

to be sputtered or eroded. The sputtered target material is deposited as a thin film or layer on the substrate.

Summary of the DisclosureInvention

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According to one embodiment, the present ~~disclosureinvention~~ relates to a novel method of fabricating sputtering targets that include non-metals such as boron, carbon, nitrogen, oxygen, silicon, a boride, a carbide, a nitride, an oxide, a silicide, a boron (B)-containing material, a carbon (C)-containing material, a nitrogen (N)-containing material, an oxygen
10 (O)-containing material, or a silicon (Si)-containing material, including mixtures of non-metals, compounds of non-metals, master alloys containing boron, carbon or silicon and products produced by these processes. According to one embodiment, a process comprises preparation of pre-alloyed powder(s) or master alloy powder(s) or selection of ultra fine compound powder(s) of about 0.01 to 50 microns, preferably 0.1 to 10 microns, more
15 preferably 1.0 to 5.0 microns average particle size and most preferably less than 2 microns. It has been discovered that spitting will not occur when the above phases are in form of ultra fine particles of less than 50 microns, preferably less than 10 microns in size. After the ultra fine powders are blended together, the powder blend is canned, followed by a hot isostatic press (HIP) consolidation. Powder processing as above is employed to make the
20 target materials because of unique advantages over the prior art's melting process, both technically and economically.

According to one embodiment of the present ~~disclosureinvention~~, a sputter target comprises a plurality of materials. The plurality of materials includes at least a first material and a second material. The first material is comprised of cobalt (Co), chromium (Cr), ruthenium
25 (Ru), nickel (Ni), or iron (Fe). The second material is comprised of carbon (C), a carbon (C)-containing material, a carbide, a nitrogen (N)-containing material, a nitride, a silicon (Si)-containing material, or a silicide. The second material constitutes a phase. The phase of the second material has an average size between greater than 0 micron and 50 microns. The first material comprises at least 15 atomic percent or greater.

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second material. The first material is comprised of cobalt (Co), ruthenium (Ru), nickel (Ni), or iron (Fe). The second material is comprised of an oxygen (O)-containing material or an oxide. The second material constitutes a phase. The phase of the second material has an average size between greater than 0 micron and 50 microns.

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According to one embodiment of the present ~~disclosure~~invention, a sputter target comprises a plurality of materials. The plurality of materials includes at least a first material and a second material. The first material is comprised of ruthenium (Ru), nickel (Ni), or iron (Fe). The second material is comprised of boron (B), a boron (B)-containing material or a boride. The second material constitutes a phase. The phase of the second material has an average size between greater than 0 micron and 50 microns.

In one aspect, there is provided a sputter target comprising a plurality of materials, the plurality of materials including at least a first material and a second material, the first material comprised of ruthenium (Ru), the second material comprised of titanium oxide (TiO₂), the second material constituting a phase, the phase of the second material having an average size between 0 micron and 50 microns.

According to one aspect of the present ~~disclosure~~invention, a method of fabricating a sputter target comprises the steps of: blending a plurality of materials; canning; and pressing. The plurality of materials includes at least a first material and a second material. The first material is comprised of cobalt (Co), chromium (Cr), ruthenium (Ru), nickel (Ni), or iron

(Fe). The second material is comprised of carbon (C), a carbon (C)-containing material, a carbide, a nitrogen (N)-containing material, a nitride, a silicon (Si)-containing material, or a silicide. The second material has an average particle size between greater than 0 micron and 50 microns. The first material comprises at least 15 atomic percent or greater. The plurality of materials is comprised of multiple powders, one or more master alloy or compound powders, or a mixture of one or more powders with one or more master alloy or compound powders.

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plurality of materials includes at least a first material and a second material. The first material is comprised of cobalt (Co), chromium (Cr), ruthenium (Ru), nickel (Ni), or iron (Fe). The second material is comprised of boron (B), a boron (B)-containing material or a boride. The second material has an average particle size between greater than 0 micron and less than 10 microns. The plurality of materials is comprised of multiple powders, one or more master alloy or compound powders, or a mixture of one or more powders with one or more master alloy or compound powders.

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In another aspect, there is provided a method of fabricating a sputter target, the method comprising the steps of: blending a plurality of materials including at least a first material and a second material, the first material comprised of ruthenium (Ru), the second material comprised of titanium oxide (TiO₂), the second material having an average particle size between 0 micron and 50 microns, the plurality of materials comprised of multiple powders, one or more master alloy or compound powders, or a mixture of one or more powders with one or more master alloy or compound powders; canning; and pressing.

Brief Description of the Drawings

Reference is now made to the accompanying drawing wherein:

Figure 1 shows the process flow chart of the invention described herein according to one aspect of the present invention.

Figure 2 illustrates a representative microstructure of a consolidated (Co₇₄Cr₁₀Pt₁₆)₉₂ - (SiO₂)₈ alloy according to one aspect of the present invention.

Figure 3 illustrates a representative microstructure of a consolidated (Co₇₄Cr₁₀Pt₁₆)₉₂ - (SiO₂)₈ alloy according to one aspect of the present invention.

Appendix 1 shows a Periodic Table of elements.