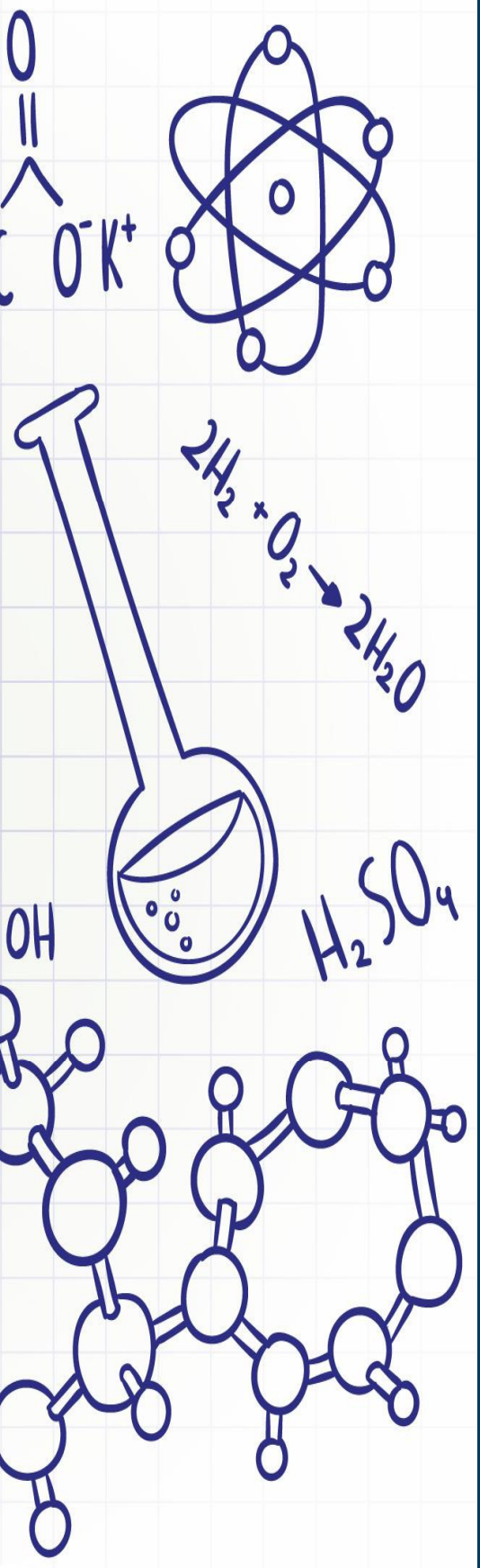

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Development and characterization of magnetic nanoparticles for theranostic applications

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ORAL

Magnetic nanoparticles (MNPs), especially iron oxide nanoparticles, have attracted much attention in the last decades due to their remarkable physicochemical and magnetic properties. These properties coupled with their low toxicological effects, make MNPs ideal for biomedical applications[1]. In addition, chemical functionalization with specific biocompatible targeting molecules provides them with the ability to selectively attach to cells or tissues. Thus, MNPs can be simultaneously used in both diagnosis and therapy, i. e. as contrast agents for magnetic resonance imaging (MRI) and as nanoheaters in magnetic hyperthermia based therapy[2]. MNPs are known to enhance the contrast of the clinical MR images. On the other hand, magnetic hyperthermia is a promising cancer therapy relying on the use of the unique magnetic properties of MNPs to generate heat under an alternating magnetic field. The increase of temperature selectively destroys the tumour cells, inherently more sensitive to mild-temperature changes (of 5 to 7 ºC above the body temperature), while preserving the healthy ones[3]. Nevertheless, the poor heating efficiency of most reported MNPs, together with the lack of biocompatibility studies, hampers the spread of multifunctional nanoparticles as the next generation of therapeutic bio-agents in medicine. Hence, in this study, two different sets of iron oxide nanoparticles were synthesized by co-precipitation, modifying the synthesis temperature (30 and 55 ºC) at moderate alkaline pH (ca. 9). These mild conditions allow the production of superparamagnetic nanoparticles through a cost efficient and industry friendly scalable procedure. The synthesized materials proved to be suitable for theranostic applications. In addition, a novel haemocompatibility methodology based in a microfluidic device that mimics the haemodynamic behaviour of blood cells in *in vitro* microvascular environment was used with noteworthy results.

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