Joint workshop of MAST3RBoost, MOST-H2, and MOF2H2 Projects on Hydrogen Storage and Production

- *Organized by MAST3RBoost, MOST-H2, MOF2H2 and HySTrAm four EU-funded projects pioneering sustainable hydrogen storage solutions through innovative Metal-Organic Frameworks (MOFs) and advanced Life Cycle Assessment (LCA) methodologies.*
- *This workshop will cover the advances in material design and production, and how to properly analyse their sustainability from different perspectives.*

Madrid, Spain — June 19, 2025. The EU-funded sister projects MAST3RBoost, MOST-H2, and MOF2H2 are coming together to launch a joint workshop focused on the life cycle assessment (LCA) of new materials designed for hydrogen (H2) storage. The event will take place on **June 30 from 14:00 to 15:30 (CEST)** under the title *"Environmental Impact & Sustainability of Hydrogen Storage and Production: LCA Insights from EU Projects."* This workshop will bring together LCA experts, regulators, scientists, and industry leaders to discuss advancements in material design and their sustainability from different perspectives.

The three projects are developing **Metal-Organic Frameworks (MOFs)**, innovative materials capable of storing gaseous hydrogen in fuel tanks with the goal of making H2 a sustainable and viable fuel for applications ranging from transportation to industry. The workshop aims to address LCA methods applied to these materials and enable the projects to share experiences and overcome common challenges in evaluating the environmental impact of newly developed materials.

Key topics will include the **environmental impact of materials derived from recycled waste**, the **modeling of uncharacterized chemicals**, and how to integrate the supply chain's impact into the life cycle assessment of hydrogen storage solutions.

The workshop aligns with the goals of the **European Green Deal**, which promotes the use of sustainable materials. As the EU continues to fund projects related to H2 usage and storage, LCA becomes a critical tool to assess the sustainability of these solutions and their competitiveness against fossil-fuel-based technologies.

The event will feature:

- **14:00 - 14:05** — Welcome and Introduction
- **14:05 - 14:15** — Keynote Presentation: *LCA in Hydrogen Storage and Production*
- **14:15 - 14:35** — Project Flash Presentations:
    - ***MAST3RBoost***: Recycled raw materials for manufacturing ultraporous materials for high-density hydrogen storage.

Funded by the European Union

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- ***MOST-H2***: Novel MOF-based adsorbents for efficient hydrogen storage.
- ***MOF2H2***: MOFs for hydrogen production through photocatalytic overall water splitting.
- ***HySTrAm:*** Hydrogen storage for green ammonia production based on new catalytic reactors.

- 14:35 - 15:20 — Round Table Discussion: *Challenges, Best Practices, and Next Steps*
- 15:20 - 15:30 — Wrap-Up and Next Steps

Invited experts include **Lenka Svecova** (LEPMI, France), who will share her expertise on material recycling and sustainability assessment in the hydrogen sector. Lenka Svecova is an Associate Professor at the Laboratory of Electrochemistry and Physico-chemistry of Materials and Interfaces (LEPMI) in Grenoble, France. She holds a Ph.D. in Environmental Science and Technology from École des Mines de Saint-Étienne (France) and the University of Chemistry and Technology in Prague (Czech Republic). Her research focuses on the recycling and recovery of critical metals and life cycle assessment (LCA), particularly in hydrogen technologies. She has co-authored over 30 scientific publications and co-supervised 10 PhD theses.

The event is open to a broad audience, including material science experts, the hydrogen industry, regulators, and academia.

Registration is available through the following link: https://bit.ly/43xaRHt

About MAST3RBoost

MAST3RBoost, a project funded by the European Union with a duration of 48 months, represents a pioneering initiative in the field of hydrogen storage. Based on a new generation of machine learning-enhanced ultra-porous materials, MAST3RBoost aims to pave a disruptive path to match the needs of different transportation sectors.

The project's main objective is to develop the world's first 1-kg scale demonstrator based on H_2 cryo-adsorption, leveraging the enhanced capabilities of ultra-porous materials obtained through machine learning. This innovative approach promises to offer revolutionary solutions for hydrogen storage, opening up new possibilities in the current energy landscape.

The consortium is formed by 13 Partners from 9 European countries and South Africa: Envirohemp S.L. (Spain); Contactica S.L. (Spain); Agencia Estatal Consejo Superior de Investigaciones Científicas (Spain); CIDETEC Surface Engineering Institute (Spain); Spike Renewables SRL (Italy); EDAG Engineering GMBH (Germany); Nanolayers OU (Estonia); LKR Leichtmetall Kompetenzzentrum Ranshofen GMBH (Austria); University of Pretoria (South Africa); Council For Scientific And Industrial Research (South Africa); Stellantis (old PSA Groupe) (Portugal); TWI (UK); University of Nottingham (UK).

About MOST-H2

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Widespread use of hydrogen as an energy carrier is a key priority for the EU. It is essential to achieve EU and national climate and energy transition targets. MOST-H2 works on an integrated multiscale lab-to-tank approach to develop, validate and demonstrate innovative, low cost, cryo-adsorptive hydrogen storage. It aims at developing monolithic Metal-Organic Framework (MOF) adsorbents with an optimal combination of volumetric and gravimetric capacity. The targeted materials can store hydrogen efficiently, will be easy and safe to transport, and have a small environmental footprint.

The project's main objective is to combine advanced synthetic and computational strategies in a cyclic materials development approach to create new high-performance, MOF adsorbents that are sustainable by design. This includes the development of novel monolithic MOF adsorbents with an optimal combination of volumetric and gravimetric H2 sorption capacity for efficient hydrogen storage. Furthermore, the project aims to upscale these optimal monolithic MOFs for integration into a newly designed cryo-adsorption storage tank, tested under realistic conditions.

The consortium is formed by 16 partners from 6 EU countries, Morocco and the UK: National Center for Scientific Research "Demokritos" (Greece), University of Crete (Greece), University of Le Mans (France), University of Erlangen (Germany), University of Alicante (Spain), Max-Planck Society (Germany), Mohammed VI Polytechnic University (Morocco), Laguens y Perez SL (Spain), Lapesa Grupo Empresarial SL (Spain), FEN Research GmbH (Austria), Italferr SPA (Italy), Greendelta GmbH (Germany), Steinbeis 2i GmbH (Germany), University of Cambridge (UK), Immaterial Ltd. (UK) and Hiden Isochema Ltd (UK).

About MOF2H2

MOF2H2 acronym stands for Metal Organic Framework for Hydrogen production by photocatalytic overall water splitting. The MOF2H2 project is a collaborative effort towards sustainable low carbon hydrogen production. With 8 partners in 4 countries and 3 M euros in funding from the EU Commission, our focus on developing efficient and scalable photocatalytic systems has the potential to transform the industry

The MOF2H2 project aims to improve the sun-to-hydrogen efficiency of Metal Organic Frameworks (MOFs) for overall water splitting under visible light. The project also seeks to gain an in-depth understanding of the photocatalytic performance of MOFs and establish a correlation between the structure and chemical features of MOFs. Additionally, the project aims to scale up the production of the two best MOFs through a sustainable route, and evaluate the long-term stability of these MOFs in operating conditions to achieve a Technology Readiness Level (TRL) of 4.

The consortium is formed by 9 partners from 4 EU countries and Israel: Ecole Supérieure de Physique et de Chimie Industrielles de la ville de Paris "ESPCI PARIS – PSL" (France), Universitat Politecnica de Valencia "UPV" (Spain), Centre National de la Recherche Scientifique "CNRS" (France), Université de Montpellier "UMON" (France), Université de Caen Normandie "UNICAEN" (France), Israel Institute of Technology "Technion" (Israel), Universiteir Maastricht "UMAA" (The netherlands), Euroquality (France) and The National Hellenic Research Foundation "NHRF" (Greece).

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About HySTrAm

The HySTrAm project will develop innovative solutions to produce 'green ammonia' from hydrogen at lower pressure, thereby making the process more efficient. These solutions will also aim to solve the energy challenges that Europe is facing today. In addition, this will strengthen the Europe's technological leadership, and create economic growth and jobs across the full European value chain.

HySTrAM project aims to build a plant at Technology Readiness Level (TRL5) which demonstrates a production process of green ammonia that is equally cost effective and commercially attractive. The system will test a combination of porous materials and reinforced pressure vessels that will demonstrate lower pressure alternatives for hydrogen storage and safer transport options.

Additionally, the use of ultra-porous materials and pressure vessels will facilitate stable operation parametres for the ammonia synthesis reactor. The employment of sorbents in the synthesis reactor will increase the ammonia conversion thus eliminating the need of the reactant recirculation. This is expected to improve the performance, efficiency and lifetime of the operating system, but also to unlock a descentralised ammonia (NH3) production plan.

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