HYPER
ELECTRIFIED CHEMISTRY

Newsletter

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An electrochemically produced oxidiser for modular, onsite generation of HYdrogen PERoxide

HYPER's world class consortium aims to transform hydrogen peroxide (H_2O_2) production from a large-scale, energy intensive chemical process to a small-scale on-site production, through electrifying the chemical production of H_2O_2.

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1. Coordinator's update

I am very pleased with and impressed by the consortium's efforts in reaching a major project milestone, namely the completion and deployment of the TRL 4-5 mini-plant (see below). Achieving a fully functional system that performs as expected is a significant accomplishment for any project. The unveiling of the mini-plant at the most recent consortium meeting last month clearly demonstrated the partners' strong engagement and shared satisfaction with this achievement. The electrolyser output exceeds the TRL 6 persulfate production KPI defined at the start of the project. The mini-plant is now back "home" at our partner JSI in Slovenia, for further optimisation and expansion to the TRL 6 demonstration unit that is expected to be operational the second half of 2026.

In addition to the operative mini-plant, updated techno-economic analyses indicate that a competitive price for our e-H2O2 is much more within reach than determined in earlier analyses. This improvement, together with much better life cycle assessments, reinforce our belief that the project is on the right path. The anticipated process and design improvements that will be implemented to the mini-plant for the TRL 6 demo will hopefully confirm these more optimistic analyses of the HYPER technology.

The project has also published its first article, a review article on alternative H2O2 production processes, with focus on the techno-economic and life cycle assessments of these processes. More details are provided below. Several other publications are in the pipeline, and more information on these results will be forthcoming in early 2026.

The project's 2nd Reporting Period ends in a couple weeks, and our Review Meeting with the Commission services is late January. Hopefully the Commission will be as pleased with project progress as we are.

Figure 1. Consortium meeting #7 in Hradec Kralove, Czech Republic.
Photo by: ETA-Florence Renewable Energies.

2. Second project milestone achieved: TRL 4/5 mini-plant now operational

By developing a modular, fully electrochemical pathway for decentralised H_2O_2 production, the consortium is paving a new, sustainable direction for the industry.
Through the combined R&D efforts of all partners, the design and construction of the TRL 4/5 pilot unit have been successfully completed. Its delivery, installation, and start-up at the project's textile partner, InoTex in the Czech Republic, mark a pivotal validation of both the core electrochemistry and the process engineering behind the concept.
This operational plant is more than a technical achievement, it is a crucial step on the path toward the TRL 6 demonstration planned for 2026, bringing decentralised, green H_2O_2 production closer to industrial reality.
More details on the pilot plant's operational features can be found in the Second "Insights" Article, now available on LinkedIn.
Link to the article.

Figure 2. HYPER TRL 4/5 mini-plant at InoTex facility in Dvůr Králové.
Photo by: ETA-Florence Renewable Energies.

3. Joint webinar coming soon

Together with the Horizon Europe project ELOXYCHEM, work is underway on a new joint webinar series, with the inaugural online event scheduled for 4 February 2026.
The webinar is designed for industrial professionals, chemists, electrochemists, and experts in sustainable chemical processes. Its aim is to gather participants from both scientific and industrial backgrounds, fostering discussions that are technically robust yet accessible, ensuring broad engagement with the latest developments in the field.
Speakers from other European projects and from the industry will also provide contributions, offering valuable insights into the green electrochemical production of chemicals.

4. First project article available open-access

The HYPER project has recently published its first peer-reviewed article in ACS Omega, providing a comprehensive review of alternative hydrogen peroxide (H_2O_2) production routes beyond the conventional anthraquinone (AO) process. The article offers an up-to-date overview of thermochemical, electrochemical, bioelectrochemical, and plasma-based technologies, with a particular focus on their energy performance, techno-economic viability, environmental footprint, and safety considerations. While the AO process remains the industrial benchmark, the review highlights its significant climate impact, largely driven by fossil-fuel-based hydrogen and energy use, and outlines how electrified alternatives could enable more sustainable and flexible H_2O_2 production in the future. Importantly, the paper emphasizes that many emerging technologies remain at low technology readiness levels, with key challenges related to scalability, cost, energy efficiency, and long-term stability still to be addressed. Nevertheless, the authors underline the strong potential of modular, on-demand H_2O_2 production concepts, particularly when coupled with renewable electricity, as a promising pathway for reducing emissions and avoiding transport and storage constraints. This publication lays a solid foundation for the HYPER project's experimental and demonstration activities, with further results expected as the project progresses toward higher TRL validation.

Theofanidis, S.A.; Georgiadis, A. G.; Hop, C. J. W.; Yu, X.; Yfanti, V.L.; Fayet, G.; Villemur, C.; Vleeming, H.; Delikonstantis, E.; Heyn, R. H. Alternative H_2O_2 Production Processes: An Outlook on Candidate Technologies Beyond the Anthraquinone Process. ACS Omega 2025, Article ASAP. DOI: 10.1021/acsomega.5c07503

5. Recent events and meetings

The HYPER consortium has been busy presenting the project around Europe at different conferences, as well as coming together in Hradec Kralove, Czech Republic, for the seventh in-person consortium meeting. A summary of recent events is provided herein:

M32 Consortium meeting - Partners gathered to discuss the latest project developments and progress across the different work packages, in Hradec Kralove, Czech Republic, in November 2025. The second meeting day was dedicated to a visit to the InoTex industrial plant with the opportunity to see the TRL 4/5 pilot plant in full operation and witness the successful bleaching performance of the electrochemically produced hydrogen peroxide on textiles.

STYL International Fashion Fair, 22-24 August 2025 - The Horizon Europe project was presented at the STYL International Fashion Fair at the Brno Exhibition Centre in the Czech Republic. Partners from InoTex showcased

the project to numerous professionals from the fashion industry, highlighting its objectives within the Horizon Europe framework.

Annual Chemical Days, 17-19 September 2025 - The HYPER Horizon Europe project was also featured at the Annual Chemical Days in Slovenia where partners from HELIOS RESINS highlighted the project during their presentations.

Figure 3. HYPER partners from InoTex and First Lady of Czech Republic at STYL 2025.
Photo by: Jan Marek (InoTex).

TEXCHEM-RegioTEX, 23 October 2025 - HYPER partners from the National Institute of Chemistry and InoTex contributed to the scientific program. The presentation, titled "HYPER: An Electrochemically Produced Oxidiser for Modular Onsite Generation of Hydrogen Peroxide (H_2O_2)", introduced the project's innovative approach to developing electrochemical conversion routes for sustainable chemical production.

Figure 4. Project presentation by David Zorko, HELIOS RESINS, at the Annual Chemical Days 2025, Slovenia.
Photo by: Martin Ocepek (HELIOS RESINS)

For more information visit our HYPER website, LinkedIn page and YouTube channel.

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PROJECT PARTNERS

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