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### Zinc-Iron magnetic Nanoparticles for tumor Theranostics

#### Abstract:

Iron Oxide Nanoparticles (IONPs) possess the potential to significantly impact cancer treatment through their theranostic capabilities, serving as contrast agents (CAs) for magnetic resonance imaging (MRI) and facilitating magnetic hyperthermia (MH). Moreover, doping IONPs with other elements can enhance these capabilities. In this talk, the synthesis and characterization of innovative magnetic nanoparticles (MNPs), comprising both single-core and alloy ZnFe NPs, exhibiting improved magnetic properties and enhanced magnetic-to-heat conversion efficiency, will be exposed. Interestingly, our findings challenge conventional nucleation and growth theories, which fail to predict the final size and shape of IONPs and, consequently, their magnetic characteristics, highlighting the need for further investigation into this nanomagnetism phenomenon. Leveraging the enhanced properties of these novel NPs, we achieved successful tumor therapy through MH following intravenous administration and tumor accumulation via the enhanced permeability and retention (EPR) effect. Importantly, these results were achieved using a single low dose of MNPs and a solitary exposure to clinically applicable alternating magnetic fields (AMF). Thus, to the best of our knowledge, we present the first successful application of intravenously administered MNPs for MRI-tracked MH tumor therapy in passively targeted tumor xenografts, employing a single NPs low dose and only one AMF exposure at frequencies suitable for clinical use.

#### Biography

**Caro** has completed his PhD at the age of 29 years from Pablo de Olavide University and postdoctoral studies from IBIMA Plataforma-BIONAND. He has published more than 40 papers in reputed journals, 3 book chapters and 8 patents. Moreover, he has been serving as a guest editor of *Pharmaceutics*.