

November 18, 2014

Tanaka Precious Metals
Tanaka Holdings Co., Ltd.

World's First Success in Development and Formation of Platinum-based Metallic Glass Powder for 3D Printers

Three types of powder including nickel-based alloys with platinum and iridium are developed for formation using selective laser sintering

Samples of platinum group metal powder will begin to be provided starting December 1, 2014

Tanaka Holdings Co., Ltd. (Head office: Chiyoda-ku, Tokyo; President & CEO: Akira Tanae) announced today that Tanaka Kikinzoku Kogyo K.K. (Head office: Chiyoda-ku, Tokyo; President & CEO: Akira Tanae), which operates the Tanaka Precious Metals Group's manufacturing business had become the world's first company to succeed in the development and formation of platinum-based metallic glass powder supporting selective laser sintering 3D printers. The company also succeeded in developing platinum group metallic powder using nickel-based alloys with platinum and iridium additives, and manufacturing objects using them. Tanaka Kikinzoku Kogyo will have an exhibit at POWTEX TOKYO 2014, an exhibition to be held at Tokyo Big Sight from November 26 (Wed) until November 28 (Fri), 2014, and after showcasing these platinum group powder materials for the first time, sample delivery will commence December 1, 2014.

Tanaka Kikinzoku Kogyo obtained a patent for the composition of platinum-based metallic glass in 2004, and with this development, the company became the first in the world to powderize platinum-based metallic glass that can be used in existing selective laser sintering 3D printers^(*) by adjusting particle diameter and fluidity through the use of proprietary equipment. Tanaka Kikinzoku Kogyo also developed two types of powder material using nickel-based alloys with platinum and iridium additives. Joint research was conducted with the Technology Research Institute of Osaka Prefecture, with the revelation of laser energy irradiation conditions optimized for the quality and shape of powder resulting in the successful manufacture of objects made of platinum, platinum-based metallic glass and nickel-based alloy with iridium additive. This marks the world's first formation of platinum-based metallic glass using 3D printers. Tanaka Kikinzoku Kogyo will provide platinum group metallic powder, in addition to processing the diameter size of platinum group metallic powder particles, proposing formation in the manufacture of platinum group alloys, and manufacturing objects depending on requests from customers.

Platinum group metals have a high melting point and are durable, but many — especially alloys — have poor workability such as cutting and plastic forming, and there were limitations in the shapes available using existing forming methods. Enabling these materials to be formed using

3D printers makes it possible to form complex shapes and manufacture complex products using materials with different melting points. This development is expected to lead to small lot production of a diverse range of products requiring corrosion resistance such as medical materials, and the expansion into industrial products with specialized components in areas requiring heat resistance such as the automotive industry and the aerospace industry. Tanaka Kikinzoku Kogyo aims for annual sales of 400 million yen by FY2020 with the provision of platinum group metallic powder materials for 3D printer use.



Platinum-based metallic glass object (8 x 8 x 5mm blocks)



Platinum-based metallic glass powder material

■ The potential of platinum-based metallic glass

Metallic glass is a type of amorphous metal that does not have a crystalline structure like ordinary metals. It is widely known for its high strength, great hardness, low flexibility, ultra-high corrosion resistance, high magnetic permeability, high molding workability, smooth surface, friction resistance, scratch resistance, precise casting and low vibration damping properties, and is gaining attention as a next-generation material. Tanaka Kikinzoku Kogyo was the first in the industry to develop platinum-based metallic glass using the precious metal platinum, and also to work with palladium-based metallic glass. The company obtained patents for composition using platinum, copper and phosphorus in 2004. It has developed metallic glass and provided test materials including a wide range of precious metals including those with publicly known compositions, and realized the powderization of these as a material for 3D printers with this most recent development.

The most widespread method of manufacturing metallic glass at present is casting, which involves pouring molten metal into a cast and quickly cooling it to harden. Casting requires a cast to be created in advance each time a different shape is being made, but in the manufacture of metallic glass, which requires particularly fast cooling, it is necessary to use an expensive metal cast with high thermal conductivity. However, one issue faced in practical application is the limitation of shapes that can be made due to the difficulty involved in processing these metallic casts to form complex shapes.

This method of manufacturing using a 3D printer and the recently developed platinum group powder material forms objects by using a laser beam to irradiate each layer (approximately 60 micrometers) of powder material from the top, enabling the surface of each layer to cool quickly while being formed. Platinum-based metallic glass is expected to be used in further practical applications in the future due to the ability to use it to form complex shapes.

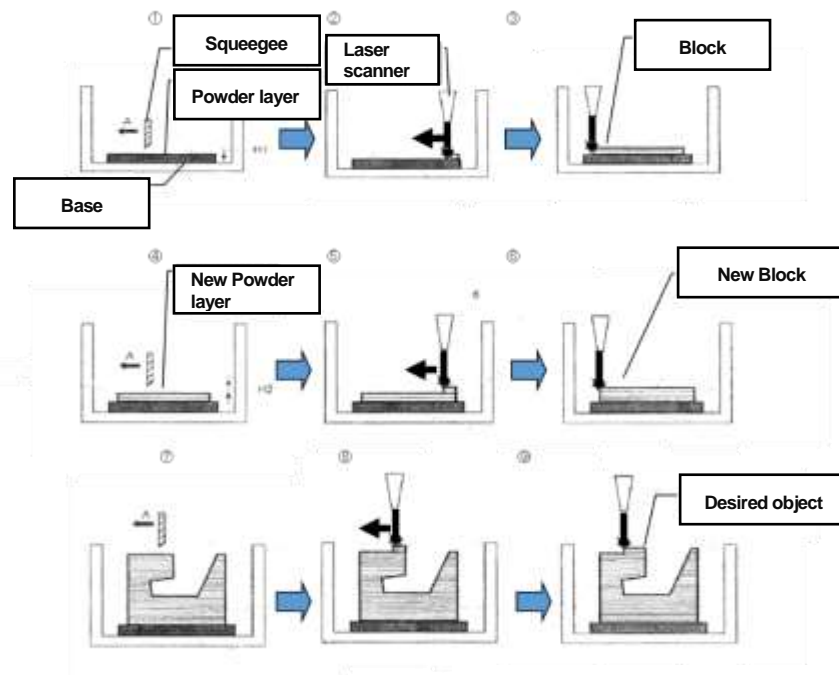
Tanaka Kikinzoku Kogyo aims to expand the effective uses of precious metals through the development of various platinum group alloy powder material for 3D printers.

※ Tanaka Kikinzoku Kogyo compared the properties of existing metallic powders (stainless steel, nickel, etc.) used for 3D printers with the newly developed platinum and platinum-based glass powders, and confirmed that the fluidity and uniformity of particle size are almost the same.

<Reference Materials>

Selective Laser Sintering

A method used for forming objects by packing powder in the layers, and directly sintering these with a high-output laser beam.



Source: Technology Research Institute of Osaka Prefecture

■**Tanaka Holdings Co., Ltd. (Holding company of Tanaka Precious Metals)**

Headquarters: 22F, Tokyo Building, 2-7-3 Marunouchi, Chiyoda-ku, Tokyo

Representative: Akira Tanae, President & CEO

Founded: 1885

Incorporated: 1918

Capital: 500 million yen

Employees in consolidated group: 3,562 (FY2013)

Net sales of consolidated group: 967.6 billion yen (FY2013)

Main businesses of the group:

Manufacture, sales, import and export of precious metals (platinum, gold, silver, and others) and various types of industrial precious metals products. Recycling and refining of precious metals.

Website: <http://www.tanaka.co.jp/english> (Tanaka Precious Metals),

<http://pro.tanaka.co.jp/en> (Industrial products)

■**Tanaka Kikinzoku Kogyo K.K.**

Headquarters: 22F, Tokyo Building, 2-7-3 Marunouchi, Chiyoda-ku, Tokyo

Representative: Akira Tanae, President & CEO

Founded: 1885

Incorporated: 1918

Capital: 500 million yen

Employees: 1,430 (FY2013)

Sales: 929 billion 60 million yen (FY2013)

Main businesses:

Manufacture, sales, import and export of precious metals (platinum, gold, silver, and others) and various types of industrial precious metals products. Recycling and refining of precious metals.

Website: <http://pro.tanaka.co.jp/en>

<About the Tanaka Precious Metals>

Established in 1885, the Tanaka Precious Metals has built a diversified range of business activities focused on the use of precious metals. On April 1, 2010, the group was reorganized with Tanaka Holdings Co., Ltd. as the holding company (parent company) of the Tanaka Precious Metals. In addition to strengthening corporate governance, the company aims to improve overall service to customers by ensuring efficient management and dynamic execution of operations. Tanaka Precious Metals is committed, as a specialist corporate entity, to providing a diverse range of products through cooperation among group companies.

Tanaka Precious Metals is in the top class in Japan in terms of the volume of precious metal handled, and for many years the group has developed and stably supplied industrial precious metals, in addition to providing accessories and savings commodities utilizing precious metals. As precious metal professionals, the Group will continue to contribute to enriching people's lives in the future.

The eight core companies in the Tanaka Precious Metals are as follows.

- Tanaka Holdings Co., Ltd. (pure holding company)
- Tanaka Kikinzoku Hanbai K.K.
- Tanaka Denshi Kogyo K.K.
- Tanaka Kikinzoku Jewelry K.K.
- Tanaka Kikinzoku Kogyo K.K.
- Tanaka Kikinzoku International K.K.
- Electroplating Engineers of Japan, Limited
- Tanaka Kikinzoku Business Service K.K.

<Press inquiries>

Global Sales Dept., Tanaka Kikinzoku International K.K. (TKI)

https://www.tanaka.co.jp/support/req/ks_contact_e/index.html