UNIVERSITÀ DEGLI STUDI DI PADOVA

DiSC

Martedì **21 maggio 2019** alle ore **15:00** presso l'**aula E**
del Dipartimento di Scienze Chimiche

la **Prof.ssa Marcela Fernandez van Raap**

Instituto de Física La Plata (IFLP-CONICET)
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terrà il seminario dal titolo:

MAGNETIC NANOSTRUCTURES FOR BIOMEDICAL APPLICATIONS

La presenza della S. V. sarà molto gradita

Prof. V. Amendola

Il Direttore del Dipartimento
Michele Maggini

MAGNETIC NANOSTRUCTURES FOR BIOMEDICAL APPLICATIONS

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Magnetic nanostructures are nowadays under exhaustive research for biomedical applications, both in therapy and diagnosis, such as drug, cell and gene targeted delivery, hyperthermia, photothermal therapy, bioimaging and biosensors. Iron oxide (Fe_3O_4 and Fe_2O_3 phases) is the most used magnetic material because of its excellent properties such as chemical stability, easily functioning surface, low-cytotoxicity, biocompatibility, high saturation magnetisation and high magnetic susceptibility.

In this talk I will briefly introduce our group, experimental facilities and techniques and review our results on various aspects related to magnetic nanostructures, such as synthesis and characterization [1,2], interaction with cells [3] and tissues [4]. The addressed problems were mainly motivated with the establishment and translation of magnetic hyperthermia therapy and more recently in the improvement of cell therapy using magnetic targeting for tissue regeneration.

I will include a brief description of a device, based on a parallel LC resonant circuit optimized to generate alternating magnetic fields of 100 kHz frequency and amplitude adjustable from 2 to 15 kA/m, as a versatile tool for research involving the use of magnetic materials and alternating magnetic field for fighting cancer, like magnetic hyperthermia and drug and gene delivery triggered by magnetic stimuli [5].

[1] Effect of nanoclustering and dipolar interactions in heat generation for magnetic hyperthermia. D. Coral et al. *Langmuir*, 2016, 32 (5), pp 1201–1213 DOI: 10.1021/acs.langmuir.5b03559
[2] Anticipating hyperthermia efficiency of magnetic colloids by a semi-empirical model: a tool to help medical decisions. M. B. Fernández van Raap et al. *Phys Chem Chem Phys.* 2017;19(10):7176. DOI: 10.1039/c6cp08059f.
[3] Stress-induced gene expression sensing intracellular heating triggered by magnetic hyperthermia. M. E. de Sousa et al. *J. Phys. Chem. C*, 2016, *120* (13), pp 7339–7348 DOI: 10.1021/acs.jpcc.5b12330
[4] Nanoclusters of crystallographically aligned nanoparticles for magnetic thermotherapy: aqueous ferrofluid, agarose phantom and ex-vivo melanoma tumour assessment. D. Coral et al. *Nanoscale*, 2018, 10, 21262, DOI: 10.1039/C8NR07453D.
[5] Patent Nº 20160101254. Veiga A. et al. Portable Electromagnetic Field Applicator for Magnetic Hyperthermia Experiments 8 th IEEE Latin American Symposium on Circuits and Systems S.A. González et al. Circuits & Systems (LASCAS), 2017 IEEE 8th Latin American Symposium DOI:10.1109/LASCAS.2017.7948091