MESTRADO EM FÍSICA

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Proposta de tese

Title: New nanomagnetogels based on peptide hydrogels and magnetic nanoparticles for drug delivery applications

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Objectives:
In this work, new biocompatible peptide hydrogels will be used together with superparamagnetic nanoparticles forming nanomagnetogels, to be employed as new drug delivery systems.

Abstract:

Hydrogels constitute an important class of biomaterials with a wide range of applications, which include among others drug delivery, tissue engineering, *in vivo* imaging and template materials. Thus, there is an ever-expanding urge to design and prepare new hydrogelators [1-3]. This kind of materials has been synthesized in the Centre of Chemistry of UM (CQ/UM), under ongoing collaborations.

Superparamagnetic nanoparticles (MNPs) have also been prepared at Centre of Physics (CFUM) by several techniques. These MNPs are of special relevance, as they can be guided and localized to the therapeutic site of interest by external magnetic field gradients and used in cancer treatment by hyperthermia [4,5].

The magnetic nanoparticles will be incorporated in the hydrogels, forming nanomagnetogels. The micro and the nanostructure of the magnetogels will be obtained using characterization techniques (TEM, SEM, AFM…). Several spectroscopic techniques will also be used to provide information about the molecular organization of the new nanomagnetogels.

The drug delivery potential of the nanomagnetogels will be preliminary assessed by investigating the incorporation and transport of drugs by these materials towards lipid bilayers that closely mimics native cellular membranes. For this purpose, fluorescence anisotropy measurements and resonance energy transfer (FRET) assays will be used.

References:

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