



8 de **NOVIEMBRE** de 2023

12.00 h

Aula, Ed. I+D, Campus Río Ebro

• **INMA**

Junior

AMF-TRIGGERED ENZYME PRODRUG THERAPY

Beatriz Torres Herrero

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Direct Enzyme Prodrug Therapy (DEPT) relies on the selectivity and specificity recognition of enzymes to convert a harmless drugs into potent cytotoxic agents. Nevertheless, off-target activation is still challenging due to the non-selective distribution of the therapeutic enzyme and the use of highly active mesophilic enzymes at body temperature. We addressed this by using magnetic nanoparticles (MNPs) as local heating sources to enhance the catalytic activity of prodrug-converting enzymes with optimal temperatures higher than body temperature. Herein, I will explain the synthesis of biomimetic silica nanohybrids (nHs) co-entrapping the therapeutic enzyme Horseradish Peroxidase (HRP) and MNPs. Within the developed nanosystem, the entrapped HRP converts indole-3-acetic acid (3IAA) into peroxy radicals with an optimal temperature of 50 °C, whereas MNPs respond to alternating magnetic fields (AMFs) becoming local hotspots. In contrast to classical magnetic hyperthermia, which aims to induce cell death through a global temperature increment using magnetic heating, our approach focuses on generating a temperature rise in the vicinity of a MNP without a macroscopic temperature increase. Furthermore, I will move to the *in vitro* and *in vivo* studies to demonstrate the proof of concept of 3IAA bioconversion sped up through AMF application. The strategy developed herein offers versatility for the co-entrapping of additional therapeutic enzymes, expanding the concept of prodrug activation beyond redox reactions.

RECHARGEABLE BATTERIES: LITHIUM AND BEYOND

Sergio Aina Sanz

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Nowadays, Li-ion batteries dominate the market of rechargeable batteries. Despite their outstanding properties, they face several challenges that need to be addressed in the near future. Issues such as material scarcity with geographical limitations, safety concerns and the global increasing energy demand are some of them. Consequently, several alternatives are being developed, with Sodium-ion batteries leading the race. But how close are they to the finish line? In this seminar, I will explain their functionality, emphasizing their advantages, comparing them to Li-ion batteries, and discussing their current stage of commercialization. Additionally, I will also touch upon other alternatives beyond lithium and sodium.