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REDHY

Redox-Mediated economic, critical raw material free, low capex and highly efficient green hydrogen production technology

REDHY - Deliverable report

DELIVERABLE 3.1 – Fluorine-free PEM and PEI

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Public Summary

The EU project REDHY is developing a new generation of electrolysis systems that move beyond today's conventional technologies. Instead of optimizing traditional setups, REDHY takes a disruptive approach based on bipolar membrane systems, which combine acidic and alkaline membranes into a single architecture. This design opens new possibilities for efficiency, cost reduction, and critical raw material minimization.

One key step in this development is replacing PFAS-containing materials, such as Nafion, with safer alternatives. PFAS (per- and polyfluoroalkyl substances) are known as "forever chemicals" due to their environmental persistence and growing regulatory concern.

This deliverable presents progress toward creating PFAS-free proton exchange membranes, which will form the acidic side of future BPMs. Several membrane formulations were developed using sulfonated polymer strategies, with some achieving conductivity and performance levels comparable to Nafion. Importantly, these materials also meet REDHY's Milestone 4 target of >70 mS/cm conductivity and <55% water uptake and show promising stability in early testing.

In parallel, ionomers matching the new membrane chemistry are being developed for use in the catalyst layers. These efforts support REDHY's goal of building sustainable, high performance electrolysis systems with minimal environmental impact and full material integration across PEM/AEM interfaces.

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Project partners:

#	Partner short name	Partner Full Name
1	DLR	DEUTSCHES ZENTRUM FUR LUFT – UND RAUMFARHT EV
2	CNRS	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIC
3	UNR	UNIRESEARCH BV
4	UPV	UNIVERSITAT POLITECNICA DE VALANCIA
5	IDN	INDUSTRIE DE NORA SPA-IDN
6	CENMAT	CUTTING-EDGE NANOMATERIALS CENMAT UG HAFTUNGSBESCHRANKT
7	CNR	CONSIGLIO NAZIONALE DELLE RICERCHE

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