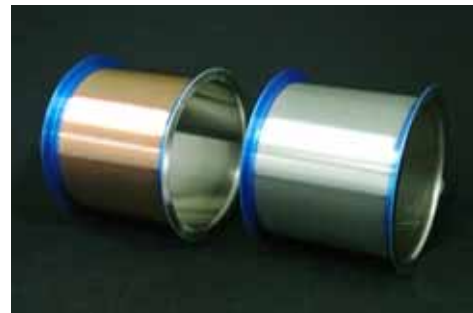

Tanaka Precious Metals Commences Providing Samples of High-performance Copper Bonding Wire and Silver Bonding Wire Aimed at Mass Production This Spring

- Replacing Gold Bonding Wire Used in Automotive Materials and LEDs, etc. -

Tanaka Holdings Co., Ltd. (a company of Tanaka Precious Metals, Head office: Chiyoda-ku, Tokyo; President & CEO: Hideya Okamoto) today announced that Tanaka Denshi Kogyo K.K. (Head office: Chiyoda-ku, Tokyo; President & CEO: Koichiro Tanaka) of Tanaka Precious Metals, which boasts the world's leading share in the manufacture of bonding wire (wiring material, hereinafter "wire"), will commence the provision of samples of CA-1 copper wire with the reliability 1.5 times than conventional products and SEB silver wire with electrical conductivity improved by approximately 60% on January 11.

CA-1 and SEB are able to provide the necessary performance at a low cost as alternatives for gold wire that is currently used widely in semiconductor wiring not only in general purpose devices such as personal computers and smartphones, but also devices requiring high performance such as automotive electronics.



CA-1 (left) and SEB (right)

■ CA-1 Bare Copper Bonding Wire

- With the reliability 1.5 times than conventional products, this copper wire excels in all aspects of productivity, bondability, cost and electrical conductivity -

CA-1 is bare copper wire with reliability improved to 1.5 times addressing the weaknesses of conventional bare copper wire. As a result of testing the failure rate at the high temperature of 175°C (when resistance increases 20%), it was found that while the failure rate of conventional bare copper wire started rising from 0% after 800 hours, CA-1 maintained a failure rate of 0% even after 1,200 hours, confirming that it has 1.5 times the reliability of conventional wire^(*).

Tanaka Denshi Kogyo mass produces both bare and precious metal-coated copper wire. Because the bare type is susceptible to oxidation, it presents issues such as low reliability and low productivity due to the narrow process window (tolerance range) that is a condition of stitch bonding (wire bonding to the substrates). Meanwhile, the precious metal-coated type presents issues such as tending to damage aluminum electrodes (resulting in low adhesion) due to the hardness of the ball (the round melted part at the tip of the wire) and being a more expensive type of copper wire. In order to resolve these issues, CA-1 was newly developed by creating an alloy under optimal conditions using 99.99% copper and a trace amount of metal, which realized the following features.

- Reliability: 1.5 times the reliability of conventional bare type and achieve the same level as precious metal-coated wire
- Productivity: Higher productivity due to the stitch bonding process window is approximately 1.5 times wider than conventional bare wire
- Bondability: No damage to aluminum electrodes on IC (integrated circuit) chips due to the optimization of ball softness
- Cost: Costs reduced by approximately 20% compared to precious metal-coated wire ^{(*)2}

With the current elevated gold prices, copper wire as an alternative to gold wire has begun to be widely used as wiring material for ICs and LSI (large-scale integration) circuits in general purpose devices such as personal computers and smartphones primarily from the perspective of reliability. In addition to these applications, CA-1 is able to significantly reduce manufacturing costs while sufficiently meeting the required performance by replacing the currently widely used gold wire in applications requiring high reliability, such as automotive electronics and industrial equipment.

■ SEB Silver Bonding Wire

- Electrical conductivity improved by approximately 60%, enabling costs to be reduced by 80% with almost equivalent performance as gold wire -

SEB is a silver wire with electrical conductivity improved by approximately 60% compared to the existing SEA silver wire. Although SEA is able to reduce precious metals costs by approximately 80%^{(*)3} compared to gold wire, and offers excellent bondability and productivity on par with gold wire, its weakness was having lower electrical conductivity (higher electrical resistance) than gold wire. In order to overcome this weakness, further improvements were made to the alloy combination that contributed to raising the electrical resistance. SEA's electrical resistance of approximately 5.2 micro ohm centimeters ($\mu\Omega\text{-cm}$) was improved to approximately 3.3 $\mu\Omega\text{-cm}$ in SEB as a result, providing the world's first wire with the same level of electrical resistance as gold wire^{(*)4}. The features of SEB are as follows.

- Electrical conductivity: Improved by approximately 60% compared to conventional products, which is almost the same level as gold wire (improvement from SEA)
- Cost: Precious metals costs can be reduced by approximately 80 % compared to gold wire
- Bondability: No damage to aluminum electrodes due to the ball as soft as gold wire
- Productivity: Sufficient adhesion achieved under almost the same usage conditions as gold wire
- It is easy to switch from gold wire since it only requires safe and inexpensive nitrogen gas

The wiring material used in LEDs (light emitting diodes), ICs and LSIs is mainly gold wire, which offers excellent performance in all aspects such as electrical conductivity. SEA has mainly been used as an LED wiring material, but the improved electrical conductivity of SEB enables it to be used in ICs and LSIs of all types of electronic devices because it exhibits almost the same level of performance as gold wire at low cost.

Currently, in the bonding wire industry, gold is most widely used due to its excellent chemical properties, but gold is being replaced rapidly in areas where cheaper copper and silver can be used. Tanaka Denshi Kogyo will strengthen development of alternative materials that match customers' needs through samples provision of CA-1 and SEB that can substitute gold wire, and aims to begin mass production in the spring of 2013.

Tanaka Denshi Kogyo has scheduled to exhibit CA-1 and SEB at the 42nd Internecon Japan, Asia's largest exhibition for electronics manufacturing and SMT, located at Tokyo Big Sight (Koto-ku, Tokyo) over three days from January 16 (Wed) until January 18 (Fri). Technical staff will constantly be on-site in the exhibit booth (East 24-26) to respond to interviews.

(*1) Value determined by the Company's measurement method.

(*2) With an order of 1,000 kilometers.

(*3) When the wire diameter is 25 micrometers (micro is 1/1,000,000).

(*4) The electrical resistance of gold wire containing 99% gold is approximately 3.1 $\mu\Omega$ ·cm.

<Reference>

Electrical Resistance (at 20°C, Unit: $\mu\Omega$ ·cm)

	Gold	Silver	Copper
Electrical resistance	2.2	1.63	1.69

Source: Metal Data Book 4th Revision (The Japan Institute of Metals)

■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: 3,869 (FY2011)

Net sales of consolidated group: 1.064 trillion yen (FY2011)

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 Denshi Kogyo K.K.

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

Representative: Koichiro Tanaka, President & CEO

Incorporated: 1961

Capital: 1,880 million yen

Employees: 142 (FY2011)

Net sales: 33.43 billion yen (FY2011)

Businesses: Manufacture of high-purity bonding wire (gold, gold alloy, aluminum, aluminum-silicon, copper, etc.)

Website: <http://www.tanaka-bondingwire.com/>

<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.