Contribution ID: **34** Type: **Poster**

Magnetoliposomes Based on Shape Anisotropic Calcium/Magnesium Ferrite Nanoparticles as Nanocarriers for Doxorubicin

Friday 24 September 2021 13:30 (1h 30m)

The combination of liposomes with superparamagnetic nanoparticles allies the advantages of the widely used liposomal systems and the possibility to magnetically guide, selectively accumulate, and control the release of drugs on target. The effectiveness of the resulting structures –magnetoliposomes –is intrinsically related to the individual characteristics of the lipid formulation, the magnetic nanoparticles and their physicochemical combination. Herein, shape-anisotropic calcium-substituted magnesium ferrite nanoparticles ($Ca_{0.25}Mg_{0.75}Fe_2O_4$) were prepared for the first time, improving the magnetic properties of spherical counterparts [1]. The nanoparticles revealed a superparamagnetic behavior, high saturation magnetization (50.07 emu/g at 300 K), and a large heating capacity. Furthermore, a new method for the synthesis of solid magnetoliposomes (SMLs) was developed to enhance their magnetic response [1]. The manufacturing technicalities were optimized with different lipid compositions originating nanosystems with optimal sizes for biomedical applications (around or below 150 nm) and low polydispersity index. The high encapsulation efficiency of doxorubicin in these magnetoliposomes was proven, as well as the ability of the drug-loaded nanosystems to interact with cell membrane models and release DOX by fusion. SMLs revealed to reduce doxorubicin interaction with human serum albumin, contributing to a prolonged bioavailability of the drug upon systemic administration. Finally, the drug release kinetic assays revealed a preferable DOX release at hyperthermia temperatures (42 ºC) and acidic conditions (pH = 5.5), indicating them as promising controlled release nanocarriers by either internal (pH) and external (alternating magnetic field) stimuli in cancer therapy.

Author: CARDOSO, Beatriz (Centre of Physics (CFUM), University of Minho)

Co-authors: Prof. CASTANHEIRA, Elisabete (Centre of Physics (CFUM), University of Minho); RODRIGUES, Rita (Centre of Physics (CFUM), University of Minho); Prof. COUTINHO, Paulo (Centre of Physics (CFUM), University of Minho); BAÑOBRE-LÓPEZ, Manuel (Advanced (magnetic) Theranostic Nanostructures Lab, Life Sciences Department, INL); AMORIM, Carlos (Physics Department and CICECO, University of Aveiro); AMARAL, Vitor (Physics Department and CICECO, University of Aveiro)

Presenter: Prof. CASTANHEIRA, Elisabete (Centre of Physics (CFUM), University of Minho)

Session Classification: Materials and technologies for Health and Environment (Posters)

Track Classification: Materials and Technologies for Health and Environment