Precious Metal Sputtering Targets Find Uses in Many Fields

Precious metal thin films with excellent characteristics have been used in various industrial fields. Under today's industrial environment, their applications are expected to expand further, ranging from small devices, such as mobile phones and smartphones, to large devices, such as glass for building materials and solar cells. The Tanaka Kikinzoku Group has been offering precious metal sputtering targets (hereinafter referred to as targets) since 1980. The group manufactures targets of alloys as well as those of pure metals.

Planer targets

Cylindrical target

Targets That Fit Larger Substrates

At present, designs of production lines, in which yield and productivity are taken into consideration, as seen in larger low-e glass and touch panels, have been increasing. Against this backdrop, needs for larger targets and cylindrical targets have dramatically increased. The Tanaka Kikinzoku Group has been offering silver (Ag)-based large targets and cylindrical targets. As for cylindrical targets, the group offers targets up to ϕ160mm in external diameter and up to 4,000mm in length, in accordance with customers' needs. Cylindrical targets exhibit about three times better use efficiency than general planer targets. Furthermore, as a cylindrical target constantly rotates, the cooling efficiency of the target improves. Hence, it becomes possible to power up the sputtering machine to increase productivity. At present, needs for cylindrical targets have been increasing not only for precious metal targets, but also for other types of targets. Fields, in which cylindrical targets are used, have been expanding. Precious metal targets are needed in the semiconductor field as well. The Tanaka Kikinzoku Group manufactures targets that accommodate Φ12-inch wafers, meeting the needs of semiconductor manufacturers.

Ag Targets

In terms of properties, Ag is a material with high reflectance and low electrical resistance. Taking advantage of its characteristics, Ag is being used in various fields, including optical media, such as DVDs and Blu-ray discs (BDs), glass for building materials, solar cells, and crystal oscillators. However, the problem with Ag is that its properties, such as sulfurization and migration, degrade and therefore, the Tanaka Kikinzoku group introduced Ag alloys. Ag alloys can suppress the sulfurization and migration issues of Ag. Thus, they prove as effective materials for use in substrates and processes, where the use of Ag is difficult. The Tanaka Kikinzoku Group has been proposing Ag alloy targets by organizing information from customers based on diverse back data.

Au Targets

As gold (Au) is a chemically stable material, it has been used in various electrodes, including those for crystal oscillators, since early times. Even now, these needs for Au remain, and the Tanaka Kikinzoku Group offers Au targets to

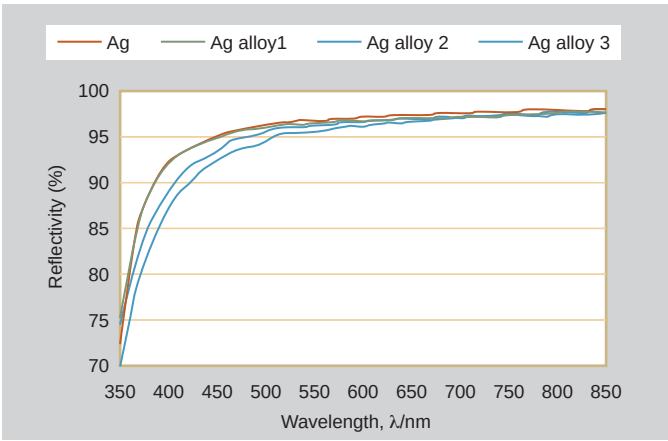


Fig. 1: Wavelength measurements of deposited Ag alloy

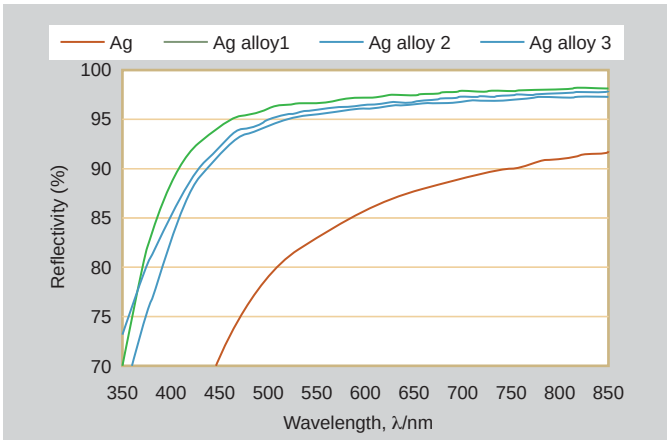


Fig. 2: Wavelength measurements after 85°C, 95% humidity for 1 week

Large bar as a material for Au targets

various fields. Although detailed specifications, such as shapes and sizes of targets, required in different fields vary, the group has been offering stable products through processes suited to respective requirements.

Platinum Group-Based Targets

Platinum group metals are stable even under high temperatures that exceed the melting temperature of Au, and they are required as materials for glass fusing furnaces, temperature sensors, and catalysts. Platinum group metals are also used in the thin film field, in which targets are used. Taking advantage of their superior properties, including oxidation resistance and corrosion resistance, they are used in various fields as electrodes for various electronic devices, semiconductors, and medical equipment, as sensors, reflective layers, adhesion layers, and barrier layers.

Pt-Based Magnetic Alloy

The amounts of stored digital TV images and personal computer data have been increasing continuously year by year, and hard disc drives (HDDs) for recording these data have now become indispensable products in today's society. High-quality Pt-based sputtering targets, which the Tanaka Kikinzoku Group offers, play a significant role in HDDs.

With magnetic recording media used in today's HDDs, the perpendicular magnetic recording method, which provides significantly larger recording density compared to conventional longitudinal magnetic recording method, has become the mainstream. Recording media that adopt the perpendicular magnetic recording method have come to use materials called granular materials, replacing the conventional magnetic layer for longitudinal recording. In granular materials, oxides, such as silica are added to CoCrPt-based alloys. Thus, latest recent recording media require

Table 1: Sample Pt-based magnetic alloys

Target	Purity	Applications
CoCrPt + X alloy target X represents SiO_2, Cr_2O_3, etc.	99.90%	Magnetic recording media
FePt-based alloy target	99.90%	Next-generation magnetic recording media
FePt, CoPt alloy target	99.99%	Magnetic random access memories (MRAM), magnetic heads, magnetic sensors, etc.

CCP-SiO_2-based sputtering target

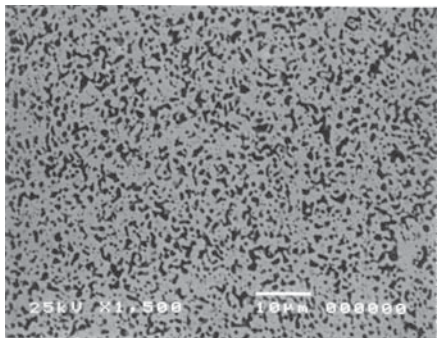
dramatically higher-quality sputtering targets. The Tanaka Kikinzoku Group's sputtering target products for magnetic recording have received high acclaim for their quality in the field of perpendicular magnetic recording media. They are making significant contribution to the global HDD market.

Recycling with High Recovery Rate

The Tanaka Kikinzoku Group is capable of carrying out a comprehensive recycling routine from the manufacture of precious metal targets to recovery and refining of used targets and shields. Taking advantage of its experiences, the group is capable of recycling recovered precious metals into high-purity precious metals by recovering precious metals from various shapes of jigs at high recovery rates and by refining them. As it has high analytical techniques, the Tanaka Kikinzoku Group can evaluate valuables entrusted from customers at appropriate values.

Total Support

In developing targets, the Tanaka Kikinzoku Group conducts processes from sputtering film formation to various tests of sputtered films to offer products that have functions required by customers.



An example of oxide dispersion in a CoCrPt-SiO_2 target. Fine oxides (black spots) are uniformly dispersed.

The Tanaka Kikinzoku Group manufactures all materials relating to sputtering films in the assembly of various devices, including bonding wires, foundation plating films, pastes, and sealing materials for packages. With this strength, it is capable of proposing optimum combinations by placing sputtered films at the base.

As described above, precious metal sputtered films have become part of components indispensable in contemporary life. The Tanaka Kikinzoku Group is determined to make daily efforts in the development and improvements of precious metal targets in order to help create a more comfortable living space in the future. ❑

Observation image of a thin film nano surface by atomic force microscope (AFM)

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Tanaka Kikinzoku International K.K

Head Office (Tokyo Marunouchi)	TEL : +81-3-5222-1380
Seoul Branch	TEL : +82-2-588-1854
Hong Kong Branch	TEL : +852-2736-0011
Singapore Branch	TEL : +65-6778-4411
Taipei Branch	TEL : +886-2-2536-2053
Kaohsiung Sales Office	TEL : +886-7-223-5215
Manila Representative Office	TEL : +63-2-631-2726

Tanaka Kikinzoku International (Shanghai) Co.,Ltd.

Head Office (Shanghai)	TEL : +86-21-6448-5988
Shenzhen Branch	TEL : +86-755-2588-2500

Tanaka Kikinzoku International (America),Inc.

Head Office (Chicago)	TEL : +1-224-653-8309
San Jose Branch	TEL : +1-408-779-0461

Tanaka Kikinzoku International (Europe) GmbH

Head Office (Frankfurt)	TEL : +49-69-2193870

Tanaka Kikinzoku International (Thailand) Co.,Ltd.

Head Office (Bangkok)	TEL : +66-2-652-5180

Tanaka Kikinzoku International (Malaysia) Sdn.Bhd.

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