Claims

1. A sputtering target comprising:

an aluminum matrix; and

(1) a material or phase containing aluminum and further containing either a rare earth element or a titanium group element or both a rare earth element and a titanium group element or

(2) a material or phase containing either a rare earth element or a titanium group element or both a rare earth element and a titanium group element

at a content of 10 to 70 mol% in the aluminum matrix~~.~~,

~~2. The sputtering target according to claim 1,~~ wherein

a difference between a composition of the sputtering target and a reference composition is within ±3% both in an in-plane direction of a sputter surface and in a target thickness direction under (Condition 1) or (Condition 2),

the reference composition being an average of compositions at 18 sites in total measured in accordance with (Condition 1) or (Condition 2~~),~~) and

~~wherein~~ an intermetallic compound including at least two elements selected from aluminum, a rare earth element, or a titanium group element is present in the sputtering target.

(Condition 1) in which

the sputtering target is a disk-shaped target having a center O and a radius of r, and in the in-plane direction of the sputter surface, measurement sites for composition analysis are 9 sites in total including, on imaginary crossing lines orthogonally crossing at the center O as an intersection, 1 site at the center O, 4 sites 0.45r away from the center O, and 4 sites 0.9r away from the center O, and

in the target thickness direction, a cross section including one of the imaginary crossing lines is formed, the cross section is a rectangle having a longitudinal length of t (that is, the sputtering target has a thickness of t) and a lateral length of 2r, and measurement sites for composition analysis are 9 sites in total including 3 sites, on a vertical transversal passing through the center O, at a center X and 0.45t away from the center X upward and downward (referred to as a point a, a point X, and a point b) and including, on the cross section, 2 sites 0.9r away from the point a toward left and right sides, 2 sites 0.9r away from the point X toward the left and right sides, and 2 sites 0.9r away from the point b toward the left and right sides, or

(Condition 2) in which

the sputtering target has a rectangle shape having a longitudinal length of L1 and a lateral length of L2 (note that examples of the rectangle include a square in which L1 and L2 are equal and a rectangle obtained by developing a

side surface of a cylindrical shape having a length J and a circumferential length K, and in a form of the rectangle, L2 corresponds to the length J, L1 corresponds to the circumferential length K, and the length J and the circumferential length K have a relationship of J > K, J = K, or J < K), and in the in-plane direction of the sputter surface, measurement sites for composition analysis are 9 sites in total including, on imaginary crossing lines orthogonally crossing at a center of gravity O as an intersection in a case where each line orthogonally crosses a side of the rectangle, 1 site at the center of gravity O, 2 sites away by a distance of 0.25L1 from the center of gravity O on the imaginary crossing line in the longitudinal direction, 2 sites away by a distance of 0.25L2 from the center of gravity O in the lateral direction, 2 sites away by a distance of 0.45L1 from the center of gravity O in the longitudinal direction, and 2 sites away by a distance of 0.45L2 from the center of gravity O in the lateral direction, and

in the target thickness direction, a cross section including one imaginary crossing line that is parallel to any one of a longitudinal side having a length of L1 and a lateral side having a length of L2 is formed, and in a case where the imaginary crossing line is parallel to the lateral side having a length of L2, the cross section is a rectangle having a longitudinal length of t (that is, the sputtering target has a thickness of t) and a lateral

length of L2, and measurement sites for composition analysis are 9 sites in total including 3 sites, on a vertical transversal passing through the center of gravity O, at a center X and 0.45t away from the center X upward and downward (referred to as a point a, a point X, and a point b) and including, on the cross section, 2 sites 0.45L2 away from the point a toward left and right sides, 2 sites 0.45L2 away from the point X toward the left and right sides, and 2 sites 0.45L2 away from the point b toward the left and right sides.

~~3~~2. The sputtering target according to claim 1~~ or 2, wherein an intermetallic compound including at least two elements selected from aluminum, a rare earth element, or a titanium group element is present in the sputtering target.~~

~~4. The sputtering target according to claim 3~~, wherein the intermetallic compound comprises one, two, three, or four kinds of intermetallic compounds being present in the sputtering target.

~~5~~3. The sputtering target according to any one of claims 1 ~~to 4~~or 2, wherein at least one nitride of at least one element selected from aluminum, a rare earth element, or a titanium group element is present in the sputtering target.

4. The sputtering target according to any one of claims

1 to 3, wherein the

~~6. The sputtering target according to any one of claims 1 to 5, wherein the~~ rare earth element is at least one of scandium or yttrium.

~~7~~5. The sputtering target according to any one of claims 1 to ~~6~~4, wherein the titanium group element is at least one of titanium, zirconium, or hafnium.

~~8. The sputtering target according to any one of claims 1 to 7, wherein the~~

6. The sputtering target according to any one of claims 1 to 5, wherein the sputtering target having an oxygen content of 500 ppm or less.

7. The sputtering target according to any one of claims 1 to 6, wherein the sputtering target having a composition such that the equilibrium diagram shows no Al phase deposition.