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Dottorato di Ricerca in

Scienza dei Materiali e Nanotecnologie
Scienze Chimiche

Si comunica che, nell'ambito delle attività seminariali dei Dottorati di Ricerca, il

Prof. Davide Peddis

Università di Genova

Martedì 8 Ottobre 2024 alle ore 16:00

terrà,
presso **l'Aula A** del Dipartimento di Scienze Chimiche, il seminario dal titolo:

"Design of Advanced Magnetic Nano-architecture"

L' organizzatore del seminario
Prof. N. Tuccitto

I Coordinatori
Prof. G. Compagnini
Prof. G. Spoto

Il Direttore del Dipartimento
Prof. A. Licciardello

Design of advanced magnetic nano-architecture

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Magnetic Nanoparticles (MNPs) are unique complex objects whose physical properties differ greatly from their parent massive materials. In fact, the magnetic properties are particularly sensitive to the particle size, being determined by finite size effects on the core properties, related to the reduced number of spins cooperatively linked within the particle, and by surface effects, becoming more important as the particle size decreases. MNPs have generated much interest because of their possible applications in high density data storage, ferrofluid technology, catalysis, environmental technology, and biomedicine (e.g., drug delivery, contrast enhanced MRI)[1]. To synthetize Magnetic nanoarchtiecture (MN) represent an additional tool to further tuning physical properties of MNPs, obtaining new multifunctional materials. MN consist in a magnetic core embedded in shell/matrix that may be composed of polymers[2], mesoporous structures (e.g., silica[3], zirconia[4], zeolites[5], metalorganic framework[6]) or even molecules[7]. Shell/matrix can have magnetic properties and in this case properties of MN rely even more strong on the interplay between those of the constituent components. When the individual components themselves, are complex systems belonging for examples to the family of correlated electron oxide with exotic physical properties, it becomes non-trivial and extremely fascinating to customize the properties of these bi-magnetic nanocomposites[8–10]. Based on this framework, this talk will focus on the design of MN that means to control the matter at the nanoscale, correlating magnetic properties, micro- and meso-structure and molecular coating. Some recent results on synthesis of magnetic nanocomposites and their application in energy (e.g., permanent magnets, thermoelectricity), biomedicine, catalysis and other technological field will be discussed.

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Short bio

Davide Peddis (DP) graduated *magna cum laude* in Physical Chemistry (2003) and obtained his PhD in Physical Chemistry (2007) at the University of Cagliari. Now DP is Associate Full Professor of Physical chemistry @ University of Genova and associate researcher at CNR-ISM. In the years 2007-2009 he worked as Research Fellow at University of Cagliari and at ISM – CNR. He was Senior Scientist at Vinca Institute, University of Belgrade between December 2014 and February 2017 where he was team leader for a group focused on synthesis and functionalization of magnetic nanoparticles for biomedical application. He has extensive experience in collaborations with international groups: he was visiting professor at the Le Mans University (collaboration Prof. J.M. Grenèche), Extended Guest Lecturer at the Uppsala University (collaboration with Prof. P. Nordblad and Dr. R. Mathieu) and visiting scholar at the University of Delaware (Collaboration with Prof. G. Hadjipanayis). Research activity of DP is developed in the framework of Solid State Physical-Chemistry and Condensed Matter Physics, studying the relationship between physical properties, crystalline structures, and morphological features of magnetic nano–hetero-structures (nanoparticles, particles embedded in matrix, core shell structures, hollow nanoparticles, anisometric particles). Particular attention has been devoted to the investigation of fundamental properties of magnetic nanoparticles (static and dynamical properties) with particular interest in materials for applications in biomedicine (MRI, drug delivery, hyperthermia), catalysis, and energy field (permanent magnets, hydrogen production). DP research activity is presented in over 190 peer reviewed papers (h-index/Cit.: 45/6300 - Google Scholar,) and 6 book chapter in the period 2006-2023. He was co-editor of a book titled "*New Trends of Nanoparticles Magnetism*" (Springer, 2021). DP over 350 communications, including invited (58 personally given) and oral presentations (25 personally given), to national / international conferences ad recognized scientific institution. DP has been co- supervisor of 5 master students, 5 PhD student, 3 post-docs, 5 researchers in formation and he was also appointed for three international PhD committee (February 2015, November 2017 Uppsala University, 2020, Basel University). Davide Peddis has been granted over 2.1 milion of euro to date, coming for national and EU project.