

October 29, 2014

Tanaka Precious Metals
Tanaka Holdings Co., Ltd.

TANAKA to Commercialize Dye for Dye Sensitized Solar Cells Developed by The University of Tokyo to Be Able to Generate Power from Near Infrared Light

Photoelectric conversion wavelength band extended to over 1,000nm, with provision to commence in 2015

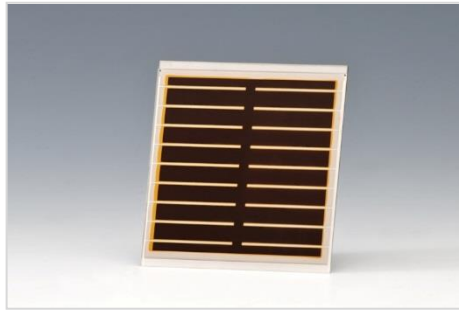
Tanaka Holdings Co., Ltd. (a company of Tanaka Precious Metals; Head office: Marunouchi, Chiyoda-ku, Tokyo; President & CEO: Akira Tanae), announced today that Tanaka Kikinzoku Kogyo K.K. (Head office: Marunouchi, Chiyoda-ku, Tokyo; President & CEO: Akira Tanae), which operates the Tanaka Kikinzoku Group's manufacturing business, will begin provision of DX (Dye-X) ruthenium complex dye used in dye sensitized solar cells with the photoelectric conversion wavelength band extended to over 1,000 nanometers (a nanometer is a billionth of a meter).

■ **The University of Tokyo has developed a dye enabling the efficient photoelectric conversion of the long-wavelength region (near infrared light). It will be manufactured and sold by Tanaka Kikinzoku.**

DX is a sensitizing dye for dye sensitized solar cells developed by a team including Hiroshi Segawa Professor of Research Center for Advanced Science and Technology at the University of Tokyo, who is a key researchers in the Cabinet Office's Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST), and is a next-generation sensitizing dye able to efficiently absorb and perform photoelectric conversion of near infrared light^(*) that could not be absorbed by ruthenium sensitizing dyes used in the past. Tanaka Kikinzoku Kogyo received a license for DX from the University of Tokyo to jointly apply for an international patent for DX, and will manufacture and sell the product from January 2015.

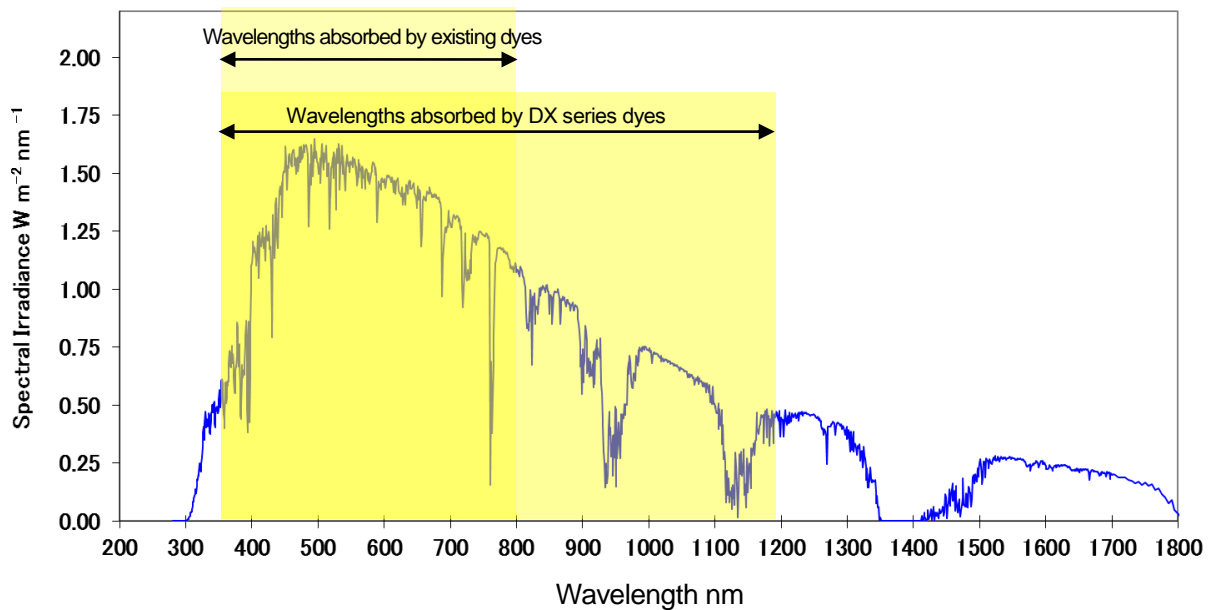
■ **Success in extending the power generation wavelength range (spectral sensitivity range) results in realization of high current density and high conversion efficiency**

The threshold on the long-wavelength side of the power generation wavelength range of existing dye sensitized solar cells was limited to 800 nanometers, and dye able to absorb near-infrared light enabling the use of long-wavelength light had to be developed. DX series dyes employ spin inversion excitation^(**) to successfully extend the long-wavelength side of the power generation wavelength range by around 200 nanometers compared to existing sensitizing dyes. As a result, the photocurrent of solar cells is improved by over 25%, and high-performance solar cells using DX series dyes are able to provide the world's highest photocurrent for an organic solar cell at 30mA/cm² with a high conversion efficiency of over 10.0%. DX is also suitable for generating power from outdoor light because it is able to perform photoelectric conversion of near infrared light with a longer wavelength than visible light more efficiently than existing sensitizing dyes. A tandem cell able to further increase the conversion efficiency by combining it with a dyes specifically for visible light, such as CYC-B11, is currently being developed.



A dye-sensitized solar cell using DX ruthenium dye to be provided by Tanaka Kikinzoku Kogyo

<Comparison of the spectrum of sunlight and spectrum that can be absorbed by ruthenium dye>



■ Efforts aimed at widespread adoption of dye sensitized solar cells

Dye-sensitized solar cells generate power utilizing a mechanism in which dye is applied to porous titanium oxide, absorbing light and releasing electrons to the titanium oxide. The conversion efficiency tends to be maintained even in low light, and because it is not dependent on the angle of incidence of sunlight, it is expected to be used in various applications for which previous silicon-based solar cells were unsuitable for, and is being developed as a type of next-generation solar cell offering high added value at low cost.

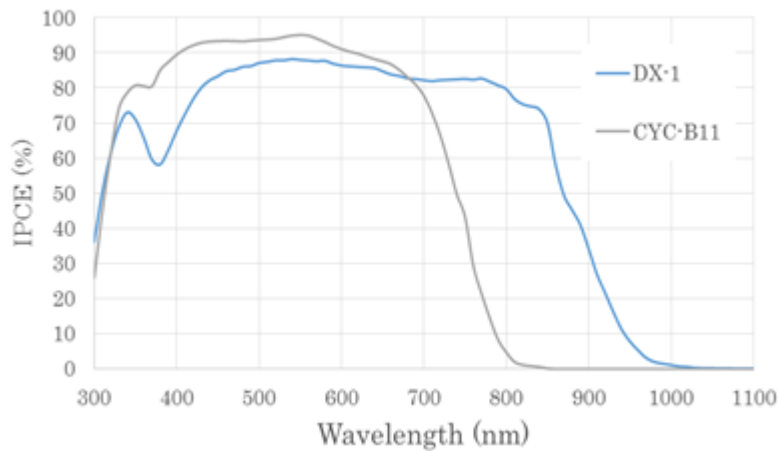
One important element for obtaining high conversion efficiency in dye sensitized solar cells is the structure of the dye that absorbs the light, and much R&D is currently being carried out on ruthenium complex dye as a stable dye with high performance.

Moving forward, Tanaka Kikinzoku Kogyo and the University of Tokyo will proceed with development aimed at improving the efficiency and durability of DX, such as the development of a tandem cell combining DX with a conventional dye for absorbing visible light. Tanaka Kikinzoku Kogyo aims for annual sales of 200 million yen through supplying DX.

As a producer of precious metals, Tanaka Kikinzoku Kogyo is engaged in efforts to reduce manufacturing costs aimed at practical application and widespread use, such as stable procurement of the ruthenium used as a material in the dye, development of high-yield manufacturing processes, and recycling for the effective use of ruthenium.

<Reference Materials>

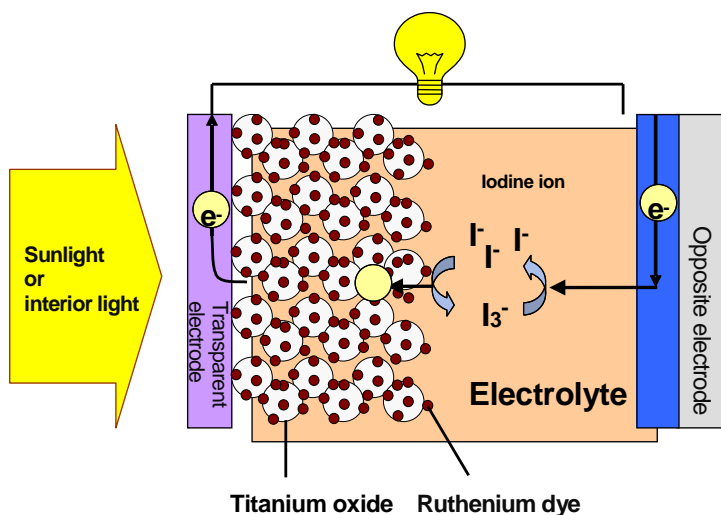
- Comparison of the power generation wavelengths of DX1 and Tanaka Kikinzoku Kogyo's existing CYC-B11



About CYC-B11

CYC-B11 is a ruthenium dye featuring high power generation efficiency of visible light, which has been sold by Tanaka Kikinzoku Kogyo since December 2011.

- The power generation structure of a dye-sensitized solar cell



*1 The wavelength of near infrared light is around 700 to 2,500 nanometers

*2 Spin inversion excitation: Normally, an “excited singlet state” in which the spin of electrons is maintained occurs when a molecule absorbs light and is excited, but this is a transfer in which the electron spin is inverted and an “excited triplet state” occurs when excited. It is not normally observable, but it can be observed at an extremely weak strength in certain molecules.

■**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 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.