

PERSONAL INFORMATION

Claudio Sangregorio

WORKING EXPERIENCE

01/201 - present	Director of ICCOM-CNR Sesto F.no, Italy
2020-present	Research Director at ICCOM-CNR Sesto F.no, Italy
2010-2020	Senior Researcher, ISTM-CNR, Milan and ICCOM-CNR, Sesto F.no, Italy
2009-2010	Researcher, ISTM-CNR, Milan, Italy.
2006-2009	Researcher, Consorzio INSTM, Dept. of Chemistry, University of Florence, Florence, Italy.
2003-2006	Assistant Professor, Dept. of Chemistry, University of Florence, Florence, Italy.

FELLOWSHIP

08/2008 – 11/2008	Visiting Professor at Universidade Federal Fluminense –Rio de Janeiro, Brazil
05/1999 – 04/2003	Post-doctoral Fellow, Dept. of Chemistry, University of Florence, Florence, Italy.
01/1998 – 04/1999	Post-doctoral Fellow, Advanced Materials Research Institute, University of New Orleans, New Orleans, LA, USA.
11/1995 -05/1996	Visiting scientist at CNRS-Centre de Recherche sur les Très Basses Températures, Grenoble, France

EDUCATION

1997	PhD in Science and Technology of Materials, Univ. of Florence, Italy. Title: Magnetic Nanoparticles: the sol-gel and the molecular approaches, supervisor: Prof. D. Gatteschi
1994	Abilitazione alla Professione di Chimico
1994	Master degree in Chemistry (110/110 magna cum laude); Dept. of Chemistry, Univ. of Florence, Italy; Title: Synthesis and characterization of metallic and metal alloys nanoparticles precipitated in reverse micelles. Supervisor: Prof. P. Baglioni

INSTITUTIONAL RESPONSIBILITIES

2010 – to date	Responsible of the LAMM-LAB laboratory at ICCOM-CNR
2013 - 2017	Member of the Directorial Board of the Italian Association on Magnetism.
2017 – to date	Board member of the Electron Microscopy Centre of CNR at ICCOM-CNR, Firenze.
2017 - 2021	Academic Board member of the Ph.D. in Chemistry, University of Siena, Italy.
2021 – to date	Academic Board member of the Ph.D. in Chemistry, University of Florence, Italy
2017 -to date	Project officer of MISE projects
2021- to date	Director of the DSCTM unit in the infrastructure IMI@IT.

SCIENTIFIC ACTIVITY

Research Activity	The 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 his activity was mainly focused on the development of biocompatible magnetic nanomaterials for theranostic applications, magnetic-plasmonic nanostructures for high-sensitivity sensors and photothermal therapy, optimized ferrite nanoparticles for the realization of rare-earth free permanent magnets (and their recycling), and high frequency low losses materials, including the scale-up of some of these materials to the industrial production. More recently the research interest has covered also the possibility to exploit some of these material for magnetic induction catalysis of processes of industrial relevance. A significant part of his activity has been devoted to the field of molecular magnetism where he actively investigated the physical properties of single molecule magnets, single chain magnets and valence tautomeric metal-polyoxolene
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compounds. During these years CS has developed several collaborations with national and international universities, public research institutions and companies (Colorobbia Italia, ENI, Europa Metalli-LMI, Bracco, Endostart, Gaiker (SP), Vicor (USA) e, lo sviluppo di magneti permanenti senza terre rare con IMA (SP), Max Baermann GmbH (D), Kolektor (SL), Gorenje (SL), Domel (SL) e Wattsup Power (DK)..

Expertise: Synthesis and functionalization of nanomaterials by colloidal chemistry at lab and large scales; Magnetic measurements (ac susceptibility, SQUID and VSM magnetometers, torque, etc..) of magnetic nanoparticles and molecular materials and data analysis; photomagnetic measurements; EPR and HF-EPR spectroscopy; Magneto-optical techniques; XAS and XMCD at synchrotron facility, TEM; Single crystal and powder X-Ray diffraction; Cryogenic Techniques

He is responsible of the LAMM-LAB laboratory at ICCOM-CNR (<http://www.iccom.cnr.it/it/lamm-lab/>)

Publications He has co-authored 242 scientific articles on peer-reviewed international journals of chemistry and physics and 4 book Chapters (hi = 59, Scopus; 67 Scholar). His work has been the subject of communication to several important international conferences and workshops (>100).

He has been invited to give seminars (in the last few years at Univ. Federal de Rio de Janeiro, 2015; Univ. Federal Fluminense, 2015, Italian School on Magnetism Milano, 2016; Univ. of Nantes, 2017;; School on Magnetism, 2018; International School on Hybrid and Organic Photovoltaics, 2017; Università di Pisa, 2019, Univesidad de Zaragoza, 2019, Immanuel Kant Baltic Federal University of Kaliningrad, 2019 and 2020; XI Scuola Segre 2021) and to present invited lectures at 20 international and national conferences.

Selected Publications of the last 5 years

- B. Muzzi, M. Albino, A. Gabbani, A. Omelyanchik, E. Kozenkova, M. Petrecca, C. Innocenti, E. Balica, A. Lavacchi, F. Scavone, C. Anceschi, G. Petrucci, A. Ibarra, A. Laurenzana, F. Pineider, V Rodionova, C. Sangregorio "Star-Shaped Magnetic-Plasmonic Au@Fe₃O₄ Nano-Heterostructures for Photothermal Therapy" ACS Appl. Mater. Inter. (2022) <https://doi.org/10.1021/acscami.2c04865>.

- B. Muzzi, M. Albino, M. Petrecca, C. Innocenti, C. de Julián Fernández, G. Bertoni, C. Marquina, M.R. Ibarra, C. Sangregorio "3d Metal Doping of Core@Shell Wüstite@ferrite Nanoparticles as a Promising Route toward Room Temperature Exchange Bias Magnet" Small 2107426 (2022).

- A. Gabbani, E. Fantechi, G. Petrucci, G. Campo, C. de Julian Fernandez, P. Ghigna, L. Sorace, V. Bonanni, M. Gurioli, C. Sangregorio, F. Pineider "Dielectric Effects in FeOx-Coated Au Nanoparticles Boost the Magnetoplasmonic Response: Implications for Active Plasmonic Devices" ACS Appl. Nano Mater. 4(2), 1057–1066 (2021)

- B. Muzzi, M. Albino, C. Innocenti, M. Petrecca, B. Cortigiani, C. de Julián Fernández, G. Bertoni, R. Fernandez-Pacheco, A Ibarra, C. Marquina, R. M. Ibarra, C. Sangregorio "Unraveling the mechanism of the one-pot synthesis of exchange coupled Co-based nano-heterostructures with high energy product" Nanoscale, 12, 14076 - 14086 (2020)

- E. Kozenkova, K. Levada, M.V. Efremova, A. Omelyanchik, Y.A Nalench, A.S Garanina, S. Pshenichnikov, D.G. Zhukov, O. Lunov, M. Lunova, I. Kozenkov, C. Innocenti, M. Albino, M.A. Abakumov, C. Sangregorio, V. Rodionova "Multifunctional Fe₃O₄-Au Nanoparticles for the MRI Diagnosis and Potential Treatment of Liver Cancer" Nanomaterials 10, 1646 (2020)

- E. Fantechi, C. Innocenti, G. Bertoni, C. Sangregorio, F. Pineider "Modulation of the magnetic properties of gold-spinel ferrite heterostructured nanocrystals" NanoResearch 13, 785–794 (2020) doi:10.1007/s12274-020-2696-x

- J. Muro-Cruces, A. G. Roca, A. López-Ortega, E. Fantechi, D. del-Pozo-Bueno, S. Estradé, F. Peiró, B. Sepúlveda, F. Pineider, C. Sangregorio, J. Nogues "Precise Size Control of the Growth of Fe₃O₄ Nanocubes over a Wide Size Range Using a Rationally Designed One-Pot Synthesis" ACS Nano, Articles ASAP (2019) doi.org/10.1021/acsnano.9b01281

- F. Pineider, E. Pedrueza-Villalmanzo, M. Serri, A. Mekonnen Adamu, E. Smetanina, V. Bonanni, G. Campo, L. Poggini, M. Mannini, C. de Julián Fernández, C. Sangregorio, M. Gurioli, A. Dmitriev, R. Sessoli "Plasmon-enhanced magneto-optical detection of single-molecule magnets" Mater. Horiz. (2019) doi:10.1039/C8MH01548A

- M. Albino, E. Fantechi, C. Innocenti, A. López-Ortega, V. Bonanni, G. Campo, F. Pineider, M. Gurioli, P. Arosio, T. Orlando, G. Bertoni, C. de Julián Fernández, A. Lascialfari, C. Sangregorio "The Role of Zn²⁺ Substitution on the Magnetic, Hyperthermic and Relaxometric Properties of Cobalt Ferrite Nanoparticles" J. Phys. Chem. C, (2019), DOI: 10.1021/acs.jpcc.8b10998

- F. Varsano, M. Bellusci, A. La Barbera, M. Petrecca, M. Albino, C. Sangregorio "Dry reforming of methane powered by magnetic induction" Int. J. Hydrogen Energy" (2019) <https://doi.org/10.1016/j.ijhydene.2019.02.055>

- S. V. Spirou, M. Basini, A. Lascialfari, C., Sangregorio, C. Innocenti, "Magnetic hyperthermia and radiation therapy: Radiobiological principles and current practice" Nanomaterials (Open Access) 8(6), 401 (2018) DOI: 10.3390/nano8060401.

Research Grants

- C. Gellini, F. L. Deepak, M. Muniz-Miranda, S. Caporali, F. Muniz-Miranda, A. Pedone, C. Innocenti, C. Sangregorio "Magneto-Plasmonic Colloidal Nanoparticles Obtained by Laser Ablation of Nickel and Silver Targets in Water" *J. Phys. Chem. C* 121 (6) 3597-3606 C (2017) DOI: 10.1021/acs.jpcc.6b11628
 - A. López-Ortega, E. Lottini, G. Berton, C. de Julián Fernández, C. Sangregorio, "Topotaxial phase transformation in cobalt doped iron oxide core/shell hard magnetic nanoparticles" *Chem. Mater.* 29 (3), 1279-1289 (2017) DOI: 10.1021/acs.chemmater.6b04768
 - E. Lottini, A. Lopez-Ortega, G. Berton, S. Turner, M. Meledina, G. Van Tendeloo, C. de Julian Fernandez, C. Sangregorio "Strongly Exchange Coupled Core/Shell Nanoparticles with High Magnetic Anisotropy: A Strategy toward Rare-Earth-Free Permanent Magnets" *Chem. Mater.* 28 (12), 4214-4222 (2016) DOI: 10.1021/acs.chemmater/6b00623 (2016)
 - Responsible of ICCOM-CNR RU in the EC project INSPIRE "INtelligent and Sustainable Processing of Innovative Rare-Earth magnetS" EIT Raw Materials RIS Project 2021-2024 (210 k€)
 - Scientific Responsible of the project Accordo di Programma MiSE-ENEA "Sviluppo e caratterizzazione di nanocompositi magnetici ibridi per la separazione di miscele gassose" 2020-2022 (40 k€).
 - Responsible of the project Endorail Ferrofluid "Studio delle proprietà chimico-fisiche della sospensione Endorail Ferrofluid" collaboration with Endostart s.r.l. (36 k€)
 - Participant (responsible of the ICCOM RU) in the European Defence Agency project COMMON-LINK Computational Modelling for long-term inter-sectoral advanced knowledge on Non-Newtonian fluids -B-PRJ-RT-980 (560 k€).
- In the past he has been:
- Member of the Management Committee MC of project COST "TD1402 - Multifunctional Nanoparticles for Magnetic Hyperthermia and Indirect Radiation Therapy" (2014-2018)
 - Coordinator of the CNR Unit in the H2020 EU Project Amphibian (2017-2019) (496 k €)
 - Scientific responsible for INSTM in the FP7 project "Nanother".
 - Scientific coordinator and WP responsible in the FIRB project "RINAME" (5,000 k €).
 - WP responsible and member of the steering committee in the FP7 project "Nanopyme" 2013-2015 (400 k€).
 - Recipient of the Regione Lombardia project "MAGNANO (2013-2015),
 - Responsible of the CNR RU in the "IN_RL17 MOTORSPORT" Regione Lombardia (2017-2018) project
 - Recipient of the 2014-2015 CNR-CNPq bilateral project (20 k€)
 - Responsible of the Ente Cassa di Risparmio di Firenze project SMART (50 k €).
 - Responsible of the CNR RU in the project "CARIPLO N 2010-612. (200.k€)
 - Scientific responsible for the project Accordo di Programma MiSE-ENEA "Studio di nuovi materiali per la catalisi magnetica a induzione" 2016-2018 (115 k€)
 - Recipient of the Grant Progetto Giovani Ricercatori – Univ. of Florence
 - Scientific responsible of the Italian project PRISMA and of the projects BIOMAG, NAN04I+MT and MAGHYP in the NoE "Magmanet" of the VI FP;
 - Local coordinator of the Integrated European Laboratory "Magnetic, Magnetotransport and thermal measurements".
 - Participant to several National Research Projects, PRIN, FISR, FIRB, and C.N.R. funds. Participant to the Research Training Network, RTN, of EC in the V ("Molnanomag") and VI ("Quemolna") FP and in the FP7 project "NanoMagma". Responsible of the CNR project "modulo PM.P05.012.001 Nanosistemi organizzati di magneti molecolari". Participant in the projects AIRC2011 and AIRC2012 and in the Cariplo projects "Magnetic-nanoparticle-filled conductive polymer composites for EMI reduction" and "New biomimetic tools for miRNA targeting, in the INFN projects "Hadromag" (2018-19) and "Prothyp" (2020-2021) and in the project "Fondi di Internazionalizzazione di Ateneo Univ. of Florence – Universidade Federal Fluminense (2017-2021).

Additional Information

Member of the organizing committees of national (10) and international (7) conferences, workshops (2) and schools (8) on the topics of nanomagnetism, magnetic nanoparticles and their applications. (in 2022 he chairs the VII National Magnetism Conference, Florence, the V School of Nanomedicine, Rome, and he is membre of the Program Committee of the 11th International Conference on Fine Particle Magnetism (Yokohama, Japan).

Member of the Editorial Board of *Nanomaterials*. Guest Editor of 2 special issue on magnetic nanoparticles (*J. Nanosci. Nanotechnol.*) and ferrite permanent magnets (*J. Phys. D Appl. Phys.*). Supervisor of candidates for Master (14) and PhD (14) theses in Chemistry, Material Science and Chemistry and Pharmaceutical Technology, and of foreigner and Italians post-docs (> 30), Erasmus students and European graduate students of the Marie Curie Training Center. He participated to the jury committees of the thesis of PhD courses in France (4 times) and Spain (2).

Reviewer for many important journals in Chemistry and Material Science (*Nature Nanotech*, *Angew. Chem.*, *Adv. Mater.*, *Phys. Rev. B*, *J. Am. Chem. Soc.*, *ACS Nano*, etc.). Reviewer for FET, Pathfinder,

and ERC calls (EC), FIRB and PRIN projects (Italy), VQR, INFM Projects (Italy), French National Research Agency, DFG (Germany), Norwegian, Romanian, and Czech Republic National Science Foundations. Member of evaluation committees (> 15) for Assegni di ricerca, scholarships and for the CNR Senior researcher selection 315.11 PR. He has got the I Fascia ASN qualification for: 03/B2 Fondamenti Chimici delle Tecnologie and 03/B1 Fondamenti delle Scienze Chimiche e dei Sistemi Inorganici and the eligibility for Director of the ISM-CNR Institute (364.278 ISM).

He lectured General and Inorganic Chemistry (2001-04) and Method for Structure Resolution by XRD (2003-07) at the Univ. of Florence and "Nanomagnetism"(2008) at UFF, Rio de Janeiro (Brazil). He regularly holds courses on nanomagnetism for graduate students of the Chemistry and Engineering courses at the Univ. of Florence and for PhD student of Chemistry at the Univ. of Florence and Univ. of Siena and participates at national and international schools on nanomagnetism and its application. From 2018 to 2021 he gave the course "Application of magnetic nanoparticles" for the Master program in Physics at the IKBFU, Kalinigrad, Russia.

Project officer for MiSE – FONDO PER LA CRESCITA SOSTENIBILE – "INDUSTRIA Projects. Member of the Board of the Doctoral School in Chemical and Pharmaceutical Sciences, Univ. of Siena, (2017-21) and Chemistry, Univ. of Florence (from 2021). Scuole di Dottorato (Univ. di Siena e Firenze).

Director of the DSCTM unit in the IMI@IT national infrastructure

Experience eze all'estero: 1995-96, 7 mesi, CNRS-Centre de Recherche sur les Très Basses Températures, Grenoble (France);

1998-1999 14 mesi, ricercatore post-docall'Advanced Materials Research Institute, University of New Orleans, USA

2008 3 mesi, visiting Professor a Universidade Federal Fluminense –Rio de Janeiro (Brasile)

Autorizzazione al trattamento dei dati personali:

Ai sensi della legge 679/2016 del Regolamento del Parlamento Europeo del 27 aprile 2016, esprimo il mio consenso al trattamento e all'utilizzo dei miei dati forniti in questo CV.

Firenze, 16/01/2023