

September 12, 2025

TANAKA PRECIOUS METAL GROUP Co., Ltd.

**TANAKA PRECIOUS METAL TECHNOLOGIES Succeeds in  
Developing High-Performance Palladium Alloy Hydrogen  
Permeable Membrane Operable in the Low-Temperature Range  
of 300°C**

**- Expanding the Lineup of Palladium Alloy Hydrogen Permeable Membranes Essential for High-Purity Hydrogen Purification— Eliminating the Need for Additional Equipment, Suppressing Equipment Deterioration, and Contributing to Reduced Energy Costs -**

TANAKA PRECIOUS METAL TECHNOLOGIES Co., Ltd. (Head Office: Chuo-ku, Tokyo; Representative Director & CEO: Koichiro Tanaka), a company engaged in the industrial precious metals business of TANAKA, announces the **successful development of a [palladium \(Pd\) alloy hydrogen permeable membrane](#) operable in the low temperature range around 300°C**. Compared to conventional products, this product features **high hydrogen permeation performance while operating at lower temperatures**. Provision of this product's samples is scheduled to start on or after September 15, 2025.

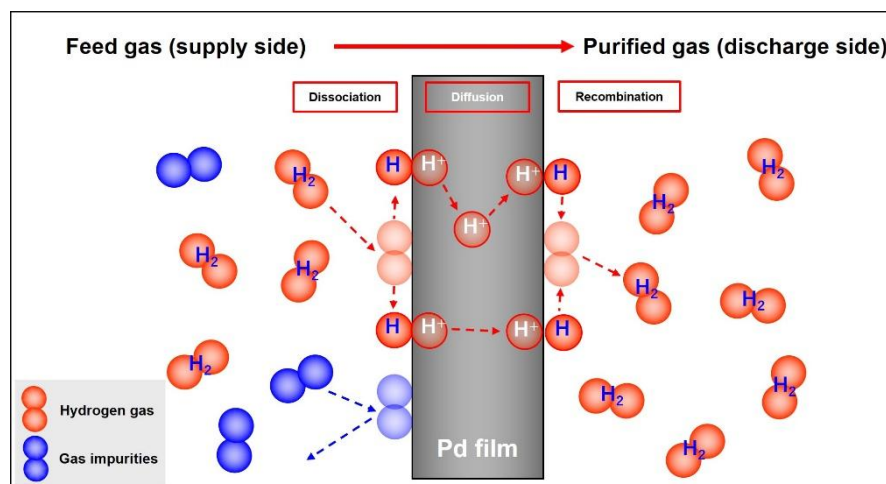
An academic presentation regarding this product will be made at The Japan Institute of Metals and Materials' "2025 Fall Meeting," which will be held at Hokkaido University from September 17 to 19, 2025.



Palladium Alloy Hydrogen Permeable Membrane (PdCu39)

Among PdCu alloy membranes, PdCu40 (an alloy with 60% palladium content and 40% copper content) is known to exhibit the highest hydrogen permeation performance. However, hydrogen purification using PdCu40 required operation at high temperatures of around 400°C. TANAKA focused on the palladium content ratio in PdCu-based hydrogen permeable membranes and successfully maximized the performance of PdCu-based hydrogen permeable membranes with PdCu39 (an alloy with 61% palladium content and 39% copper content).

Previously, the high hydrogen permeation capability of PdCu39 was not recognized. This was because even a slight fcc phase <sup>(\*)1</sup> presence would significantly reduce hydrogen permeation performance, and achieving a complete bcc phase <sup>(\*)2</sup> was considered difficult. However, by applying proprietary heat treatment methods developed through decades of expertise in precious metal materials research, it became possible to obtain a complete bcc phase, leading to the commercialization of this product.



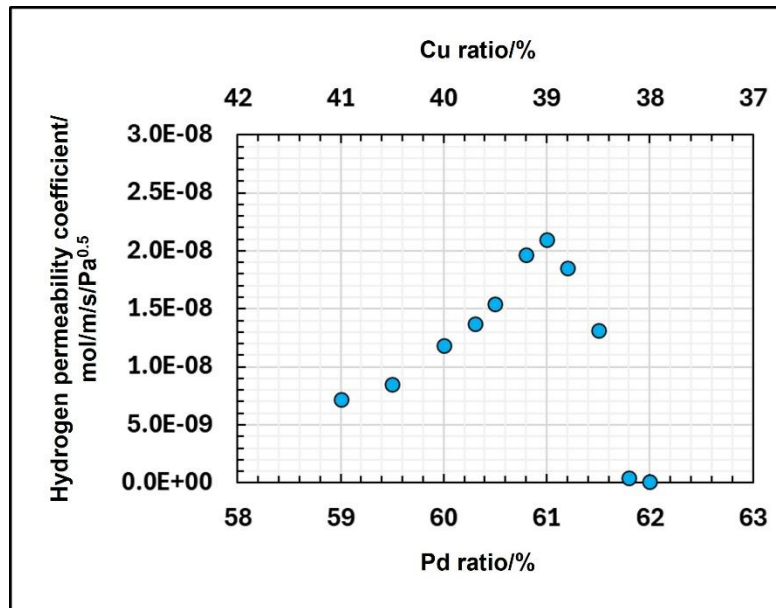
Hydrogen Permeation Mechanism via Palladium-based Hydrogen Permeable Membranes

With recent advances in hydrogen purification technologies, there is increasing demand for hydrogen permeable metal membranes capable of operating at lower temperatures than previously possible. To purify high-purity hydrogen, the most common method involves purifying hydrogen gas generated from methanol-water through modules incorporating hydrogen permeable membranes. However, while hydrogen is generated from methanol-water at temperatures of around 300°C, hydrogen permeable membranes typically exhibit their performance at 400°C or higher, necessitating additional heating equipment and contributing to increased costs. Moreover, the generation of gas impurities due to heating has also posed a challenge.

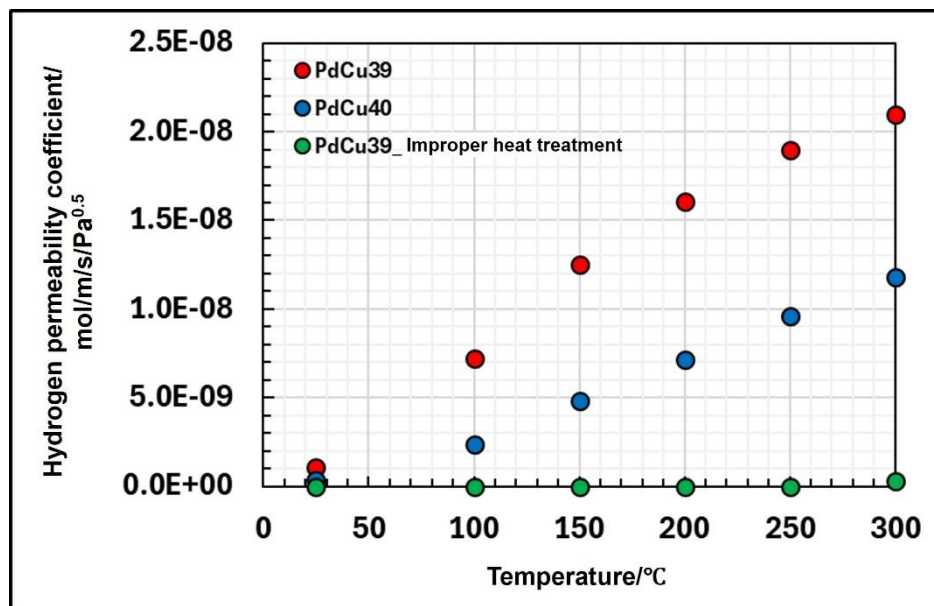
This product can purify hydrogen at a low temperature of approximately 300°C, eliminating the need for additional heating equipment and reducing equipment oxidation more effectively than conventional products. Additionally, it is expected to help reduce energy costs, including electricity and CO<sub>2</sub> emissions.

## ■ Product Features

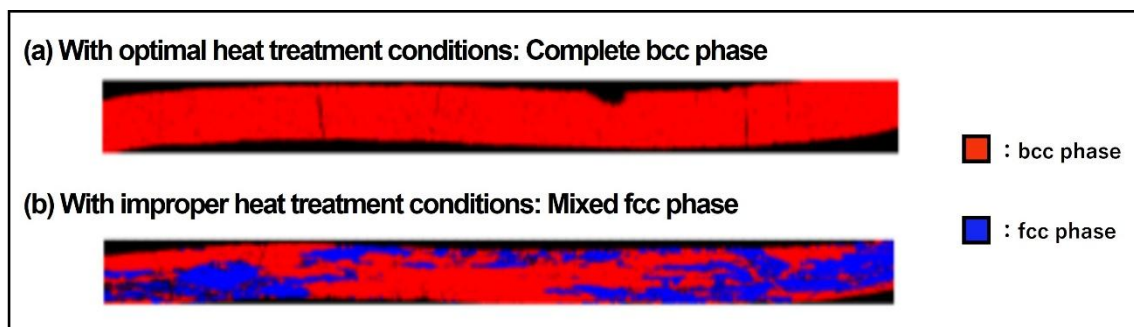
- Effective at low temperatures around 300°C
- High hydrogen permeation performance through achievement of complete bcc phase
- Pinhole-free membrane
- No additional heating equipment required, reducing equipment oxidation during the heating process
- Enables downsizing of hydrogen purification equipment compared to other technologies



Pd/Cu Ratio in PdCu Alloys and Hydrogen Permeability Performance @ 300°C



Temperature Dependence of Hydrogen Permeation Performance



Differences in bcc Phase/fcc Phase Ratio of PdCu39 Depending on Heat Treatment Conditions

#### ■ Dimensions and Shapes Available (Prototype Samples for Evaluation)

Thickness	Width	Shape
Minimum 10 μmT	Maximum 120 mm	Sheets (square, circular, etc.)

\*1 **fcc phase**: Refers to the metallic phase with a face-centered cubic crystal structure.

\*2 **bcc phase**: Refers to the metallic phase with a body-centered cubic crystal structure.

## Company Information

#### ■ 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 5,591 employees, the group's consolidated net sales for the fiscal year ended December 2024 were 846.9 billion yen.

#### ■ TANAKA Industrial Precious Metal Materials Portal

<https://tanaka-preciousmetals.com>

#### ■ Product inquiries

TANAKA PRECIOUS METAL TECHNOLOGIES Co., Ltd.

<https://tanaka-preciousmetals.com/en/inquiries-on-industrial-products/>

#### ■ Press inquiries

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