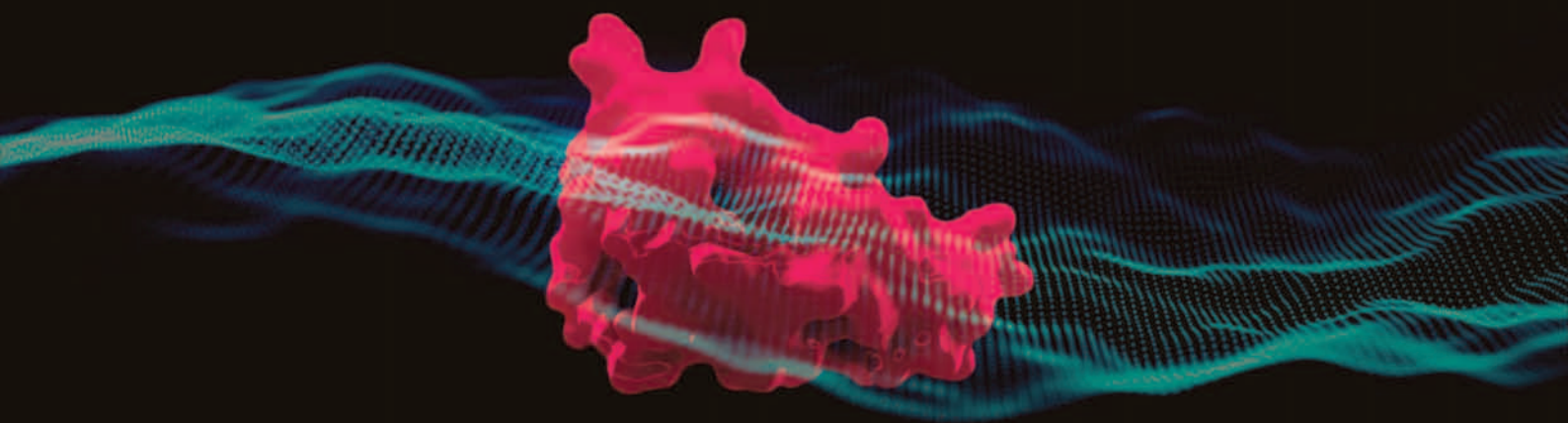
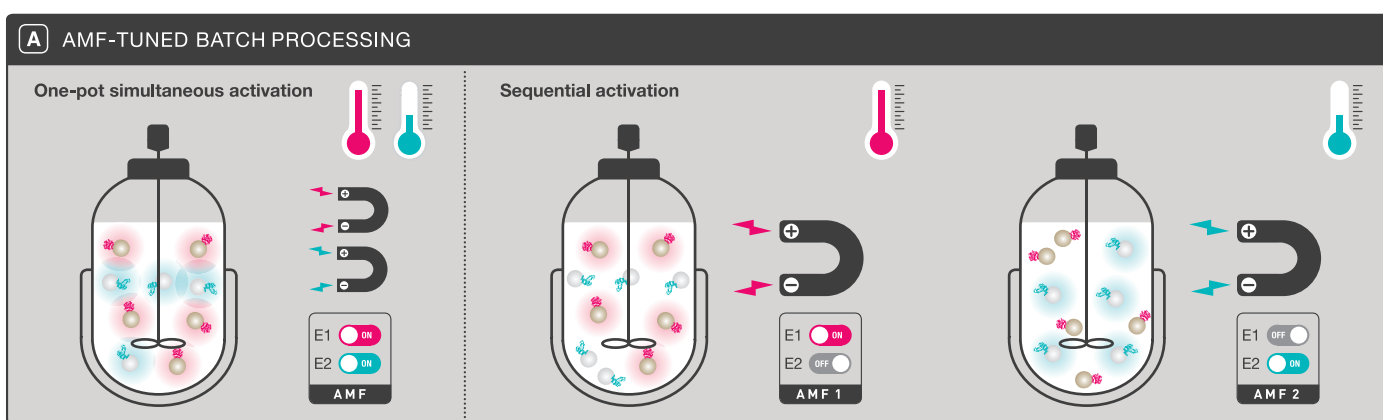
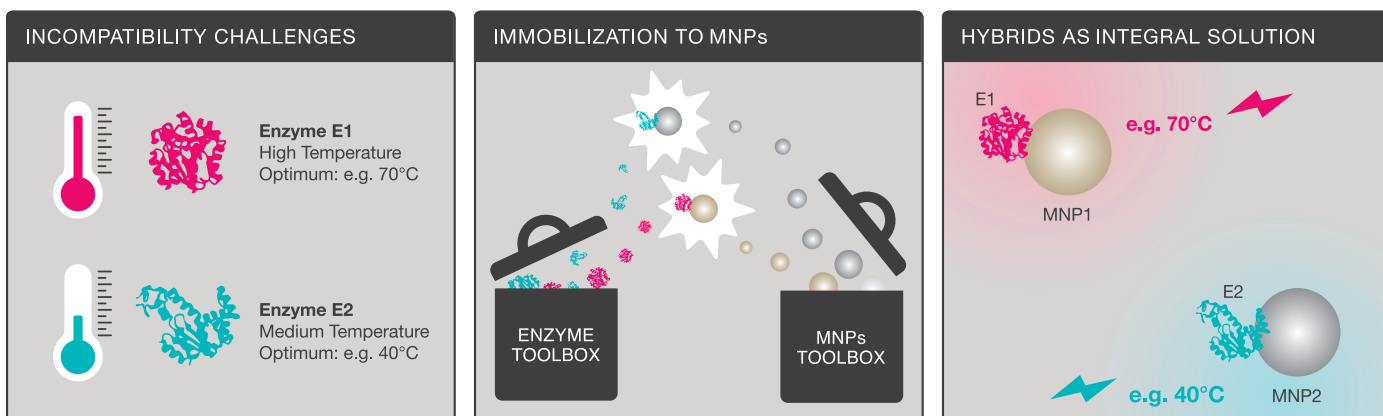


# HOT NEWS NO. 1



## Development of Enzymatic Cascades in well-coordinated One-Pot-Systems

Welcome to our first newsletter of the H2020-FETOPEN project HOTZYMES. We are happy to present news from our networking activities, project highlights and upcoming events in the field of biocatalysis. We wish you a pleasant read!

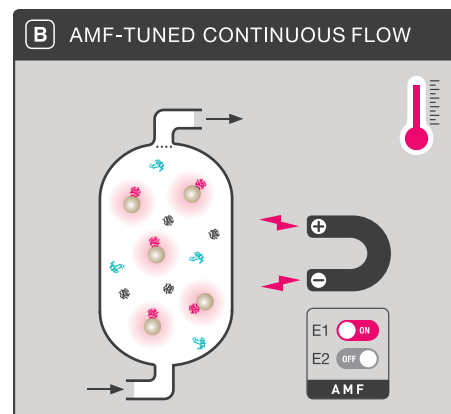


To enable the optimal temperature conditions for each reaction in a multi-step-scheme, HOTZYMES couples enzymes to magnetic nanoparticles that are controllable at nano-scale locally. Using magnetic heating, functional control over different enzymes will be exerted. This will be enabled by an immobilisation of enzymes on magnetic particles, which are exposed to an alternating magnetic field. Due to molecular movement, a desired micro-temperature can be created at the outer layer of the particle, where the catalysts are going to be attached. To ensure an easy separation, re-utilization and integration into bioreactors, these conjugates will be integrated within porous microparticles.

To meet this technological break-through, a new generation of magnetic bioreactors specific to the field of biocatalysis will be designed.

HOTZYMES aims to enhance the biotechnological production of pharmaceutical and biocommodities. The use of multi-enzymatic processes is considered a promising biomanufacturing platform, although several challenges need to be solved – from cross reactivity found in enzyme cascades over enzyme inactivation or inhibition at unsuitable temperature to finding the optimal reaction conditions.

*The EU-project HOTZYMES is funded in the frame of the H2020-FETOPEN-2018-2020 call. It consists of a multidisciplinary consortium of 7 partners from four european countries, who implement the project with a budget of 3 million Euro.*



Further information on [www.hotzymes.eu](http://www.hotzymes.eu)



## KICK-OFF MEETING IN SARAGOZA

On 10<sup>th</sup> and 11<sup>th</sup> of April, the multidisciplinary HOTZYMES consortium consisting of 7 partners of 4 European countries met in Saragoza (Spain) for the Kick-off meeting, focused on the project goal of fabricating a new generation of magnetic bioreactors to allow the control of enzyme activity and a biotechnological production of pharmaceuticals and biocommodities.



## BIOTRANS JUNIOR AWARD

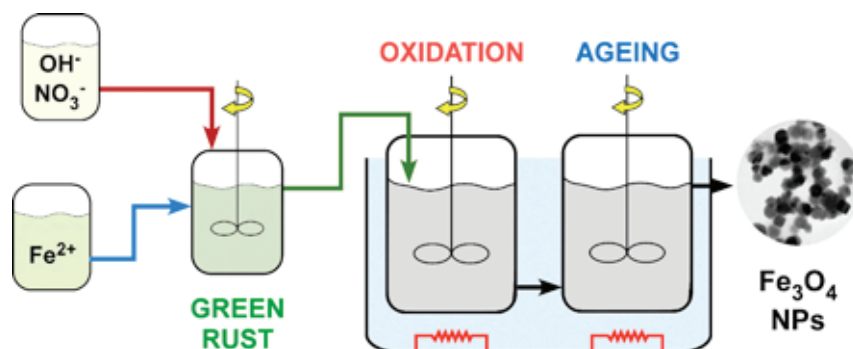
A great success for our HOTZYMES partner, Forschungszentrum Jülich: Dörte Rother participated in the 14<sup>th</sup> International Symposium on Biocatalysis and Biotransformations (Biotrans) which was held on July 7<sup>th</sup> - 11<sup>th</sup> 2019 in Groningen, Netherlands and was awarded for outstanding achievements in this field with the “Biotrans Junior Award 2019”. About 700 participants exchanged their knowledge and discussed scientific questions in the field of biocatalysis. Two of them were Dörte Rother and PostDoc researcher Eduardo Melo who introduced HOTZYMES during a poster presentation at the event.



## SEBIOT-PRIZE

Fernando López Gallego from CIC biomaGUNE was awarded with the Young researcher award in biotechnology granted by the Spanish Biotechnology society (SEBiot). The prize ceremony took place last July 2019 in Vigo during the celebration of the Nation biotechnology conference-BIOTEC 2019. The awardee gave an invited lecture explaining his most relevant advances during his career.





## CONTINUOUS PRODUCTION OF MAGNETIC IRON OXIDE NANOCRYSTALS BY OXIDATIVE PRECIPITATION

The paper „Continuous production of magnetic iron oxide nanocrystals by oxidative precipitation“ was published in the Chemical Engineering Journal in February 2020.

It illustrates the production of magnetite nanoparticles by oxidative precipitation in aqueous media, following a continuous approach that offers additional advantages when reproducible and scalable industrial procedures are needed. As a proof of concept, obtained nanoparticles were evaluated according to their magnetic response as potential magnetic hyperthermia agents indicating significant improvement of heating efficiency that goes up to 1.5-2 kW/gFe<sub>3</sub>O<sub>4</sub> for both smaller (~40 nm) and larger (~200 nm) particles.

Link to the publication:

<https://www.sciencedirect.com/science/article/pii/S1385894720305842#>

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## IRON NANOPARTICLE BIO-INTERACTIONS EVALUATED IN XENOPUS LAEVIS EMBRYOS, A MODEL FOR STUDYING THE SAFETY OF INGESTED NANOPARTICLES

The paper “Iron nanoparticle bio-interactions evaluated in *Xenopus laevis* embryos, a model for studying the safety of ingested nanoparticles” was published in the Nanotoxicology Journal in November 2019.

It addresses the use of *Xenopus laevis* embryos as a suitable model to investigate the toxicity and the bio-interactions at the intestinal barrier of Fe<sub>3</sub>O<sub>4</sub> and zerovalent iron (ZVI) NPs compared to Fe(II) and (III) salts. Results obtained using the Frog Embryo Teratogenesis Assay in *Xenopus* (FETAX) demonstrated that, at concentrations at which iron salts induce adverse effects, both iron NPs do not cause acute toxicity or teratogenicity even if they accumulate massively in the embryo gut. These results improve the knowledge on the safety of orally ingested iron NPs and their interaction with the intestinal barrier, useful for defining the potential risks associated with their use in food/feed fortification.

Link to the publication:

<https://www.tandfonline.com/doi/full/10.1080/17435390.2019.1685695>



## EUROPEAN RESEARCHERS NIGHT “WANDERLUST”

HOTZYMES members from CICBiomagUNE - Center for Cooperative Research in Biomaterials, nB nanoscale and The University of Zaragoza attended the European Researchers Night in Zaragoza. The 2019 edition of the event, that aims to connects research(ers) with society, was named Wonderlust2019 and took place in 250 capital cities in the European Union during the afternoon and evening of September 2019. HOTZYMES not only provided hands-on-experiments for curious hobby researchers of all age groups and introduced its concept to the general public, but also provided information about the project in a different form: Fernando Lopez-Gallego held a humouristic stand up monologue titled “The Enzyme Farmer – El Ganjero de Enzimas” which received a lot of praise from the audience. Last but not least, Nico Cassinelli from nB nanoScale Biomagnetics and his band performed during the event, giving another successful example that science and having a good time go hand in hand.



## ESIB 2019

The European Summit of Industrial Biotechnology (esib) 2019 is one of the biggest networking events for representatives from science, industry and politics in the field of industrial biotechnology. More than 500 attendees from all over the world were discussing scientific and industrial challenges under the guiding thread „Next Generation Bio-production“ between 18<sup>th</sup> - 20<sup>th</sup> November 2019 in Graz, Austria. HOTZYMES was represented with an exhibition stand from acib, where experts from academia and industry were able to get insights into the project and its aims.





## NALS20 CONFERENCE

The 2<sup>nd</sup> International Conference on Nanomaterials Applied to Life Sciences 2020 (NALS 2020) was held in Madrid (Spain) between the 29<sup>th</sup> and 31<sup>st</sup> January 2020 in Madrid. The conference connected academia and industrial researchers in materials science, chemistry, engineering, medicine, and biology, to establish synergies, strengthen initiated collaborations and create new ones. A perfect surrounding and opportunity for the HOTZYMES team to present the project. Iliaria Armenia from the Aragón Materials Science Institute (ICMA) from CSIC and postdoctoral researcher at HOTZYMES, gave a talk presenting results to nearly 150 attendants from researchers to nanotechnical industries. As well, Jesus del Barrio, a postdoc from the Institute of Materials Science of Madrid (ICMM) presented a poster at the conference.

A scientific community with research interest as well got the chance to get informed at the nB nanoScale Biomagnetics exhibition stand about the usage of nanomaterials in medical and biotechnological applications.

## ITN-INTERFACES

Fernando López-Gallego from CIC biomaGUNE participates as Project leader in this ITN network formed by 20 partners both from the academy and industrial sectors. The project's aim is at interfacing enzymes with solid materials to fabricate the next generation of heterogeneous biocatalyst able to transform bio-based raw materials into high-added materials. Besides the scientific objectives, this consortium aims at training the next generation of early-stage scientists with skills in molecular biology, organic chemistry and chemical engineering.

## ERC-CONSOLIDATOR GRANT

An ERC-Consolidator Grant was granted to Fernando López-Gallego from CIC biomaGUNE to develop the project METACELL. This project has started last January 1<sup>st</sup> 2020 with the goal of developing artificial metabolic cells based on immobilized cell-free systems to manufacture chiral building blocks with enormous applications in polymer, cosmetic and pharmaceutical chemistries. METACELL pursues developing new platforms to advance towards the transition from a fuel-based economy to a new bioeconomy - more compatible with the planet's sustainability.





## DRINKS WITH SCIENCE “DE COPAS CON LA CIENCIA”

Speaking of having a good time: Drinks with Science, a show of scientific dissemination in the key of humour, originally was founded by the group of scientific researchers of the Institute of Chemical Synthesis and Homogeneous Catalysis (ISQCH) and Aragón Materials Science Institute (ICMA) from the Spanish National Research Council (CSIC). This event aims to satisfy the scientific curiosity of the general population - from high school students to adults - in a relaxed, enjoyable and fun way in leisure time by bringing it closer to the bars. A specific science training is not needed: Complicated topics of science are treated in a relaxed and understandable way with pearls of humour, all this between pint of beers or refreshments.

HOTZYMES coordinator Valeria Grazu from the Aragón Materials Science Institute (ICMA) from CSIC gave an outreach talk, explaining the process of transferring science from lab to market whilst introducing HOTZYMES as an example to the audience of more than 50 people. Her talk also included figures about the role of women in science, as it was a special occasion – commemorating the „International Day of Women and Girls in Science 2020“. A good reason to raise the glass!

More Info & News

[www.hotzymes.eu](http://www.hotzymes.eu)



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