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## Tanaka Precious Metals Succeeds in Recovery of Trace Amounts of Precious Metals by Detoxifying Cyanogen Plating Waste Liquid

The new cyanogen compound decomposition technology is able to detoxify waste liquid and recover trace amounts of precious metals at low cost - waste liquid generated in the plating process for semiconductors, etc. can be utilized as an urban mine

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Tanaka Holdings Co., Ltd. (a company of Tanaka Precious Metals, Head office: Chiyoda-ku, Tokyo; President & CEO: Hideya Okamoto) today announced that the Shonan Plant (Hiratsuka-shi, Kanagawa) of Tanaka Kikinzoku Kogyo K.K. (Head office: Chiyoda-ku, Tokyo; President & CEO: Hideya Okamoto) has successfully established a technology enabling the recovery of precious metals such as gold, platinum and palladium contained in trace amounts in waste liquid by detoxifying cyanogen plating waste liquid (hereinafter, "the Technology").

### ■ Low-cost detoxification of waste liquid and recovery of trace amounts of precious metals

The cyanogen plating waste liquid generated when processing plating such as semiconductor components contain cyanogen compounds and inorganic carbonates, in addition to valuable metals such as precious metals. In general, 1m<sup>3</sup> of cyanogen plating waste liquid contains 0-3 grams of gold, 0-3 grams of platinum and 0-5 grams of palladium, in addition to a variety of trace amounts of valuable metals such as rare earths.

The Technology has enabled the recovery of precious metals from the residue obtained by decomposing concentrated cyanogen plating waste liquid (sludge) in a lower temperature range than conventional methods and separating cyanogen compounds from sludge as cyanogen gas. Low decompose temperature of the Technology not only enables the processing waste liquid at low cost, but also does not corrode the furnace due to inorganic carbonates that are fusible salts do not melt in the furnace. Furthermore, the separated cyanogen gas decomposes into water, carbon dioxide and nitrogen by further combustion, this makes the process simple.

### ■ Issues with conventional processing methods

Cyanogen compounds have strong toxicity, and cyanogen compounds in the cyanogen plating waste liquid generated in the plating of semiconductor components generally have medium to high<sup>(\*)1</sup> concentration, therefore precautions must be taken in processing. At present, there are several methods for processing cyanogen plating waste liquid without outsourcing to a waste disposal company, but all of them are costly and non-environmental friendly..

Furnace atomization method is known for processing waste liquid containing medium to high concentrations of cyanogen compounds (medium to high concentration cyanogen waste liquid) The furnace atomization method is a method in which the waste liquid is sprayed into a furnace at a temperature of over 1,000°C to decompose cyanogen compounds. However, the furnace atomization method is costly and unable to recover valuable metals caused by inorganic carbonates melt, adhere to and damage the furnace.

Meanwhile, there is a method to process low concentration<sup>(\*)2</sup> cyanogen waste liquid known as alkaline chlorination in which sodium hydroxide is added then sodium hypochlorite is added

while adjusting the concentration of hydrogen ions (pH) to 10-11. However, when detoxify medium to high concentration cyanogen waste liquid using alkaline chlorination method, it generates intense heat, exposes to a risk of generating a large amount of toxic gases and causes considerable cost due to the need to use a lot of chemicals for processing. Then when recover valuable metals from waste liquid, the combined volume of waste liquid and chemicals increases and the concentration of the valuable metals becomes diluted, and this results in a poor recovery performance and subsequently poor cost effectiveness..

Other methods to process medium to high concentration cyanogen waste liquid are a method using thermal hydrolysis under high temperature and high pressure and the ozone oxidation method using the oxidizing power of ozone gas. However, the former method is unable to sufficiently decompose cyanogen compounds and the latter method is costly.

#### ■ Overcoming issues presented by conventional methods

In order to resolve such issues, Tanaka Kikinzoku Kogyo has developed a technology enabling the recovery of precious metals by detoxifying the cyanogen at low cost without corroding the furnace through a process that decomposes the waste liquid sludge and separates the cyanogen compounds as cyanogen gas at a lower temperature than in the conventional method. The Technology has the following features.

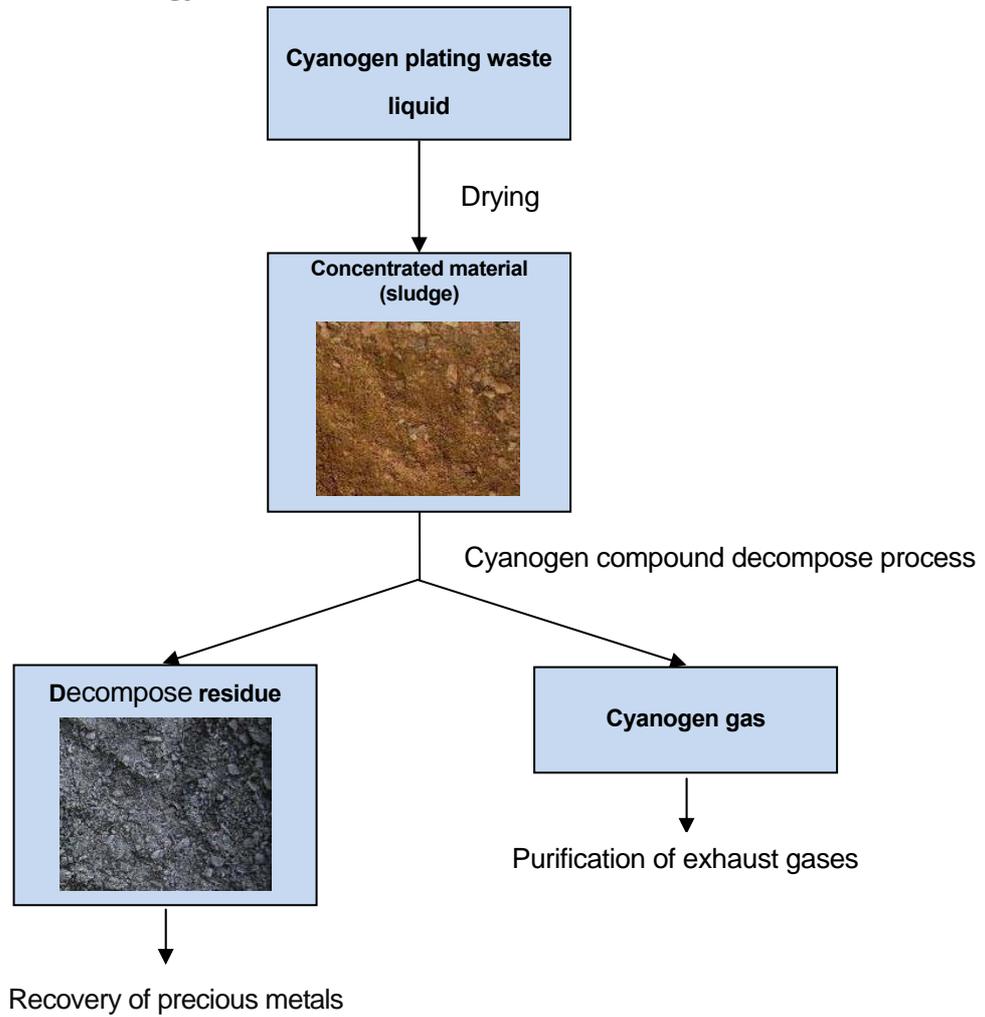
- It is able to separate the cyanogen compounds as cyanogen gas by decomposing the sludge at a lower temperature than the decompose temperature in the conventional method.
- Due to low decompose inorganic carbonates that are fusible salts do not melt in the furnace and corrode in the furnace.
- Low decompose temperature enables processing at low cost.
- Decompose residue from the separation of cyanogen compounds has low toxicity, which facilitates recovery of precious metals.  
(Valuable metals other than precious metals can also be recovered as required)

Tanaka Kikinzoku Kogyo will continually search for opportunities to contribute to waste reduction, precious metals recycle and generation of environmentally-friendly products.



Furnace used for processing cyanogen compounds

**[Reference] The main flow of the processing and recovery of cyanogen plating waste liquid using the Technology**



**\*1 Medium to high concentration**

In this case, medium concentration means that the concentration of cyanogen compounds in the waste liquid is 100-999mg/L. High concentration means that the concentration of cyanogen compounds in the waste liquid is 1,000mg/L or more.

**\*2 Low concentration**

In this case, low concentration means that the concentration of cyanogen compounds in the waste liquid is less than 100mg/L.

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

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

Representative: Hideya Okamoto, President & CEO

Founded: 1885

Incorporated: 1918

Capital: 500 million yen

Employees in consolidated group: 3,895 (FY2012)

Net sales of consolidated group: 839.2 billion yen (FY2012)

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: Hideya Okamoto, President & CEO

Founded: 1885

Incorporated: 1918

Capital: 500 million yen

Employees: 1,455 (FY2012)

Sales: 808.6 billion yen (FY2012)

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 Kogyo K.K.
- Tanaka Kikinzoku Hanbai K.K.
- Tanaka Kikinzoku International K.K.
- Tanaka Denshi Kogyo K.K.
- Electroplating Engineers of Japan, Limited
- Tanaka Kikinzoku Jewelry K.K.
- Tanaka Kikinzoku Business Service K.K.