HYPER
ELECTRIFIED CHEMISTRY

Newsletter

Issue 2 / April 2024

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.

CONTENTS

1. Project update from the Coordinator

The HYPER project is nearly 1/3 completed and the first Periodic Reporting period with accompanying Review Meeting with the European Commission is only months away. I continue to be impressed with the engagement of all the partners in the project and their commitment to achieving project goals.

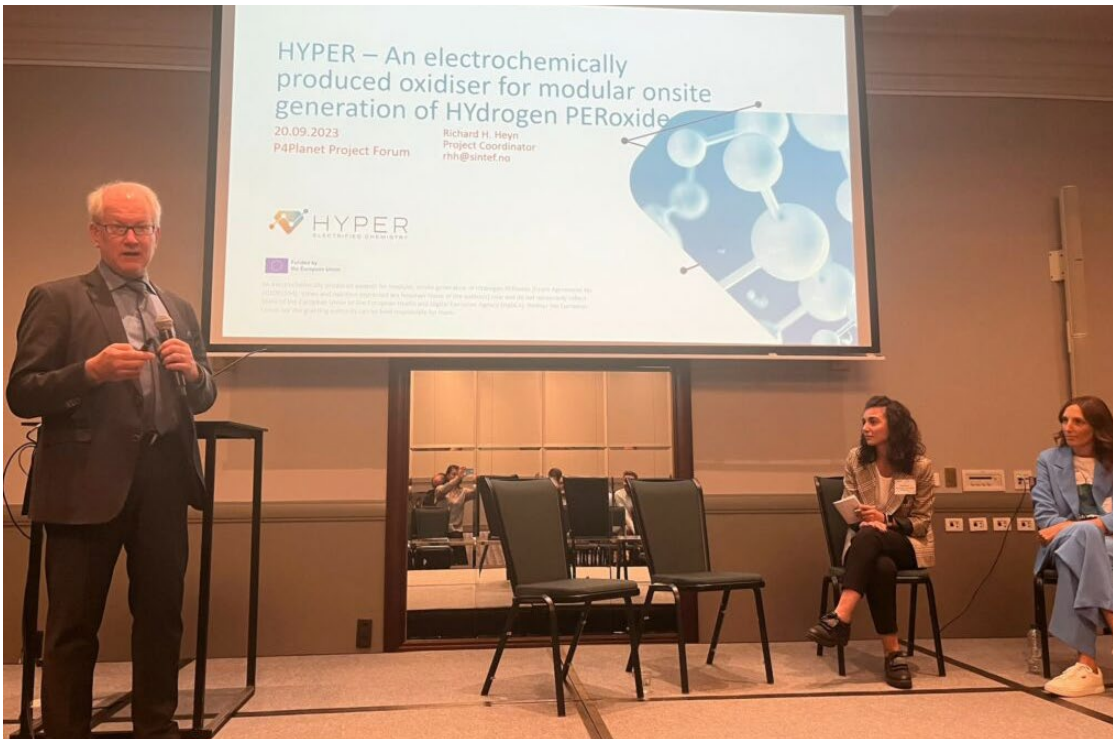
As described elsewhere in this Newsletter, the project welcomed a new affiliated entity into the project, Belinka Perkemija, a sister company of project partner Helios. Belinka Perkemija is one of eight European hydrogen peroxide producers, and their expertise will be invaluable for realization of the TRL 6 HYPER hydrogen peroxide unit that will be placed on Belinka Perkemija's site in Slovenia.

Progress on the development of both the electrolyser (electrochemical production of persulfate) and utilizer (hydrolysis of persulfate to hydrogen peroxide) is continuing apace and fully within project planning. Our

1 - Consortium photo in Breda

end-user partners are continuing their work on implementation of the HYPER technology in their sectors, and our techno-economic, life cycle analysis and safety team is meeting regularly to ensure that the HYPER technology is competitive, climate neutral and safe to operate.
In the coming months, the initial Deliverables on all these aspects will be written, and these Deliverables will allow the project to get its first indications of the progress toward its Key Performance Indicators. The upcoming consortium meeting at the end of May in Luxembourg will be a natural setting to take stock of the project and ensure the planned pathway to the project goals is correct.

Richard H. Heyn, Chief Research Scientist, SINTEF Industry



2 - Richard H. Heyn, Chief Research Scientist, SINTEF Industry

2. First project milestone achieved

The first milestone of the project "Selection of cathodic reactions relevant for each downstream industry" is a list of viable cathodic reactions including operational parameters. This milestone has now been achieved with a preferred cathodic reaction defined for each of the downstream industries in collaboration with the industry partners.

The cathode process research will be split into low-risk and high-risk workflows, with the low-risk workflow being a readily achievable reaction for a useful industrial product that will ensure timely development of the entire HYPER process and the high-risk workflow covering more ambitious use cases for process intensification within the downstream industries.

3. New project associate partner Belinka Perkemija

Project HYPER welcomes Belinka Perkemija as a new associate partner to the team. Belinka is based in Ljubljana, Slovenia.
On 11 – 12 July, Belinka Perkemija https://www.belinka-perkemija.com/, hosted a three-day educational visit for Emina Kapić and dr. Brigita Hočevar, representatives from project partners NIC, at the Ljubljana, Slovenia site. During the visit, the guests were educated on the conventional process for the production of H_2O_2 and the analytics used for H_2O_2 detection and quantification.

This field visit was important for HYPERs research development because a goal of the project is to obtain hydrogen peroxide in an environmentally friendly way, in an industrial environment, therefore the conventional process should be studied in order to improve upon it.

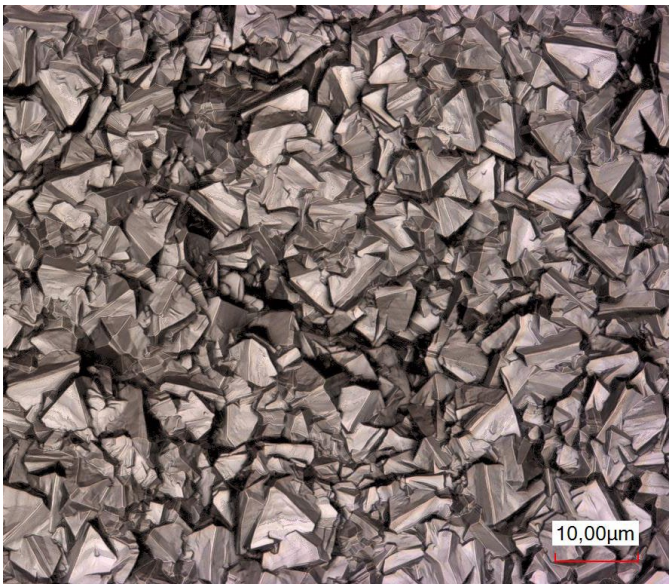
The project plans to build a pilot plant for the electrochemical production of hydrogen peroxide at the Belinka Perkemija site.

3 - Field visit to Belinka.
Belinka Perkemija plant. left to right; Darko Horvat (Belinka Perkemija), Darja Koklič (Belinka Perkemija), Emina Kapić (NIC), Brigita Hočevar (NIC), Matija Mencinger (Belinka Perkemija), Andrej Podkoritnik (Belinka Perkemija).

4. DIACHEM® electrode ready for commissioning

The DIACHEM® electrode, one of the technological core elements of the electrolyser unit, has been custom designed in cooperation with HYPER partner EUT and has been produced by CONDIAS.
The process involved several pretreatment steps to prepare a suitable metal-based substrate for HF-CVD coating.
Onto the substrate the conductive and highly chemically resistant boron-doped diamond (BDD) coating was applied in CONDIAS' proprietary HF-CVD systems.
The finished DIACHEM® electrode has been provided to EUT, where it will be integrated as anode into the prototype electrolysis cell, that – like the DIACHEM® electrode – has been specifically developed for the HYPER project. Due to the unique electrochemical properties of the DIACHEM® electrode, it will serve its purpose in selectively producing persulfate as the first step of the HYPER-process for sustainable H_2O_2 production.

The image is an LSM-shot (Laser Scanning Microscope) of the electrodes diamond layer. To the human eye the electrode appears to be mat-black in colour.



4 - Photo: LSM image of the electrode's diamond layer.

5. Recent events and meetings

The HYPER project team has been busy presenting the project around Europe at different conferences, as well as finding coming together in Breda, Netherlands, for the second in-person consortium meeting. A Summary is provided herein:

- **M11 Consortium meeting** – The second in-person project meeting was held on 29-30th November 2023, in Breda, Netherlands, hosted by project partner, Process Design Center. The meeting lasted for a full two days wrapping up the first year of research and setting out plans for the following years.

- **55th TEXCHEM- RegioTEX** - INOTEX actively participated at 55th TEXCHEM- RegioTEX annual conference, 09-10 Nov 2023 (Hradec Králové, Czech Rep), making four oral presentations, and disseminating the HYPER leaflet. This international conference hosted more than 70 participants from around the world.

- **INOTEX** at **IFATCC** - On 13-14 Oct 2023 HYPER partners, INOTEX, participated at the XXVIth IFATCC International Congress in Augsburg, Germany (IFATCC – International Federation of Associations of Textile Chemists and Colourist) with the subject: 'A Paradigm Shift in the Global Textile Industry: Economy meets Ecology'.

- **Processes4Planet Projects Forum 2023** - On 20 September 2023, project coordinator, Richard Heyn, SINTEF, presented HYPER project at the Processes4Planet Projects Forum, held in Brussels. This was an opportunity for the 27 Processess4Planet projects that were funded in 2021-2022 to come together, network, and introduce the projects not only to each other, but also to external stakeholders, including European Commission representatives.

5 - INOTEX presenting at IFATCC

HYPER ELECTRIFIED CHEMISTRY

PROJECT PARTNERS

HYPER is a project funded by Horizon Europe, the EU Framework Programme for Research and Innovation, starting on 1st January 2023 and lasting for four years, with a budget of approximately €7 million.

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