

CAPSONI DORETTA: CV

PERSONAL INFORMATION

Date of birth: August 5, 1963

Place of birth: Pavia (Italy)

Nationality: Italian

ORCID: 0000-0002-1064-7196

PRESENT AND PAST POSITIONS

Since 2015 – Associate Professor CHIM/02, University of Pavia, Pavia (Italy)

1992 – 2015 - Researcher CHIM/02 (permanent position), University of Pavia, Pavia (Italy)

EDUCATION

1992: Ph.D. in Chemical Sciences from University of Pavia

1987: Master degree in Chemistry at the University of Pavia (mark: 110/110).

TEACHING AND SUPERVISION

I supervised Bachelor, Master and PhD students at University of Pavia, Italy, and I have been the scientific responsible for the activities of scholarship holders at University of Pavia, Italy. Since 1995 I am lecturer for bachelor and master courses at University of Pavia (among other: Physical chemistry and Laboratory, Physical Chemistry III, Introduction to Materials' Sciences and Laboratory, Chemistry of traditional and advanced materials for construction, Kinetic and Spectroscopy for Biotechnologies). I am lecturer in the framework of the PhD in "Chemical and Pharmaceutical Sciences and Industrial Innovation" at University of Pavia (Course title: Advanced structural characterization techniques in material science).

GRANTS

I contributed to the financed projects:

- 2022 PRIN 2022 – "Two-dimensional chiral hybrid organic-inorganic perovskites for chiroptoelectronics (MIRROR)", 2022.
- 2019 Advanced Material Call of Cariplo Foundation – "Towards smart footwear systems: a self-powered, intelligent shoe (FITNESS)", 2018.
- 2012 PRIN 2010/2011 - "Advanced nanocomposite membranes and innovative electrocatalysts for durable polymer electrolyte membrane fuel cells, NAMED-PEM", 2010CYTWAW.
- 2012 Nanoparticles, nanotechnologies and ultrafine particles Call of Cariplo Foundation "Toxicology of engineered nanoparticles: analysis of their potential thrombotic, inflammatory and haemolytic effects", 2011.
- 2011 Science and technology research on Advanced Materials Call of Cariplo Foundation - "New nanostructured materials for innovative lithium-air, high-energy rechargeable batteries", 2010
- 2010 Science and technology research on Advanced Materials Call of Cariplo Foundation – "Carbon Nanotube saturable absorbers and new ultrafast lasers", 2009.

PROFESSIONAL ACTIVITIES

Member of the Organizing Committee of Conferences and Schools:

Since 2016 - Training Courses attended by teachers of Chemistry and Science of upper secondary schools, and held at the University of Pavia within the Project “Piano Nazionale Lauree Scientifiche” – Chemistry, promoted by the Italian Ministry of Education, Universities and Research.

2014 - “1st European Crystallography School”, Pavia, 28 August – 6 September 2014

2013 - “Giornate dell’Elettrochimica Italiana – GEI 2013”, Pavia, 22-27 September 2013.

2008 - “1st SIMP-AIC Joint Meeting”, Sestri Levante (GE), 7-12 September 2008.

Member of the Italian Chemical Society (SCI), and Italian Association of Crystallography (AIC).

Institutional responsibilities

Since 2012 – Coordinator of the curricular internships for students of the bachelor and master course in Chemistry at the University of Pavia

2009 – 2015 - Member of the Board of PhD School in Chemistry of University of Pavia (XXV-XXVIII cycles)

2008 - 2014 - Workers’ safety representative at the University of Pavia

Since 2005 – I actively work and cooperate at the University of Pavia in the Project “Piano Nazionale Lauree Scientifiche” – Chemistry, promoted by the Italian Ministry of Education, Universities and Research. I was the Coordinator of the Project for the University of Pavia in 2017-2019

Commissions of trust

Since 2022 - Review panel member for the PhD defence of PhD thesis in “Chemical and Pharmaceutical Sciences and Industrial Innovation”, University of Pavia (Italy)

2021 - Review panel member for the PhD defence of PhD thesis in “Materials Engineering”, Polytechnic University of Milan (Italy)

Since 1992 - Referee for several publishers in Chemistry, Material Science, and Multidisciplinary Science, among which Z. Kristallogr., Powder Diffraction, Nanoscience and Nanotechnology Letters, The Journal of Physical Chemistry, Journal of Pharmaceutical Sciences, Journal of Materials Science, Journal of Applied Electrochemistry, Ionics, Electrochimica Acta, Electrochemistry Communications, CrystEngComm, Chemistry of Materials, ACS Applied Materials and Interfaces, Batteries, Crystals, Chemical Engineering Journal, Energies, Environmental Technology, Scientific Reports, Molecules, Nanomaterials, Materials.

IMPACT OF RESEARCH

Author of 118 peer-reviewed publications in renowned international journals and author and co-author of 2 book chapters. I attended several national and international conferences, giving more than 100 oral talks and/or poster presentations

My scientific production (May 13, 2024) led to

Source: WOS

citing articles (total): 2536

time cited: 2953

average per item: 23.81

h-index: 32

Source: SCOPUS

citing articles (total): 2616

time cited: 3033

h-index: 31

SCIENTIFIC BACKGROUND

Since the beginning of the research activity, I focused my scientific interests on the synthesis and physico-chemical, structural and microstructural characterization of polycrystalline solids and novel materials (pure and doped inorganic compounds and oxides) applied in several fields: electrochemistry, electronic and optical devices, and catalysis. The synthesis route and conditions, the composition/doping and structural features of the compounds were widely investigated and the results were related to the physical and chemical properties of the materials, to tune and optimize them for the applications.

In recent years, inorganic-organic hybrid compounds and composites have been also synthesized and characterized, for applications in polluted water remediation and drug release.

Synthetic routes widely applied: solid state, sol-gel, co-precipitation, hydrothermal and solvothermal, mechanochemical, reflux, sonochemical, microwave-assisted, electrospinning.

Widely used characterization technique: X-rays powder diffraction. The structure, stability with temperature, the cations and doping ions distribution in the cell framework, and the amount of possible impurity phases formed in the synthesis process are investigated by conventional and synchrotron X-Ray, and neutron diffraction data. Several spectroscopic (EPR, NMR-MAS, SEM, micro-Raman) and thermal (DSC, TGA) techniques have been used to support and complete the structural and microstructural data.

Investigated systems:

(A) Electrode materials for LIBs and SIBs: we developed new and optimized anode and cathode materials for lithium-ion batteries and, more recently, for Sodium-ion batteries. The electrochemical performances of the cathodic and anodic materials have also been tested and explained based on the structural and spectroscopic results. Main Investigated systems: Lithium-M-Oxides (M = Ni, Mn, V, Co, Ti), Lithium-M-Phosphates (M = Fe, Ti, V), Sodium-M-Phosphates (M = Mn,Ti, Mn,Zr). Self-standing electrodes based on phosphates active materials and Carbon nanofibers were recently developed by electrospinning: enhanced electrochemical performances at high C-rates have been obtained, compared to conventional electrodes deposited by tape-casting.

(B) $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$, Li_3VO_4 and LiMgVO_4 , tungsten bronzes: Synthesis and characterization of pure and doped/substituted $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ (perovskite-type structure), Li_3VO_4 and LiMgVO_4 , and tungsten bronzes, to optimize and tune their optical and dielectric properties. Impressive results were obtained for the $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ system, where improved permittivity is obtained by proper ion doping.

(C) Materials for polluted water remediation and controlled drug release: we recently prepared and characterized a series of Metal Organic Frameworks (MIL-100, ZIF-8 and $\text{Zn}_3(\text{BTC})_2$) and nanoclays (Halloysite nanotubes: HNTs) and demonstrated their successful application as adsorbents for the removal of a widely used human antibiotic, Ofloxacin (OFL), under relevant real conditions, viz. tap water and low-level concentration. We also synthesized MOF/ Fe_3O_4 and HNT/ Fe_3O_4 magnetic composites with improved adsorption efficiency with respect to MOFs and HNTs alone, that can be easily magnetically recovered after the treatment and, therefore, they are suitable for large-scale applications.

We designed, developed, and characterized new host-guest systems based on active principles/nanoclays and /Hydrotalcite-like Layered-Double-Hydroxides (LDH) to improve the solubility of poorly soluble drugs and to enhance their dissolution rate.

SOME RECENT SCIENTIFIC PUBLICATIONS:

Sturini, M.; Puscalau, C.; Guerra, G.; Maraschi, F.; Bruni, G.; Monteforte, F.; Profumo, A.; Capsoni, D. Combined Layer-by-Layer/Hydrothermal Synthesis of Fe_3O_4 @MIL-100(Fe) for Ofloxacin Adsorption from Environmental Waters, *Nanomaterials* 2021, 11, 3275. DOI: 10.3390/nano11123275

Capsoni, D.; Lucini, P.; Conti, D.M.; Bianchi, M.; Maraschi, F.; De Felice, B.; Bruni, G.; Abdolrahimi, M.; Peddis, D.; Parolini, M.; Pisani, S.; Sturini, M. Fe₃O₄-Halloysite Nanotube Composites as Sustainable Adsorbents: Efficiency in Ofloxacin Removal from Polluted Waters and Ecotoxicity, *Nanomaterials* 2022, 12, 4330. DOI: 10.3390/nano12234330

Maggi, L.; Bruni, G.; Ferrara, C.; Puscalau, C.; Quinzeni, I.; Friuli, V.; Monteforte, F.; Capsoni, D. Zaltoprofen-layered double hydroxide hybrids to enhance zaltoprofen solubility and dissolution rate, *Applied Clay Science* 2023, 231, 106723. DOI: 10.1016/j.clay.2022.106723

Conti, D.M.; Fusaro, C.; Bruni, G.; Galinetto, P.; Albini, B.; Milanese, C.; Berbenni, V.; Capsoni, D. ZnS-rGO/CNF Free-Standing Anodes for SIBs: Improved Electrochemical Performance at High C-Rate, *Nanomaterials* 2023, 13, 1160. DOI: 10.3390/nano13071160

Maggi, L.; Urru, C.; Friuli, V.; Ferrara, C.; Conti, D.M.; Bruni, G.; Capsoni, D. Synthesis and Characterization of Carvedilol-Etched Halloysite Nanotubes Composites with Enhanced Drug Solubility and Dissolution Rate, *Molecules* 2023, 28, 3405. DOI: 10.3390/molecules28083405

Conti, D.M.; Urru, C.; Bruni, G.; Galinetto, P.; Albini, B.; Milanese, C.; Pisani, S.; Berbenni, V.; Capsoni, D. Design of Na₃MnZr(PO₄)₃/Carbon Nanofiber Free-Standing Cathodes for Sodium-Ion Batteries with Enhanced Electrochemical Performances through Different Electrospinning Approaches, *Molecules* 2024, 29, 1885. DOI: 10.3390/molecules29081885