than Fe and Pt are one or more kinds of Cu, Ag, Mn, Ni, Co, Pd, Cr, V, and B.

26. The method for manufacturing an FePt-C-based sputtering target according to any of claims 19 to 24, wherein

the oxide powder contains at least one of SiO_2, TiO_2, Ti_2O_3, Ta_2O_5, Cr_2O_3, CoO, Co_3O_4, B_2O_3, Fe_2O_3, CuO, Cu_2O, Y_2O_3, MgO, Al_2O_3, ZrO_2, Nb_2O_5, MoO_3, CeO_2, Sm_2O_3, Gd_2O_3, WO_2, WO_3, HfO_2, and NiO_2.

27. The method for manufacturing an FePt-C-based sputtering target according to any of claims 13 to 26, wherein

the primary particles in the C powder have an average diameter of 1 μm or more and 30 μm or less.

28. The method for manufacturing an FePt-C-based sputtering target according to any of claims 13 to 27, wherein

the crystal structure of the C powder is an amorphous structure or a diamond structure.

CLAIMS

1. An FePt-C-based sputtering target containing Fe, Pt, and C, wherein

the FePt-C-based sputtering target has a structure in which primary particles of C that contain unavoidable impurities are dispersed in an FePt-based alloy phase containing 33 at% or more and 60 at% or less of Pt with the balance being Fe and unavoidable impurities, the primary particles of C being dispersed so as not to be in contact with each other,

wherein the primary particles have an average particle diameter of 5 μm or more and 30 μm or less, and

wherein the crystal structure of the C is an amorphous structure or a diamond structure.

2. An FePt-C-based sputtering target containing Fe, Pt, and C and further containing at least one metal element other than Fe and Pt, wherein

the FePt-C-based sputtering target has a structure in which primary particles of C that contain unavoidable impurities are dispersed in an FePt-based alloy phase containing 33 at% or more and less than 60 at% of Pt and more than 0 at% and 20 at% or less of the at least one metal element other than Fe and Pt with the balance being Fe and

unavoidable impurities and with the total amount of Pt and the at least one metal element being 60 at% or less, the primary particles of C being dispersed so as not to be in contact with each other,

wherein the primary particles have an average particle diameter of 5 μm or more and 30 μm or less, and

wherein the crystal structure of the C is an amorphous structure or a diamond structure.

3. The FePt-C-based sputtering target according to claim 2, wherein

the one or more kinds of metal elements other than Fe and Pt are one or more kinds of Cu, Ag, Mn, Ni, Co, Pd, Cr, V, and B.

4. The FePt-C-based sputtering target according to any of claims 1 to 3, wherein

a volume fraction of the C relative to a total volume of the target is 5 vol% or more and 60 vol% or less.

5. The FePt-C-based sputtering target according to any of claims 1 to 4, wherein

a ratio of a surface area of the C that is covered with the FePt-based alloy phase to a total surface area of the C is 80% or more.

6. The FePt-C-based sputtering target according to any of claims 1 to 5, wherein

an oxide phase is further dispersed in the FePt-based alloy phase.

7. The FePt-C-based sputtering target according to claim 6, wherein

a volume fraction of the C relative to a total volume of the target is 5 vol% or more and less than 60 vol%, a volume fraction of the oxide phase relative to the total volume of the target is 3 vol% or more and less than 55 vol%, and a sum of the volume fractions of the C and the oxide phase relative to the total volume of the target is 8 vol% or more and 60 vol% or less.

8. The FePt-C-based sputtering target according to claim 6 or 7, wherein

the oxide phase contains at least one of SiO_2, TiO_2, Ti_2O_3, Ta_2O_5, Cr_2O_3, CoO, Co_3O_4, B_2O_3, Fe_2O_3, CuO, Cu_2O, Y_2O_3, MgO, Al_2O_3, ZrO_2, Nb_2O_5, MoO_3, CeO_2, Sm_2O_3, Gd_2O_3, WO_2, WO_3, HfO_2, and NiO_2.

9. The FePt-C-based sputtering target according to any of claims 1 to 8, wherein

the C has an approximately spherical shape in which a

value obtained by dividing a major axis of the approximately spherical shape by a minor axis thereof is 2 or less.

10. The FePt-C-based sputtering target according to any of claims 1 to 9, wherein

the FePt-based sputtering target has a relative density of 90% or larger.