

Social Value Created by Toho Titanium's Technological Capabilities



Achieving a Carbon-neutral Society with the Power of WEBTi Materials

Our company has developed the "WEBTi" porous titanium sheet, a metallic titanium sheet with numerous microporous. WEBTi is a new material that combines the characteristics of porous metals, such as liquid permeability and conductivity, and the advantages of titanium having high corrosion resistance and strength. It is intended for use in electrode materials, diffusion layers, and filters in highly corrosive environments.

Particularly in recent years, it has been expected to be used as the anode side diffusion layer of a PEM (solid polymer electrolyte membrane) water electrolysis generator, which is a type of hydrogen generator. Hydrogen generators are essential to building a hydrogen-based society, which is expected to be one of the major solutions for reducing CO₂ emissions. We will quickly conduct the implementation of WEBTi into PEM water electrolysis generators and contribute to CO₂ reduction.

from Sales

We will fulfill our mission of creating the "Fourth Pillar" and develop it into a business that leads to increasing corporate value.

As a company at the top of the commercial chain for material manufacturers, we see WEBTi as a great opportunity to showcase our advanced technological capabilities to the market. We are confident that this product will not only generate profits, but will also allow us to lead the way in decarbonization, which is an urgent social issue. We are also confident that this product will lead the way in increasing our corporate value by contributing to energy innovation for the next generation.

Hydrogen is highly important from the perspective of energy security, so we predict that demand for WEBTi will increase more than 100 times its current level. However, as this is a developing market, each customer has their own requirements, so there is currently no "correct answer" to all issues. Establishing a stable supply system is also an issue. As a salesperson with a technical background, I will coordinate the launch of new businesses from both technology and marketing aspects, and strive to carry out negotiations with European and US customers quickly and with a high level of understanding. We will establish the "Fourth Pillar" and contribute to our leap forward as a sustainable company.



Ryo Ishizuka
New Materials Division
New Materials Planning & Sales Group

from Developer

We will work as a team to establish "high quality" and "stable production."

About three years ago, inquiries about WEBTi for PEM water electrolysis applications increased rapidly, and the required size and number of sheets expanded, leading to the start of production at a pilot facility. Currently, we are working on developing technologies and creating systems to improve production capacity and stabilize quality, as well as developing next-generation porous titanium materials and cost-reducing technologies.

Since this is a product made using a new manufacturing method, we have to work very hard to maintain delivery dates, quality, and production safety, while there are unexpected facility problems, and with productivity and yield not improving as expected. In addition, creating a quality/production control and facility maintenance scheme is also a major mission toward commercialization.

Moving forward, we will focus on building a team to overcome the mounting challenges. For our members and cooperating departments who are working hard under a lot of uncertainty, we would like to achieve profitability as soon as possible and grow our division into a profit center.



Yosuke Inoue
New Materials Division
Porous Titanium Sheet Production & Development Group

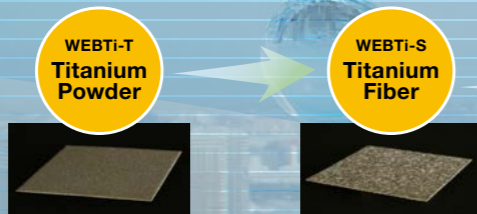
2004 Development of Seeds

We have begun development aimed at creating new business areas by combining the wide range of possibilities for the application of porous metal materials and the excellent properties of titanium.

Porous metal materials	Titanium
1) Ventilation/liquid permeability 2) Electrical/thermal conductivity 3) Impact energy absorbency 4) Large specific surface area 5) Unique texture	1) High corrosion resistance 2) High strength 3) Anodic oxidation color formation

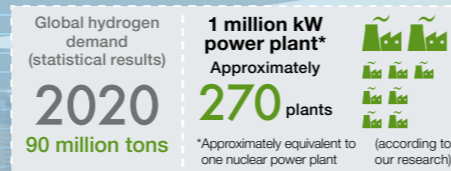
2008 Market Exploration

We started development of the product as an electrode material. We developed several prototypes. We tried sample work but we were having a hard time getting a feel for moving on to the next step.



2018 Towards water electrolysis applications

As the transition to hydrogen energy and the development of water electrolysis generators progress, WEBTi has begun to attract attention as one of the equipment materials. Considering the environmental impact during hydrogen production, there are high expectations for WEBTi's potential as the material is titanium, and high porosity is needed.



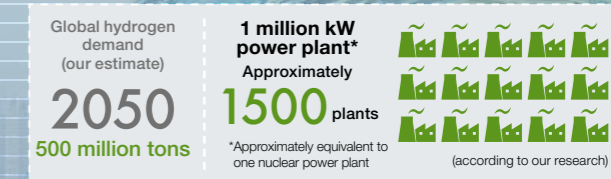
2023 Development Stage



WEBTi-K (smoothness)
A porous titanium sheet made from titanium powder paste. It is characterized by its thin film thickness and small pore diameter, making it a product with excellent flexibility and smoothness.



Mass Production Stage



2030 Realization of a carbon-neutral society

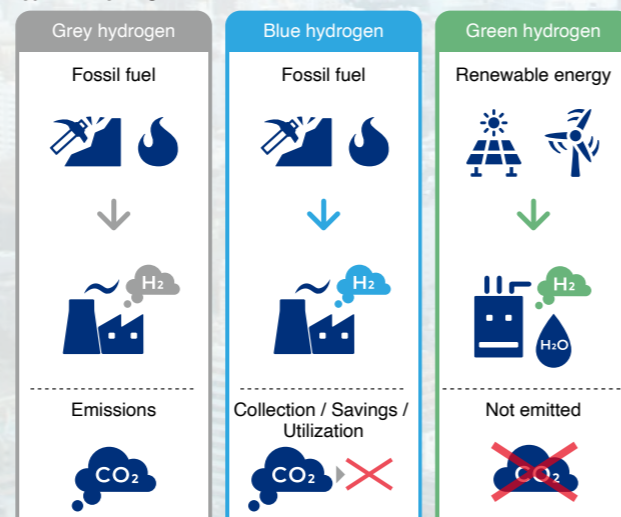
Supporting "green hydrogen" production technology

Carbon neutrality is a rapidly accelerating movement mainly in Europe and the United States. There is no doubt that hydrogen, the next generation energy source, is essential to achieving this goal. What is particularly sought after now is called "green hydrogen."

Green hydrogen refers to completely carbon-free (no CO₂ emissions) hydrogen produced through water electrolysis using renewable energy such as solar and wind power. Among the water electrolysis methods, the PEM water electrolysis method is said to be the most compatible with renewable energy. It is an essential technology for green hydrogen production, and various countries are moving forward with many projects to popularize this water electrolysis method. Replacing existing energy sources with hydrogen requires a large amount of water electrolysis capacity, so demand for WEBTi, which is used for this purpose, is expected to increase exponentially.

In order to capitalize on this trend, we have set the goal of quickly launching the mass production of WEBTi, so our development, manufacturing, and sales teams are working together to contribute to the realization of a carbon-neutral society.

Types of Hydrogen



Taking advantage of the unique properties of titanium

WEBTi was born in 2004 by combining the characteristics of titanium, such as light weight, high strength, and high corrosion resistance, with the characteristics of porous materials, such as high air permeability, high specific surface area, and electrical/thermal conductivity.

Originally, we decided to develop it because of its potential as an electrode material, and we were considering expanding it to various specifications such as large voids and high strength, but unfortunately, it was discontinued. However, now more than 10 years have passed, it has attracted attention as a material for water electrolysis generators that produce the next-generation energy source, "hydrogen", and especially as a material for PEM water electrolysis methods.

In the PEM water electrolysis method, which has the opposite mechanism to a fuel cell, the environment inside the equipment has a large acidic load that ordinary metals cannot withstand. However, it became clear that WEBTi is a unique material that combines titanium's high corrosion resistance with high air permeability, making it ideal for water electrolysis generators, and that it cannot be replaced by other metals.

PEM water electrolysis generator (hydrogen generator)

