CDTI-NEDO online Joint Workshop on Hydrogen Technology - Green Hydrogen Production & Mobility -





R&D Priorities in Hydrogen technologies and singular projects

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RESEARCH CENTER ON ENERGY, ENVIRONMENT AND TECHNOLOGY

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CIEMAT in numbers



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HYDROGEN TECHNOLOGIES RESEARCH AREA

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VISION

Ciemat 2

CIEMAT as a centre of reference for hydrogen technologies research, from production to final use, fostering the pathway to the full deployment of hydrogen technologies

SOME PRIORITIES AND PROJECTS

- Advance the technology readiness of the production of solar H2 and renewable fuels
- Increase of efficiency in H2 production by electrolysis and development of reversible systems
- Improvements on cell/stacks and electronics for cost reduction and life time increase



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HYDROSOL-Beyond



Thermochemical HYDROgen production in a SOLar structured reactor: facing the challenges and beyond Contact: alfonso.vidal@ciemat.es

CHALLENGES

- Scaling-up the HYDROSOL reactor design while advancing the state-ofthe-art (redox materials, monolithic honeycomb fabrication and functionalization) for optimum products yield.
- Design the overall chemical process, covering reactants and products conditioning, heat exchange/recovery, use of excess/waste heat, storage, monitoring and control.
- Improvement of the stability, cyclability and performance of the redox materials and redox structures (1000 cycles or 5000 hours of operation)
- Operate the plant and demonstrate hydrogen production (at levels > 7 Nm3/day)
- Storage on site : purified hydrogen is stored at 20 bar









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Trigeneration with Geotermal, Hydrogen and **Renewable Energy**

CHALLENGES

Contact: tomas.gonzalez@ciemat.es

- Improvement of energy efficiency in climatization, sanitary hot water generation and electric power, designing a Energy Management System (EMS)
- Self-standing system combining renewable energies and Hydrogen
- Integration of cool and heat co-generation systems



TOGETHER











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ELYPORT

Improved Fuel cells with advanced membrane-electrode assembly for portable applications

Contact: antonio.mchaparro@ciemat.es

CHALLENGES

- Improvement of cells and stack design and performance
- Improvement of fuel cell electronics for their use in portable applications





	Current	Objective 2024
	ELIGE project	ELHYPORT proposal
Cell Cost	15€/W	5€/W
Platinum loading*	0.16mg·W ⁻¹	0.125mg·W ⁻¹
Durability	2000 h	5000 h
Power density	25 W·kg ⁻¹ , 30 W·dm ⁻³	50 W·kg ⁻¹ , 70 W·dm ⁻³
Energy density	300 W·h·dm⁻³	900 W·h·dm ⁻³
Reliability (mean time between failures)	500 h	5000 h



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Japan – Spain collaboration

SUStainability development and cost-reduction of hybrid renewable energies powered Hydrogen stations by risk-based multidisciplinary approaches

Contact: marta.marono@ciemat.es

OBJECTIVES

- Promote the transnational mobility between European and Japanese researchers
- Develop a high-quality research network on infrastructures and resources
- Exchange best practices and lessons and compare data
- Create new knowledge that can be tailored in different countries, and contribute to research-based policy-making

G Joint Call on

Joint Call on Sustainable Hydrogen Technology as Affordable and Clean Energy

CHALLENGES

- To integrate safety in the sustainability of H2 technologies
 - ✓ UNDESTANDING RISKS
 - ✓ PREVENTING RISKS
 - ✓ DESIGN OPERATING STRATEGIES
 - ✓ INCREASING PUBLIC ACCEPTANCE
 - ✓ ECONOMIC SUSTAINABILITY





THANK YOU FOR THE ATTENTION!

Questions?

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