

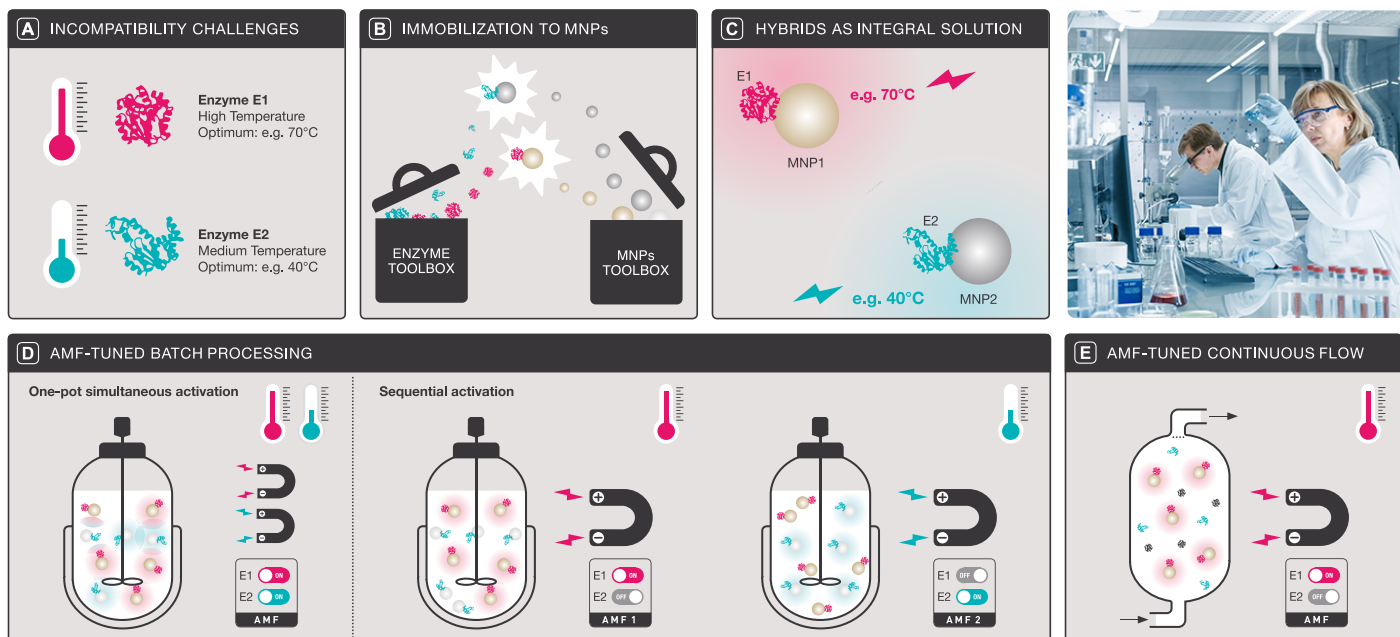
Fourth HOTZYMES Newsletter

Welcome to our fourth and final newsletter of the H2020-FETOPEN project HOTZYMES. We are approaching the end of this outstanding and interesting project and are happy to collectively present you the highlights of this exciting project period.

Finally, in the year 2022 the Corona pandemic has allowed to participate at conferences and events in person again!

Therefore, we are happy to show you some pictures from conferences visited by our consortium members.

We wish you a pleasant read



HOTZYMES OPENED A PATH TO THE EFFICIENT IMPLEMENTATION OF COMPLEX BIOTRANSFORMATIONS FOR PRODUCING FROM HIGH-COST PHARMACEUTICALS TO LOW-COST BIOCOMMODITIES.

CHALLENGES

HOTZYMES relied on the use of multi-enzymatic processes, which are considered a promising biomanufacturing platform. However, several challenges needed to be solved – from cross reactivity found in enzyme cascades over enzyme inactivation or inhibition at unsuitable temperature (A) to finding the optimal reaction conditions without negatively impacting on the stability of products and cofactors.

AIM

Under the effect of an alternating external magnetic field (AMF), the magnetic moments of MNPs are quickly reoriented so that changes in the frequency and strength of the magnetic field lead to a power dissipation that heats the surrounding environment. Indeed, the fact that in a matter of seconds it is possible to turn ON/OFF this localized heating triggered by AMF in a localized spot without raising the global temperature of the reaction media, represents a great opportunity to achieve the activation of the enzyme of interest preserving thermolabile products/co-factor, or even implement well-coordinated one-pot biocatalytic cascades (A). Thus, targeted enzymes involved in bioprocess of industrial interest are coupled to MNPs (B). To ensure easy separation, re-utilization and integration into bioreactors, these conjugates are integrated within hybrid materials (C). Specially designed AMF bioreactors allow batch processes in which the enzymes can be activated either simultaneously or sequentially (D) by the usage of different alternate AMF conditions. This remote-enzyme activation concept could also be applied to continuous flow process (E).

MAIN ACHIEVEMENTS

Our consortium members were able to show that the use of contactless magnetic heating for the regulation of enzyme activity does not have to be restricted to the use of a single monodisperse population of MNPs with a homogeneous heating capacity. Indeed, the generation of multiple local temperatures in a single-pot reactor by mixing different MNPs in suspension was shown by determining the specific local temperature induced in the surface of each set of MNPs (Nano Lett. 2021, 21(17), 7213; EP21382585 patent). Thus, for the first time, it was shown that depending on the MNPs that are combined in suspension, it is not only possible to simultaneously trigger hotspots with different local temperatures by applying a specific AMF condition but can also result in selective and independent heating of MNPs by applying AMFs of differing amplitude and frequency. These results open the gate to the development of single pot multi-enzymatic reactions operating simultaneously at different optimal temperatures or, alternatively, to the sequential activation of multi-enzymatic cascades by exploiting the versatility of MNPs as nanoheaters. Indeed, a new patent is being prepared with the results obtained by our partners focused on the preparation of hybrid materials for activating enzymes using AMF heating. Finally, a pilot-scale AMF reactor prototype was designed to get one major step closer to the industrial applications of our "HOTZYMES".

Further information on
www.hotzymes.eu



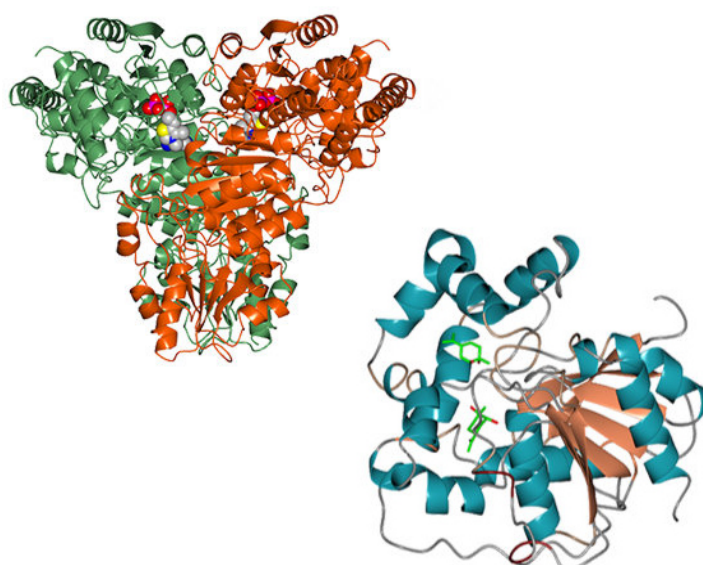
3RD ANNUAL MEETING

The third annual meeting of our FETOPEN project HOTZYMES, held on 18th of March 2022, was a great success. The HOTZYMES consortium, consisting of 7 partners of 4 European countries, continued to meet online. Additionally the webinar on Nanotoxicity was organized by the consortium. It was a great success and many collaborators participated in this satellite event. The final project event “Emerging Technologies on Biocatalysis”, a satellite workshop of the Austrian Days of Chemistry (GÖCH Chemietage), will be held as a mini-Symposium in person again. We are all looking forward to this great event (see News and Announcements).

ESAB – EUROPEAN SOCIETY OF APPLIED BIOCATALYSIS

Our Expert Advisory Board (EAB) member Roland Wohlge-muth and Jennifer Littlechild, Professor of Biological Chemistry at the University of Exeter, organized the ESAB Webinar, which took place on the 27th of May. The topic was selected to be Biocatalytic Total Synthesis. Excellent lectures were presented by Harry Atomi, Benke Hong, Yong Wang and Jason Micklefield and the topic will be continued in future ESAB webinars.

[For more details and upcoming events click here.](#)





EIC Women Leadership Programme 2022 – Kick-off Meeting

EIC WOMEN LEADERSHIP PROGRAMME (2nd COHORT)

Valeria Grazú from CSIC, coordinator of the FET Open project HOTZYMES, was selected to participate in the 2nd cohort EIC Women Leadership program that is organized by the European Innovation Council (EIC) and will take place between May and October 2022. She is one of 83 females that have been selected among entrepreneurs and researchers that are members of projects funded by the EIC.

The EIC WLP aims to support, inspire, and empower EIC female researchers and entrepreneurs. With that in mind, the 2nd cohort of the program is meant to provide a set of training and networking events, as well as business coaching and mentoring opportunities for career development. [Here you can find more information about the program.](#)

DIE BIOTEXPERTEN PODCAST: GUTES ARBEITSKLIMA FÜR ENZYME

Our team member Dörte Rother from FZ Jülich is talking about HOTZYMES in the acib GmbH Podcast “Die Biotech-Experten”. The Podcast was recorded in German language, so for all German speakers we hope you enjoy listening to Dörte’s explanations about enzymes, their use in biotechnology and her personal experiences in her role as a scientist with three kids at home.

[Klick here](#)



Photo: Sascha Kreklau / FZ Jülich

2ND GLOBAL VIRTUAL SUMMIT ON CATALYSIS & CHEMICAL ENGINEERING

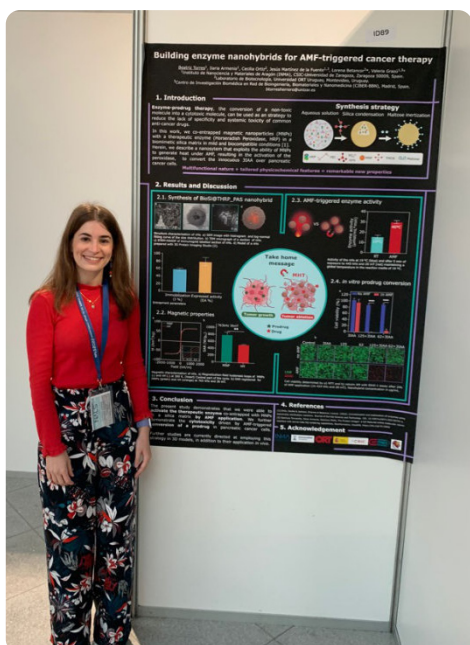
Our HOTZYMES coordinator and senior scientist Valeria Grazú from CSIC in Zaragoza was invited to talk about “Thermal-tuning of one-pot multienzymatic cascades by nanoactuation” at the 2nd global summit on catalysis & chemical engineering, which took place from between 14th to 16th of March. This virtual meeting was a unique platform for exchanging innovative research and ideas related to Chemical Engineering. The first Chemical Catalyst 2021 meeting, the first global virtual summit, enabled participants to learn and explore diverse research topics from the Catalyst domain even in the tough and testing pandemic scenario.

<https://catalysisconference.mindauthors.com/march-2022/>

3RD INTERNATIONAL CONFERENCE ON NANOMATERIALS APPLIED TO LIFE SCIENCES 2022 (NALS 2022)

Beatriz Torres and Puerto Morales from ICMM/CSIC presented results of HOTZYMES at the NALS 2022. Exciting topics from nanotoxicity to biosensors and intelligent nanomaterials have been discussed. The conference was organized by the University of Cantabria and the Institute Valdecilla-IDIVAL and held in the Excellence Campus of Universidad de Cantabria in Santander (Spain) from 27th to 29th of April 2022.

<https://nalsconferences.com/>



Beatriz Torres, Poster "Building enzyme nanohybrids for AMF-triggered cancer therapy"



Puerto Morales talks about "Magnetic nanoparticles for the control of multi-enzymatic reactions"

ADVANCED MATERIALS AND DEVICES FOR NANOMEDICINE-AMA4MED

The conference was held online from the 3rd to the 4th of May and was dealing with nanotechnology in nanomedicine as an innovative solution to address unmet medical needs, i.e. pharmaceutical agent's efficacy and selectivity, decrease of their toxicity and off-target effect, rapid diagnostics, disease monitoring and management, and personalized health care. Two of our HOTZYMES members, Beatriz Torres and Valeria Grazú, from CSIC in Zaragoza participated and were very successful: Beatrice won the 1st Prize for her poster "Building enzyme nanohybrids for AMF-triggered cancer therapy" and Valeria Grazú held a great talk about "Nanoactuators for cancer therapy".

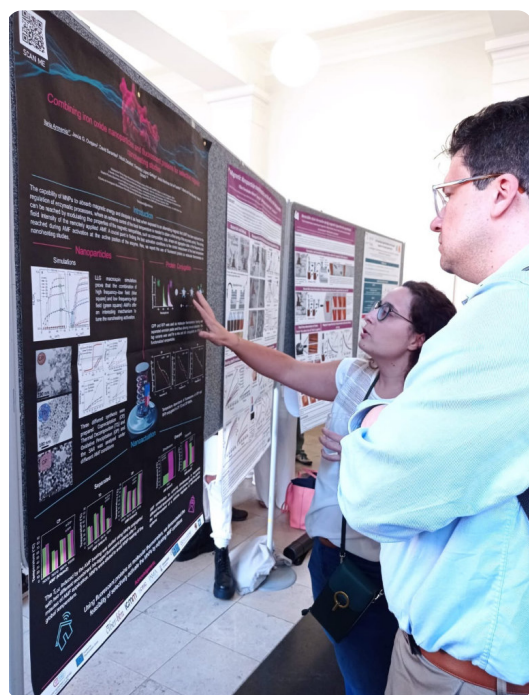
<https://www.isasi.cnr.it/en/advanced-materials-and-devices-for-nanomedicine-ama4med/>



13TH INTERNATIONAL MAGNETIC CARRIER MEETING 2022 IN LONDON, UK

To bring together scientists from chemistry, physics, medicine, biology, engineering and materials sciences and discuss recent results of magnetic particles of nano- and micro-sized dimensions and their applicability, this conference was held from 14th to 17th of June and organized by the University College London (UCL). Our HOTZYMES member Ilaria Armenia from CSIC in Zaragoza participated at this notable conference and presented her poster "Combining Iron Oxide Nanoparticles And Fluorescent Protein For Selective Magnetic Nanoheating Studies".

<http://magneticmicrosphere.com/meeting-thirteenth>



10TH INTERNATIONAL CONGRESS ON BIOCATALYSIS

This important conference took place from 28th of August to 1st of September in Hamburg and focused on biocatalysis as one of the key technologies to overcome future challenges in food supply, health, energy and the environment, i.e. the transition from fossil to a biobased circular economy. Our HOTZYMES members Eduardo Melo and Dörte Rother both participated. Eduardo presented a poster and Dörte participated as an invited speaker.

<https://www.biocat-conference.de/>

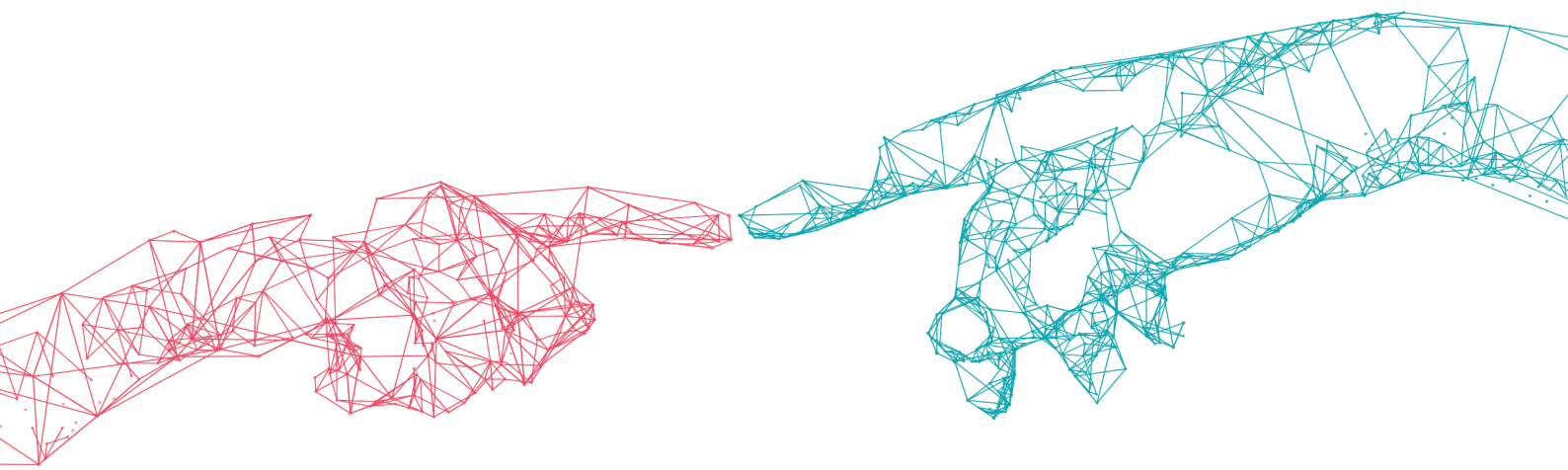


HOTZYMES PUBLICATION IN THE SCIENTIFIC JOURNAL NANOSCALE ADVANCES

Our HOTZYMES members Marina Borgese, Frederica Gamberoni, Rosalba Gornati, Giovanni Bernardini and Roberto Papait from Insubria University contributed to a review article with the first authors from the Humanitas University in Pieve Emanuele (Italy) – The Yin and Yang of epigenetics in the field of nanoparticles. In this review they analyzed two aspects of epigenetics in the field of nanoparticles: 1. The role of epigenetics in mediating nanotoxicity and 2. The possibility of using nanoparticles for delivery of “epi-drugs” to overcome their limitations.

Link to the publication:

<https://pubs.rsc.org/en/content/articlehtml/2022/na/d1na00682g>



STAY TUNED

to check more publications from HOTZYMES as several articles, book chapters and review articles are currently under peer review. Visit our Zenodo#HOTZYMES community to find all publications derived from our project:

<https://zenodo.org/communities/hotzymes/>



MINI-SYMPOSIUM IN VIENNA CHEMIETAGE 2022 (GÖCH)

The final project meeting is organized by acib GmbH as a satellite event of the Austrian days of Chemistry (Chemietage 2022 - GÖCH) in Vienna about “Emerging Technologies in Biocatalysis” on the 19th of September from 2:00 to 6:00 pm (CEST). We will discuss the potential of nano-materials for use in (bio)catalysis, current challenges and needs in biocatalysis and present related projects and start-ups.

Participation in the satellite is for free and the registration is open now, [klick here](#).



14th – 16th NOVEMBER 2022
GRAZ, AUSTRIA

ESIB CONFERENCE

The European Summit of Industrial Biotechnology (esib) is organized by acib GmbH and takes place from 14th to 16th November 2022 in Graz, Austria. The conference not only covers science but also focusses on industrial needs and hopes, economic demands, funding resources or political aspirations and still leaves space for networking and recreation. Topics to be discussed range from Trends in Biopharma, Bioeconomy and Policy to enzymatic decomposition of plastics and Clean Meat production. The registration is open now, [klick here!](#)



ESAB WEBINARS

We would like to encourage your participation in the webinars organized by the European Society of Applied Biocatalysis (ESAB). ESAB is chaired by our Expert Advisory Board (EAB) member Prof. Dr. Roland Wohlgemuth. Check the list of upcoming webinars at: www.esabweb.org

More Info & News

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