

Valeria Grazu

BioNanoSurf Group, Instituto de
Nanociencia y Materiales de Aragón
(INM,) CSIC-UNIZAR.

Centro de Investigación Biomédica en
Red de Bioingeniería, Biomateriales y
Nanomedicina (CIBER-BBN).

Nanobiocatalysis: opportunities for remote enzymatic control by nanoactuation



Wednesday, 14th June
12.00 pm

CIC biomaGUNE - Seminar Room

It is widely recognized that magnetic nanoparticles possess the ability to function as nanoactuators. Specifically, these nanoparticles can be activated as hotspots through the remote application of alternating magnetic fields (AMF), leading to the generation of significant temperature gradients within a nanoscale range from the surface of the nanoparticles. To date, this localized heating effect has primarily been investigated in the context of therapy, with the aim of inducing direct cell ablation for cancer treatment or achieving spatio-temporal control over the release of drugs or enzymes from nanotherapeutics.

1

However, despite the fact that the rates of enzymatic reactions universally depend on temperature, the remote activation of magnetic nanoparticles as local heating sources to enhance the catalytic activity of enzymes for therapeutic or industrial bioproduction purposes has remained largely unexplored. In this presentation, our focus will be on describing various strategies that are triggered by magnetic heating to:

- i) Establish localized optimal temperature conditions for each individual enzyme involved in multi-step schemes aimed at producing a range of substances, from pharmaceuticals to biocommodities.
- ii) Develop a novel "on/off" switch approach for the remote conversion of prodrugs in cancer therapy, utilizing thermophilic enzymes that exhibit minimal activity at normal body temperature.

