MAST3RBOOST PROJECT ON THE VERGE OF BRINGING BREAKTHROUGHS TO ON-BOARD H_2 STORAGE

- MAST3RBoost makes significant progress in the development of Cryo-Adsorbed Hydrogen Storage (CAH_2) technologies in Europe, with the participation of 13 Partners from 9 European countries and South Africa.
- The collaboration of prestigious European institutions towards the development of key enabling technologies carried out so far in the MAST3RBoost project showcases excellence in cross-sectoral cooperation.

Madrid, Spain, XX May 2024 - MAST3RBoost, an initiative funded by the European Union, is working on the development of Cryo Adsorbed Hydrogen Storage (CAH_2) technologies and has achieved significant research breakthroughs through the collaboration of 13 partners from 9 European countries.

The project has gained a remarkable cohesion among the various institutions that make up the consortium. Particularly, partners Nanolayers (NANO), University of Nottingham (UoN), and TWI have established a solid foundation for the development of infrastructures for using machine learning techniques developing descriptors for activated carbon materials and identifying critical parameters for improving performance indicators.

Furthermore, collaboration between University of Nottingham (UoN), Consejo Superior de Investigaciones Científicas (CSIC), University of Pretoria (UP), Envirohemp (ENV), and the Council for Scientific and Industrial Research (CSIR) has enabled the development of protocols establishing scalable/standardized synthesis, interpretation of analytical data for reproducibility, and computational models for materials within the project framework.

Additionally, in the development of innovative hydrogen storage technologies, partners Council for Scientific and Industrial Research (CSIR) and Envirohemp (ENV) have made significant advances in the densification and scaling of ultra-porous materials from the MOF and carbon families. Through joint meetings and debates, they have addressed a wide range of challenges and achieved a significant milestone in the preparation of the first composite granulates, representing a significant step forward in the research of sustainable and advanced hydrogen storage technologies. The first multi-kg batches of the densified adsorbent materials are expected to be produced by the end of 2024 and early 2025.

Moreover, partners TWI, CIDETEC, and Leichtmetall Kompetenzzentrum Ranshofen (LKR) have devoted

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considerable work to generating test matrices and reviewing databases to validate materials for hydrogen storage tanks. In particular light weight materials, such as aluminium or magnesium alloys as well as aluminium based metal matrix composites are selected to maximize gravimetric storage capacity. Their contribution has been essential for the project, as the use of suitable materials is crucial to ensuring the safety and efficiency of hydrogen storage.

On the other hand, synergistic collaboration between SPIKE, EDAG, and LKR has enabled the development of vessel components and short-term hydrogen storage systems. The partners have worked closely together to ensure efficiency and safety in the production of vessel components and systems. CAD experts from the different partners have been actively contributing to the design of the vessel and heat exchanger. This resulted in a singular system geometry whose final design was frozen in early 2024. Manufacturing stages have started and will result in the production of the first prototype during Q4 of the current year.

These significant findings are complemented by the presentation of the Life Cycle Assessment (LCA) and Life Cycle Cost Analysis (LCCA) carried out by Contactica (CTA). This systematic evaluation approach will be crucial for assessing the cost-effectiveness and environmental performance of MAST3RBoost project products, providing a comprehensive picture of the project's approach to sustainable development and systemic assessment.

MAST3RBoost has the potential to produce major breakthroughs for on-board hydrogen storage. With each stage, the consortium demonstrates its commitment to developing disrupting and sustainable materials and components. The project's outcomes are expected to stand as a testament of the joint efforts currently ongoing.

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

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And Industrial Research (South Africa); Stellantis (old PSA Groupe) (Portugal); TWI (UK); University of Nottingham (UK).

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