

# PRESS RELEASE

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-----**BMBF Hydrogen Flagship Project H<sub>2</sub>Mare for Offshore Hydrogen Production**

## Storing hydrogen safely: Fraunhofer IWM evaluates materials for tubular storage systems

**Hydrogen has an important role to play in the energy transition. Science and industry are currently working on storage and transport systems for hydrogen. The basis for this is to precisely describe and assess the behavior of metallic materials, especially steels, when they are in contact with hydrogen. As part of the BMBF lead project H<sub>2</sub>Mare, the Fraunhofer IWM will develop and evaluate criteria for assessing materials and components for so-called tubular storage systems in the joint project H<sub>2</sub>Wind. The findings will contribute to the accident-proof and durable operation of a real storage infrastructure for hydrogen.**

To store hydrogen safely, materials such as steel must be able to consistently withstand the long-term effects of hydrogen. Above all, weld seams, which have a different structure to the base material, must not show any increased susceptibility to damage when in contact with hydrogen. The storage systems must be able to operate safely and reliably under mechanical, thermal, chemical and electromagnetic loads. To prevent uncontrolled material damage, it is important to evaluate materials and components with a view to accident safety and durability. "Our research and development work in our hydrogen laboratory aims to describe interactions of atomic or molecular hydrogen in contact with materials using experimental methods and theoretical models," explains Prof. Dr. Christian Elsässer, Scientific Coordinator for Future Topics at Fraunhofer IWM. "This enables us to provide a detailed mechanistic description of damage processes, a reliable evaluation of material and component behavior, and the derivation of design guidelines and lifetime predictions for components."

The Fraunhofer Institute for Mechanics of Materials IWM receives funding of around 800,000 euros from the BMBF. "Building on our diverse experience and know-how, we can thus make an important contribution to a safe hydrogen infrastructure," says Prof. Dr. Christian Elsässer.

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**Editorial notes****Julia Dannehl** | Phone +49 761 5142-561 | [julia.dannehl@iwm.fraunhofer.de](mailto:julia.dannehl@iwm.fraunhofer.de) | [www.iwm.fraunhofer.de](http://www.iwm.fraunhofer.de)

## Uniting knowledge

Together with seven expert partners from research and industry, the Fraunhofer IWM will spend the next four years focusing on high-performance and reliable materials in contact with hydrogen for sustainable and safe offshore hydrogen production.

The H<sub>2</sub>Mare flagship project aims to establish a whole new type of turbine at sea in the future – a solution which optimally integrates an electrolyzer into an offshore wind turbine for direct conversion of the electricity. In addition, the project will also investigate further offshore power-to-X processes. A total of 35 partners and 2 associated partners are involved in H<sub>2</sub>Mare. The BMBF is funding the project from 01.04.2021 to 31.03.2025 with over 100 million euros.

H<sub>2</sub>Mare is one of three flagship projects being conducted by the German Federal Ministry of Education and Research, which is supporting Germany's entry into the hydrogen economy with its largest initiative regarding the energy transition to date. The three hydrogen flagship projects H<sub>2</sub>Giga, H<sub>2</sub>Mare, and TransHyDE are the result of an ideas competition and represent a central contribution on the part of the BMBF to the implementation of the National Hydrogen Strategy.

They are intended to remove existing hurdles impeding Germany's entry into a hydrogen economy over the next four years. The goals of the projects are the serial production of large-scale water electrolyzers (H<sub>2</sub>Giga), the production of hydrogen and downstream products at sea (H<sub>2</sub>Mare), and the development of technologies for the transport of hydrogen (TransHyDE).

## About the Hydrogen flagship projects

More than 240 partners from science and industry are working together on the three hydrogen flagship projects, which were launched on the basis of non-binding funding promises in the spring. In total, the funding will amount up to €740 million.

[Hydrogen research at the Fraunhofer IWM](#)

[Flagship project H<sub>2</sub>Mare](#)

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Wind turbines at sea generate significantly more regular electricity than their onshore counterparts: H<sub>2</sub>Mare wants to exploit this potential to produce hydrogen and hydrogen derivatives using this technology. (© Projektträger Jülich)



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**Fraunhofer IWM – Making intelligent use of materials**

- We make the mechanisms and processes in materials and material systems manageable by first assessing and describing them as models. This provides the potential to extract greater performance and efficiency from technical systems.
- We measure materials down to their atomic structures and influence the interactions. This enables us to modify material properties to meet requirements and achieve new functionalities.
- We scrutinize material systems and manufacturing processes and this knowledge is transferred into reliable products and technologies. Together with our partners from the fields of science and business, we develop innovations with a competitive edge.

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The **Fraunhofer-Gesellschaft**, headquartered in Germany, is the world's leading applied research organization. Fraunhofer plays a central role in the innovation process. As a pioneer and catalyst for groundbreaking developments and scientific excellence, Fraunhofer helps shape society now and in the future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 75 institutes and research institutions throughout Germany. The majority of the organization's 29,000 employees are qualified scientists and engineers, who work with an annual research budget of 2.8 billion euros. Of this sum, 2.4 billion euros is generated through contract research.

**Further Contacts****Prof. Dr. Christian Elsässer** | Phone +49 761 5142-286 | christian.elsaesser@iwm.fraunhofer.de**Sabine Dues** | Phone +49 761 5142-440 | sabine.dues@iwm.fraunhofer.deFraunhofer Institute for Mechanics of Materials IWM | [www.iwm.fraunhofer.de/en](http://www.iwm.fraunhofer.de/en)