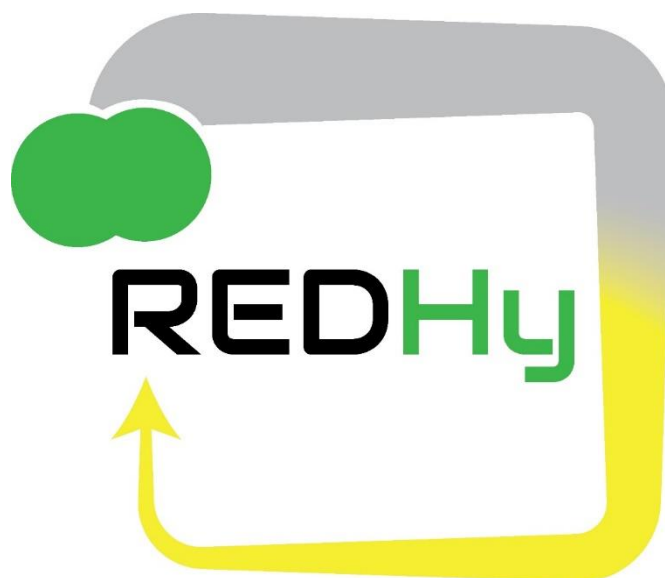


HORIZON EUROPE PROGRAMME
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REDHY

**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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1.0	15.05.25	Julien Fage (CENmat)	Creation of the document, structurazation
2.0	18.06.25	Julien Fage (CENmat)	Implementation of data and text

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 FÜR LUFT – UND RAUMFAHRT EV
2	CNRS	<u>CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE</u>
3	UNR	<u>UNIRESEARCH BV</u>
4	UPV	<u>UNIVERSITAT POLITÈCNICA DE VALÈNCIA</u>
5	IDN	<u>INDUSTRIE DE NORA SPA-IDN</u>
6	CENMAT	<u>CUTTING-EDGE NANOMATERIALS CENMAT UG HAFTUNGSBESCHRÄNKT</u>
7	CNR	<u>CONSIGLIO NAZIONALE DELLE RICERCHE</u>

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