News Release

June 23, 2026
JX Advanced Metals Corporation

New Insights into Improving Iridium Catalyst Utilization and Reducing Its Usage in PEM Water Electrolysis for Hydrogen Production
- Results from Commissioned Research Conducted with Columbia University Published in an International Scientific Journal -

JX Advanced Metals Corporation (President: Hayashi Yoichi; hereinafter "the Company") announces that it has obtained new insights into improving the utilization efficiency of iridium[1)] used as a catalyst and reducing its usage in PEM (proton exchange membrane) water electrolysis[2)], a technology employed for hydrogen production.
These research results were achieved through commissioned research conducted with Professor Jingguang G. Chen of Columbia University in the United States, and have been published in the international scientific journal ACS Catalysis[3)], which focuses on the field of catalysis.

With the aim of achieving carbon neutrality by 2050, efforts to utilize hydrogen as a next-generation energy source are advancing worldwide. Among these, green hydrogen[4)] is attracting growing attention not only for its contribution to the realization of a decarbonized society, but also from the perspectives of strengthening energy security and enhancing industrial competitiveness. PEM (proton exchange membrane) water electrolysis, one of the methods for producing green hydrogen, has attracted particular interest because it enables the efficient production of high-purity hydrogen. However, its widespread adoption faces challenges related to cost and resource constraints, as it relies on iridium, a rare and expensive metal, as a catalyst.
In response to these challenges, research and development aimed at simultaneously reducing iridium usage while maintaining and improving catalyst performance has been actively pursued. The Company has identified this field as one of its new business themes where it can leverage its accumulated expertise in rare metal material technologies, including powder control and surface/interface control. With an eye toward assessing future commercialization potential, the Company has been conducting commissioned research with Columbia University.

In this study, the research focused on an electrode catalyst in which iridium oxide (IrO_X) was supported[5)] on tantalum carbide (TaC), a support material that combines electrical conductivity with electrochemical stability. The catalytic performance under acidic conditions and the long-term durability of the catalyst were evaluated.
As a result, the IrO_X/TaC catalyst exhibited up to approximately six times higher iridium mass activity[6)] than the conventionally used IrO_2 catalyst, depending on the evaluation conditions. This finding suggests the potential to reduce iridium usage by approximately 80%. In addition, in a continuous operation test conducted at 0.5 A cm^{-2} for 200 hours, the catalyst demonstrated promising durability, with a degradation rate of 36 $\mu V\,h^{-1}$. Furthermore, it was shown that the formation of Ir–O–Ta bonds at the IrO_X/TaC interface lowers the overpotential for the oxygen evolution reaction compared with conventional IrO_2 catalysts.
These results indicate the potential to produce hydrogen using less electrical energy and suggest a new materials design guideline capable of simultaneously reducing iridium usage and improving water electrolysis efficiency.

In its "JX Metals Group Long-Term Vision 2040," the Company has set forth a goal of transforming itself from a facility-based industrial company into a technology-driven company, and is focusing on the creation of new businesses to expand the revenue scale of its focused business areas. In addition to the present initiative, the Company is actively pursuing challenges in priority fields by leveraging the core technologies cultivated through its existing businesses, targeting areas that lead to value creation, and accelerating the generation of new businesses.
Through continued research and development conducted in collaboration with partners, the Company remains committed to contributing to the realization of a sustainable society.

References

1) Iridium (atomic number 77, chemical symbol Ir) is a precious metal belonging to the platinum group metals and is an extremely rare metal characterized by exceptionally high corrosion resistance and a high melting point. In addition to its use as a catalyst in chemical reactions, iridium is also used in applications such as automotive spark plugs and crucibles.

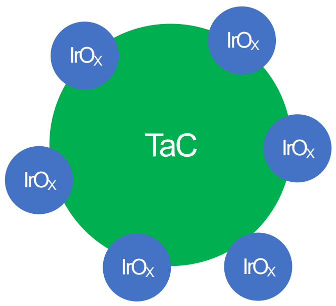
2) A technology that produces high-purity hydrogen by electrolyzing water using a polymer electrolyte (solid polymer electrolyte) membrane.

3) Sinwoo KangXue, HanNathaniel N. Nichols, Tianyou Mou, Yong Yuan, Byeongjun Gil, Yimei Zhu, Long Pan, Hideki Furusawa, Koichi Katayama, Ping Liu, Jingguang G. Chen (April 5, 2026) Enhancing Acidic Oxygen Evolution Activity by Supporting Iridium Electrocatalysts on Tantalum Carbide, ACS Catalysis, Articles ASAP (Research Article), https://doi.org/10.1021/acscatal.6c00063

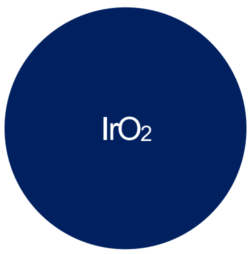
4) Green hydrogen refers to hydrogen produced by splitting water using renewable energy, with little to no CO_2 emissions generated in the process.

5) A method in which catalytically active components are fixed and dispersed on the surface of a different material.

6) A measure of catalytic activity per unit mass. It is one of the key indicators for evaluating cost reduction in fuel cell catalysts. As the catalyst mass increases with the amount used, achieving high reaction rates with smaller amounts of catalyst requires high mass activity.



Schematic illustration of the IrOx/TaC catalyst
IrO_X is supported on TaC, which serves as the support material.



Schematic diagram of the IrO_2 catalyst

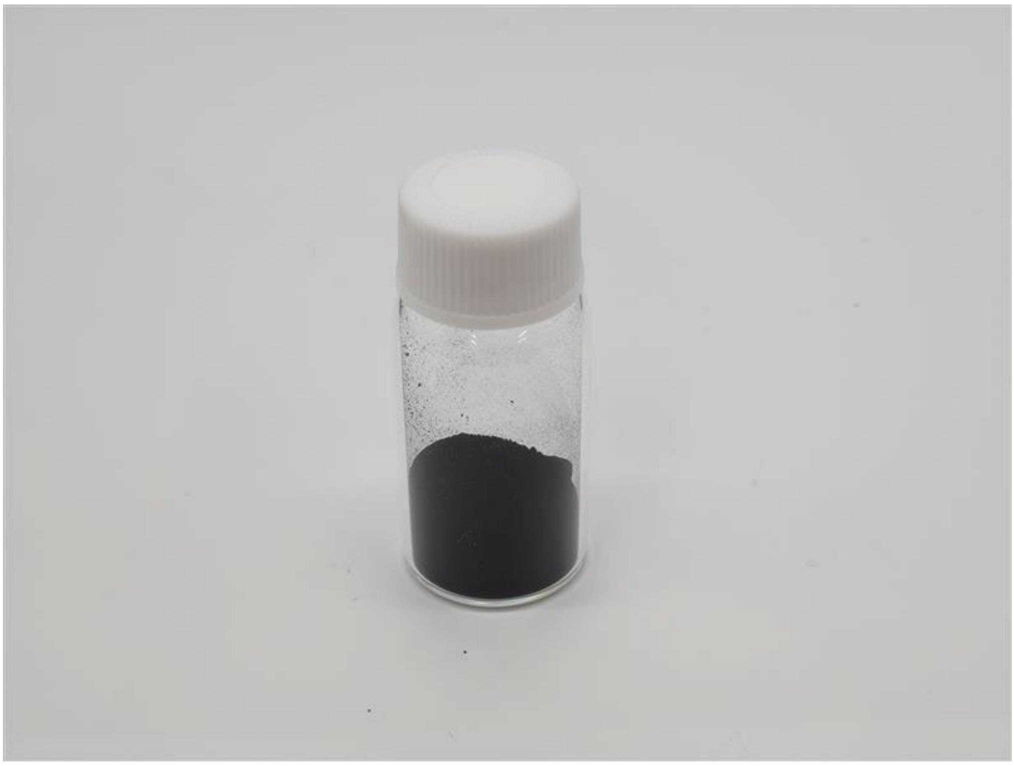


Image of the IrO_X/TaC catalyst

Professor Chen (third from the left) and the research team