



INFO HUB series

#01 Iridium

Why Is Iridium Critical for Green Hydrogen? The Role of Recycling

Why Iridium Matters

Green hydrogen is increasingly seen as an important part of Europe's transition to a climate-neutral economy. It can help reduce emissions in industries while supporting the wider transition to cleaner energy and Europe's energy independence.

One of the technologies used to produce green hydrogen is the Proton Exchange Membrane Water Electrolyser (PEMWE). A PEMWE uses electricity to split water into hydrogen and oxygen. Behind this process lies a small but important material, the iridium.

Although only small amounts are used, iridium plays a crucial role in today's PEMWE. Its scarcity and limited supply make it an important material to consider as Europe works to expand green hydrogen production.

A Small Metal with a Big Role

To operate efficiently, a PEMWE needs materials that can withstand very demanding conditions. Iridium is one of the few materials that can perform well under the highly acidic conditions inside a PEM electrolyser. This makes it particularly important for the part of the electrolyser where oxygen is produced. Thus, iridium helps PEM electrolyzers operate effectively. But there is only a limited amount of it available.

Why Is Iridium a Critical Raw Material?

Global primary production of IRIDIUM is only around 7 tonnes/year, according to the European Commission's JRC.

Iridium is also not normally mined as the main product of a mine and it is recovered as a by-product of platinum and other platinum-group metal production. This means that its availability is closely linked to the production of other metals.

Another challenge is where it comes from. Most of its production is produced in South Africa, accounting for around 89% of global primary production in the latest JRC data. Such a concentrated supply chain makes the market vulnerable to supply disruptions and geopolitical uncertainties.

For Europe, this concentration creates a supply challenge. EC identifies platinum-group metals, including iridium, as critical raw materials, while the Critical Raw Materials Act also places strong emphasis on increasing recycling and strengthening European supply chains.

Why Does This Matter for Green Hydrogen?

Europe has set ambitious targets for renewable hydrogen production, and PEM electrolyzers are expected to play an important role in achieving them.

At the same time, manufacturers are working to reduce the amount of iridium needed in electrolyser components. But as the number of electrolyzers increases, the need to use this scarce resource more efficiently becomes increasingly important.

This is why the future of green hydrogen is not only about producing more hydrogen. It is also about using materials more efficiently and finding ways to keep critical materials in circulation.

How Recycling Supports Europe's Hydrogen Future

Recycling can reduce the need to rely entirely on newly extracted raw materials. Instead of allowing materials from end-of-life components to become waste, recycling can recover them for reuse.

For iridium, this can help keep a scarce resource within the value chain, reduce dependence on primary resources and contribute to more resilient supply chains.

How IRION Contributes

This is exactly the challenge that IRION addresses.

IRION is developing processes to recover iridium together with fluorinated ionomers from end-of-life Catalyst Coated Membranes (CCMs) used in PEM water electrolyzers.

By recovering these materials and exploring coating technologies that reduce iridium use, IRION contributes to a more circular hydrogen economy.

Instead of materials being extracted, used and discarded, IRION is developing a circular approach in which iridium and ionomer can be recovered from end-of-life components and brought back into the PEMWE value chain.

Looking Ahead

As Europe develops its hydrogen economy, improving recycling and considering future recovery in component design can contribute to a more resource-efficient hydrogen value chain.

By focusing on the recovery and reuse of iridium and ionomer from end-of-life CCMs, IRION is contributing to a circular approach in which materials used in today's electrolyzers can have a longer life in tomorrow's hydrogen technologies.

Further Reading

- [European Commission – Critical Raw Materials Act](#)
- [European Commission Joint Research Centre – Raw Materials Information System: Iridium](#)
- [Clean Hydrogen Partnership – A sustainable, circular European hydrogen economy](#)
- [Clean Hydrogen Partnership – European Hydrogen Sustainability and Circularity Panel](#)
- [IRION Project](#)

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