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,

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.

2. The sputtering target according to claim 1, wherein the intermetallic compound comprises one, two, three, or four kinds of intermetallic compounds being present in the sputtering target.

3. The sputtering target according to any one of claims 1 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 rare earth element is at least one of scandium or yttrium.

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

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.