



TANAKA MIRAI Lab.

PRESS RELEASE

May 8, 2025

TANAKA PRECIOUS METAL GROUP Co., Ltd.

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TANAKA PRECIOUS METAL GROUP Co., Ltd. and **TANAKA MIRAI Lab. Began Space Protein** **Crystallization Experiments**

-Protein crystallization experiments, which were expected to contribute to the elucidation of biological functions and drug discovery, conducted in space, and the newly developed “experimental unit for space molecular crystallization using Au (gold) nanostructure formation technology” launched into space on April 21, 2025 (U.S. local time)-

TANAKA MIRAI Lab., an in-house innovation organization of TANAKA PRECIOUS METAL GROUP Co., Ltd., (head office: Chuo-ku, Tokyo; Group CEO: Koichiro Tanaka), has **developed an “experimental unit for space molecular crystallization using Au (gold) nanostructure formation technology” (patent pending)**. The experiments were conducted by installing the experimental unit on the SpaceX CRS-32, an unmanned commercial resupply spacecraft to the International Space Station, which launched from the Kennedy Space Center in the U.S. on April 21, 2025 (U.S. local time).

TANAKA has been imagining the future in 2085, the 200th anniversary of its founding, and in 2021, it launched the TANAKA Renaissance Plan (TRP), which aims to realize a sustainable society and ultra-long-term corporate management. As part of this initiative, TANAKA has established the TANAKA MIRAI Lab., an in-house innovation organization to create a better future, and is conducting various research and development.

Protein crystallization experiments in space are considered useful for the detailed structural analysis of protein molecules because the effects of gravity can be eliminated. They are expected to make a significant contribution to the elucidation of biological functions and drug discovery. On the other hand, protein crystallization experiments have a very low rate of generating crystals, which is a challenge for high-cost space experiments.

The “experimental unit for space molecular crystallization using Au nanostructure formation technology” developed by TANAKA MIRAI Lab. is expected to enable more effective space experiments because it can increase the crystal generation rate through protein crystallization technology using Au's plasmon resonance (*1). The experimental unit is scheduled to return to the ground approximately two months after launch to verify the crystal generation rate and quality in space.

Superiority of “Experimental Unit for Space Molecular Crystallization Using Au Nanostructure Formation Technology”

Protein molecules are easily absorbed onto the surface of Au nanoparticles, and plasmon resonance occurs between Au nanoparticles at wavelengths in the visible light range, promoting protein crystallization. TANAKA MIRAI Lab. has discovered that the condensation of light energy between Au nanoparticles further promotes the generation of protein crystal nuclei. In addition, in the microgravity environment of space, crystals of higher quality and larger size than those on the ground are expected to be generated because they are not affected by convection and sedimentation due to gravity.

TANAKA MIRAI Lab. believes that protein crystallization technology using Au plasmon resonance can contribute to space experiments, which are expensive and limited in number. Therefore, in combination with Au nanostructure formation technology, TANAKA has developed a capillary (cylindrical glass device) (Figure 1) with high crystal generation capabilities (patent pending) for use in the counter-diffusion ^{(*)2} method.

On the inner wall of the capillary with an inner diameter of 0.5 mm and a length of 5 cm, nano-level particles of Au (average diameter: 20 nm) are aligned at nano-level intervals (average distance between surfaces: 40 nm) that facilitate the generation of plasmon resonance near the surface of Au particles. In addition to conducting experiments in space, which is unaffected by gravity, the use of this unit is expected to dramatically improve the rate of obtaining protein crystals, which had been considered challenging. As a result, it is believed that this unit will contribute to the explanation of biological functions and the development of drug discovery research.

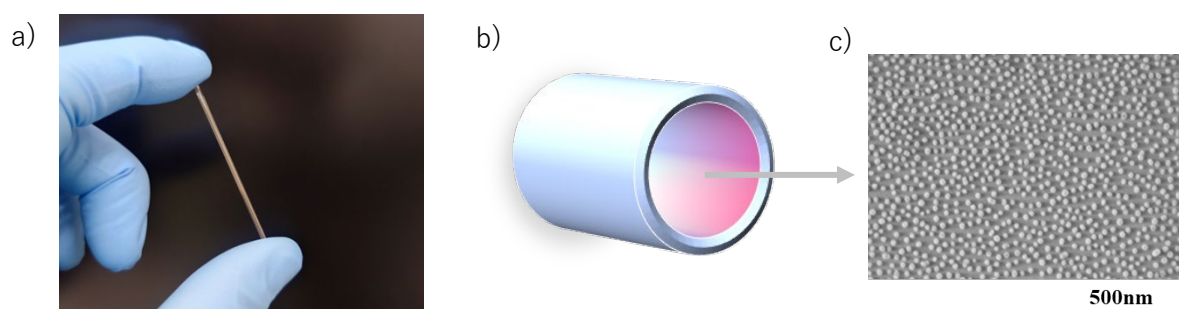


Figure 1: a) Photo of glass capillary b) Schematic diagram of glass capillary c) Electron microscope image of inner wall



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Implementation System for the Space Experiment

TANAKA MIRAI Lab. will conduct protein crystallization experiments on the International Space Station (ISS) using Kirara, a space experiment service provided by Japan Manned Space Systems Corporation, a company that offers space experiment consulting.

https://www.jamss.co.jp/en/space_utilization/kirara/

(*1) Plasmon resonance: A phenomenon in which light of a specific wavelength is absorbed on an Au surface that has been nanoparticulated. It is further enhanced when Au nanoparticles are close together at a nano-level spacing.

(*2) Counter-diffusion method: One of the protein crystallization methods, in which crystals are obtained by bidirectional diffusion of the protein solution inside the capillary and the crystallization solution outside. During this process, a concentration gradient is generated inside the capillary, which makes it possible to simultaneously search for a wide range of crystallization conditions. In addition, since the protein is not concentrated during crystallization, crystal growth proceeds gently.



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Company Information

■ About TANAKA MIRAI Lab.

TANAKA launched the TANAKA Renaissance Plan (TRP), which aims to realize ultra-long-term corporate management while looking ahead to 2085, the 200th anniversary of its founding. As part of this initiative, TANAKA launched TANAKA MIRAI Lab., an in-house innovation organization that promotes activities to “create a future that no one has ever seen before” by encouraging each and every employee to think for themselves. Its mission is to envision an unseen future and realize various possibilities by conducting research derived from “kisho (precious and rare) value,” based on the value of precious metals that have been cultivated for over 130 years since the company’s founding.



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■ About TANAKA

Since its foundation in 1885, TANAKA has built a portfolio of products to support a diversified range of business uses focused on precious metals. TANAKA is a leader in Japan regarding the volume of precious metals it handles. Over many years, TANAKA has manufactured and sold precious metal products for industry and provided precious metals in such forms as jewelry and assets. As precious metals specialists, all Group companies in Japan and worldwide collaborate on manufacturing, sales, and technology development to offer a full range of products and services. With 5,355 employees, the group’s consolidated net sales for the fiscal year ending December 2023 was 611.1 billion yen.



■ Official Website: TANAKA PRECIOUS METAL TECHNOLOGIES

<https://tanaka-preciousmetals.com>

■ Press inquiries

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