

## Establishment of Mass Production Technology for Catalyst-coated Membranes (CCMs) for Water Electrolysis toward Low-cost Green Hydrogen Production

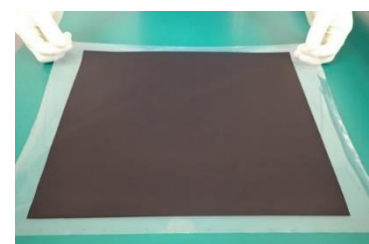
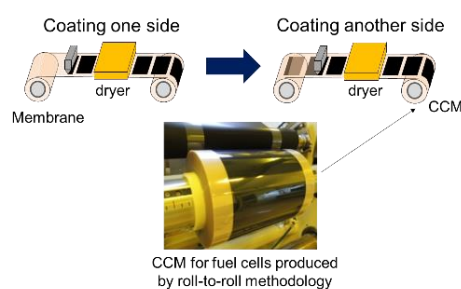
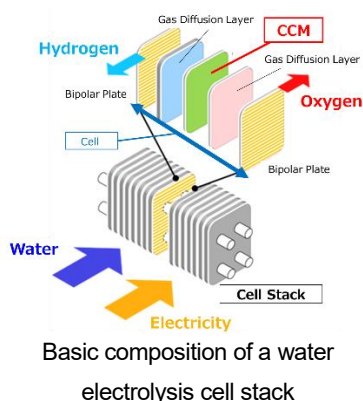
Tokyo Gas Co., Ltd.

Tokyo Gas Co., Ltd. (President: UCHIDA Takashi; “Tokyo Gas”), together with SCREEN Holdings Co., Ltd. (President: HIROE Toshio; “SCREEN”), has established a high-speed mass production technology for catalyst-coated membranes (CCMs) to be used for PEM<sup>\*1</sup> water electrolysis with an electrode area over 800 cm<sup>2\*2</sup>. The CCMs are a key component in determining the performance, cost and durability of PEM water electrolysis cell stacks.

Since May 2021, two companies have been working on the development (“development project”) of high-speed production technology for low-cost cell stacks<sup>\*3</sup>, a core component of water electrolyzers for green hydrogen production, utilizing SCREEN's "roll-to-roll methodology"<sup>\*4</sup>.

The most significant challenge in this development project was that cracks and catalyst agglomerations occurred on the electrodes of CCMs when the catalyst coating technology for production of CCMs for fuel cells<sup>\*5</sup> was applied to water electrolysis. This problem was addressed by optimizing the manufacturing process and catalyst ink<sup>\*6</sup> composition. As a result, we successfully established a mass production technology for CCMs with an electrode area over 800 cm<sup>2</sup>, which exhibited the desired performance<sup>\*7</sup>.

We plan to start the mass production of 5,000 cm<sup>2\*8</sup> CCMs for water electrolysis in 2025 by accelerating technological development for further expansion in CCM sizes and constructing mass production facilities. Such CCMs are in high demand by the manufacturers of water electrolyzers.



\* 1 : Proton Exchange Membrane

\* 2 : A 100 kW class cell stack (hydrogen production capacity of 20 Nm<sup>3</sup>/h class) can be produced by the stacking of several tens of layers.

\* 3 : [Tokyo Gas and SCREEN Agree to Jointly Develop a Water Electrolysis Cell Stack for Low-cost Green Hydrogen Production \(announced on May 26, 2021\)](#).

\* 4 : Low-cost manufacturing process for functional films that consists of the continuous processing of film using a coating and other methods during the rewinding process of a long film substrate wound in a roll.

\* 5 : This achievement is based on results from a project subsidized by the New Energy and Industrial Technology Development Organization (NEDO).

\* 6 : Catalyst powders such as precious metals and polymers are slurried together in a solvent.

\* 7 : Efficiency above 83% is achieved; test conditions: 60°C, 2 A/cm<sup>2</sup>.

\* 8 : A MW-class cell stack (hydrogen production capacity of 200 Nm<sup>3</sup>/h class) can be produced by the stacking of several tens of layers.