Fabio Michele Canepa

Professore associato

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Istruzione e formazione

1980
Laurea in chimica
Composti intermetallici della terre rare a fluttuazione di valenza messa a punto di un calorimetro per misure di cap. termica. - 110110
Università di Genova - Genova - IT

Esperienza accademica

1983 - 2002
Ricercatore tempo pieno
Università di Genova

Esperienza professionale

1983 - 2017
Consulente tecnico del Tribunale di Genova
Tribunale di Genova

Competenze linguistiche

English
Esperto

Attività didattica

2018 - 2019 courses
1. Physical Chemistry 4
2. Physical chemistry of the solid state
3. Physical chemistry 3 with laboratory (last year)
4. Physical chemistry 2 with laboratory

Attività didattica e di ricerca nell'alta formazione

Supervisione di dottorandi, specializzandi, assegnisti

tutor of the following PhD students:
Myrta Napoletano (2000 - 2002)

Mattia Lucchini (2012 - 2014)
Silvia Villa (2015 - 2017)
Tullio Cavattoni (2016 - 2018)
Ester Canepa (2017 -)

Attribuzione di incarichi di insegnamento nell'ambito di dottorati di ricerca accreditati dal Ministero

Functional magnetic materials (2 CFU) from 2010

Interessi di ricerca

Reviewer for the following scientific journals: Materials Chemistry and Physics, Journal of Physics: Condensed Matter, Journal of Magnetism and Magnetic Materials, Journal of Physics D: Applied Physics, Journal of Nanoparticle Research.
Referee of the Ministero Istruzione, Università e Ricerca (MIUR) for the National Program 'VQR - Valutazione della qualità della ricerca' 2012.
Referee of the Ministero Istruzione, Università e Ricerca (MIUR) for the Italian projects PRIN 2012.
He collaborated, as responsible of the CNR-IMEM unit, to the **European project 263014 "Magnetic superconductor cryogenic non contact Harmonic Drive (MAGDRIVE)" The project was concluded on 31/01/2014.** In this project, the CNR unit was responsible of the choice and of the complete physical characterization of Permanent and Soft Magnets, fundamental components of the low temperature friction free harmonic drive.
Responsible, for the Genova University, of FAR project n°6728/DSPAR/2002 'Magnetic refrigeration, a research related to the use of the magnetocaloric effect of ferromagnetic solids, as a possible future alternative to the standard gas compression used in refrigeration cycles". This project, concluded in 2012, showed the feasibility of this scientific research with the construction of a working demonstrative prototype.
Scientific Responsible of the Research Service Agreement between Spin-CNR Institute and Paul Scherrer Institute (Switzerland) on the Research Project "Magnetic characterization, by SQUID magnetometry, of semi-hard ferrites materials" 2015 January 15 – 2016 January 15.

He participated also to several national research projects (PRIN Projects) supported by MIUR.
Among them the last one was the **PRIN "NANOMED – Molecular Nanotechnologies for the controlled release of therapeutical drugs" (01/02/2013-01/02/2016)**.
He began his research activity in the field of the magnetism of the Rare Earth intermetallic compounds, analyzing from the experimental and theoretical point of view several light and heavy Rare Earth metallic phases. Later on, he focused his attention to the phenomenon of the Room Temperature Magnetic Refrigeration, discovering and studying some new

compounds useful for this technological improvement. He was the responsible of several national and regional Research Projects in this field, participating also to the construction of the first Italian demonstrative prototype of Room Temperature Magnetic Refrigerator. This reciprocating model used an optimized geometrical configuration of 12 high field NdFeB permanent magnets to achieve a maximum of 1.496 Tesla of magnetic flux (in vacuum) in the gap. The material used was Gadolinium sheets mechanically modeled to allow the flow circulation.
More recently, he devoted his efforts to the fascinating word of the Nanosciences, optimizing a chemical laboratory for the synthesis and characterization of nanoparticles (NPs) using the bottom-up approach. In the framework of this activity, metallic nanoparticles (Ni, Co, Ni-Co) were synthesized and characterized, in order to be used in the industrial process of the ethanol steam reforming (ESR), in collaboration with the "Catalysis Group" of the *Department of Chemical, Civil and Environmental Engineering* of Genova. Furthermore, new synthetic protocols to achieve magnetite (Fe_3O_4) nanoparticles were adopted and optimized and the nanoparticles were successfully functionalized with inorganic (silica coating) and organic moieties (different organic fluorescent molecules) using also different *linker-bridges* between the NPs and the organic molecule. A complete magnetic characterization was always used to achieve physical and dimensional information about the system of magnetic NPs analysed.
In this field he participated to the recent call "Investigator Grant – IG 2016" of the AIRC (Italian Association for the Research on Cancer) with the project "***Magnetic nanovectors for local and site-specific drug delivery in hepatocellular carcinoma or liver dominant metastasis***" still under evaluation.
In the meantime, he spent part of his research time to the study of the magnetic behaviour of different magnetic all organic nanostructures. In this field, he firstly collaborated to the magnetic study of an organic molecular material (polyfluoroacridine based) functionalized with TEMPO radicals (2,2,6,6-tetramethyl piperidine-1-oxyl radical) for a magnetic organic system stable at room temperature. In this case, a polarization mechanism between adiacent molecules in the same plane and antiferromagnetic interactions between different planes, was adopted to analyse the magnetic properties of this organic system. Later on, a study on the effective magnetic moment in cyclodextrin – polynitroxides was carried out in collaboration also with some components of the present 2015 PRIN Project. Two b-cyclodextrin (b-CD) derivatives carrying one or seven (2,2,6,6-tetramethylpiperidin-1-yl)oxyl (TEMPO) units on the small trim of b-CD (CD3 and CD6 respectively) were synthesized and magnetically analysed.
The b-CD functionalized with a single TEMPO it was successfully defined in terms of a simple Brillouin function with a $S=½$ spin system. On the contrary, the magnetic behaviour of the epta-TEMPO b-CD system was found non consistent with a non interacting seven spins model, but was successfully described in terms of an interacting spin model with a central privileged spin. These structures are important starting points towards an organic molecule carrying a high spin moment and able to be used in

Magnetic Resonance Imaging.