



Istituto di Chimica dei Composti Organometallici

## **ICCOM Pisa incontra ICCOM Firenze**

**Giovedì 14 Novembre 2019**

**Alle ore 11:00**

presso Aula 27 - Edificio A - Piano terra  
Area della Ricerca CNR, Via Moruzzi 1 - Pisa

Il **Dr. Claudio Sangregorio** di ICCOM-Firenze e del Dipartimento di Chimica "U. Schiff", Università di Firenze Polo Scientifico di Sesto Fiorentino, terrà il seguente seminario:

"Tailoring magnetic nanoparticle properties towards applications"

**Dr. Francesco Vizza**  
**ICCOM-CNR**

## Abstract:

Magnetic nanoparticles, MNP, are expected to have a tremendous impact on several technological fields, ranging from electronics, to spintronics and clinical applications, one of the most prominent reason relying on the possibility of fine tuning their physical properties to match the required optimal values. The feasibility of such a control requires the exact knowledge of the effect of the size, morphology, structure and chemical composition on the magnetic properties of the final product. However, large piece of information is still missing, mostly because of the difficulty in controlling independently each one of these parameters. However, the recent development of wet-chemistry syntheses has boosted renewed promises in the field.

In this contribution, we show how some phenomena characteristic of the nanoscale could be advantageously exploited for improving the performances of magnetic nanoparticles in several technological fields. In particular, we will discuss the state-of-the-art of the application of magnetic nanostructured materials and the future perspectives for a more extended use in two of the most prominent research areas in the field: the realization of a new class of theranostic agents, combining the therapeutic effect of targeted drug-delivery with hyperthermia and enhanced relaxometric properties, [1] and the quest for novel materials that can replace currently used Rare Earth (RE) compounds in a wide part of the spectrum of energy industrial necessities where the high performances of RE permanent magnets are not strictly required. [2-4]

[1] E. Fantechi et al. ACS Nano, 2014, 8, 4705-4719

[2] A. Lopez-Ortega et al. Chem. Mater. 2015, 27, 4048-56

[3] E. Lottini et al. Chem. Mater. 2016, 28 4214–4222

[4] A. López-Ortega et al. Chem. Mater. 2017, 29 1279-1289

## Biographic sketch:

Claudio Sangregorio graduated in Chemistry at the University of Florence and obtained the Ph. D degree in Material Science at the same institution. At present he has a position as Senior Researcher at the Institute of Chemistry of Organo-Metallic Compounds at the Italian National Research Council.

His scientific interests are in the field of nanomagnetism, and particularly in the synthesis and characterization of the structural and magnetic properties of novel nanomaterials based on metal transition oxide or metal particles. In particular, in the recent years the activity has been mainly focused on the development of biocompatible magnetic nanomaterials for theranostic applications, magnetic-plasmonic nanostructures for high-sensitivity sensors and optimized ferrite nanoparticles for the realization of rare-earth free permanent magnets and high frequency low losses materials. Large part of his activity has also been devoted to the field of molecular magnetism.

He has co-authored ca. 210 scientific articles on peer-reviewed international journals of chemistry, physics and material science and his work has been presented to several international conferences.

