

**Current Position:** Fixed-term Research Fellow B (CHIM/03) at the Department of Chemistry of the University of Pavia, Italy.

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**Studies and Career:**

2001 degree in Chemistry at the University of Pavia

2001 Professional Chemist licence at the University of Pavia

2001 research fellow at the University of Pavia

2001-2004 Ph.D. School at the University of Pavia

2004-2005 research fellow at the University of Pavia

2005 post-degree diploma at IUSS, University of Pavia

2005 Ph.D. degree in Chemical Science at the University of Pavia, thesis on “metal driven self-aggregation processes”

2005-2008 post-doc fellow I.N.S.T.M. Research Unit of Prof. R. Ugo in Milan

2008-2009 research fellow at the University of Milan

2009-2020 permanent position as Research Scientist at the Institute of Molecular Science and Technology of the National Research Council (CNR-ISTM) of Milan, from 2019 Institute of Chemical Science and Technologies “G. Natta” (CNR-SCITEC)

2014-2020 member of the Coordination and of the Managing Committees of the *SmartMatLab Centre*, a multifunctional laboratory and training center (<http://users2.unimi.it/smartmatlab/wordpress/>)

2016-2020 Adjunct Professor at the University of Milan

2018 Italian National Scientific Qualification for Associate Professor in Fundamentals of Chemical Sciences and Inorganic Systems

2020 Fixed-term Research Fellow B at the Department of Chemistry of the University of Pavia

**Research topics:**

He has gained a consolidated experience in synthesis of organic, organometallic and coordination compounds, in particular of porphyrin and metalloporphyrin compounds, and their characterization by spectroscopic and electrochemical techniques.

More recently, through the up-to-date equipment of the *SmartMatLab Centre*, he has acquired new expertise in thin films deposition techniques both from solution phase (screen and ink-jet printing, spin coating) than from vapour phase (physical vapour deposition), in films thickness and roughness determination by contact profilometer and their implementation in prototype devices. In particular, he has focused his interest in assembling dye-sensitized solar cells (DSSCs) and in their photovoltaic characterization under simulated sunlight (J-V), determination of the external quantum yield (EQE/IPCE) and electrochemical impedance measurements (EIS).

His scientific activities can be divided into five main topics:

-*Supramolecular chemistry*: study of assembling and disassembling processes in solution promoted by transition metal ions of monotopic and ditopic ligands containing a fluorescent fragment; study of tetraaza-macrocyclic ligands for the sensing of metal cations and anions.

-*Nonlinear optics*: nano-organization of NLO active organic chromophores on inorganic scaffold such as cyclotetrasiloxanes; theoretical and experimental study of dependence on the metal and on the aggregation of the second order NLO responses of push-pull porphyrinic complexes substituted in *meso* position.

-*Photoluminescent materials*: synthesis and study of models of the silica surface with photoluminescent chromophores, in particular terthiophene; design, synthesis and characterization of Er<sup>3+</sup> complexes with fluorinated ligands for applications in telecommunications.

-*Photovoltaics*: synthesis of push-pull porphyrinic photosensitizers, substituted in *meso* or in  $\beta$ -pyrrolic position, for third generation solar cells, in particular Dye-Sensitized Solar Cells (DSSCs); assembly and photo-

electrochemical characterization of photovoltaic devices; synthesis of perfluorinated metalloporphyrins as photosensitizers for water photooxidation in Dye-Sensitized PhotoElectrosynthetic Cells (DSPECs).

-*Thin films*: study of the morphological and electrochemical aspect of porphyrins and metalloporphyrins thin films deposited by physical vapour deposition technique on various conductive substrates.

He is also currently involved in the design and preparation of organic precursors for the *on-surface synthesis* of 2D carbon-based materials.

#### **Scientific Publications and Bibliometric data:**

Author or co-author of 47 publications in ISI international journals with high impact factor (*h*-index 22, total citations 1097 from Google Scholar; *h*-index 21, total citations 946 from Scopus) and 1 Italian Patent (MI2011A000181).

#### **Projects and fundings:**

He has been involved in several projects funded by the Italian Ministry of University and Scientific Research MIUR (FIRB 2003, PRISMA 2007, PRIN 2010-2011 project 20104XET32 'DSSCX'), by CARIPO Foundation (CARIPO 2008), by Lombardy Region (VeLiCa 2011), by the European Community (FP7-NMP-2009 project 246124 'SANS') and by Knowledge and Innovation Community EIT Raw-Materials ('RM@Schools3.0' and 'RAISESEE' 2018).

-2014 Scientific Responsible of the CNR-ISTM Research Unit for the project 42639194 "SmartMatLab Centre", Action 1, funded by Lombardy Region (POR 2007-2013) and CARIPO Foundation, CNR-ISTM budget 192987.31 €, total budget 975250.00 €.

-2014 Scientific Responsible of the CNR-ISTM Research Unit for the project 46553458 "SmartMatLab Centre", Action 2, funded by Lombardy Region (POR-FSE 2007-2013) and CARIPO Foundation, CNR-ISTM budget 89000.00 €, total budget 239000.00 €.

-2016 Activity Responsible for the task "Study and realization of high efficiency photovoltaic materials and cells" in the project I-ZEB (Towards Intelligent Zero-Energy Buildings for Smart City Growth) funded by Lombardy Region and CNR, CNR-ISTM budget 159244.87 €, total budget 2475000.00€.

#### **Invited Talks and Seminars:**

Co-author of more than 40 communications to national and international conferences, speaker in 2 international congresses (44<sup>th</sup> ICCG, 2022; FUTURMAT 2, 2012) and in 4 national congresses (Materilas.it 2018; IMPP-1, 2013; VI Convegno Nazionale sulla Scienza e Tecnologia dei Materiali, 2007; SCI 2006).

1 invited seminar on 'Push-pull porphyrins: from NLO properties to photoelectrochemical cell application' at the Politecnico of Milan (NanoLab Talk 2019).

#### **Editorial activities:**

Guest Editor of a Special Issue in Inorganics (MDPI): Organometallic and Coordination Compounds for Optical and Energy-Related Applications.

#### **Organization of workshops:**

2017 Member of the Scientific Committee for the closing workshop of the SmartMatLab project.

#### **Referee and Research evaluation activities:**

Reviewer activities for:

- Physical Chemistry Chemical Physics;
- ACS Energy Letters;
- Journal of Physical Chemistry C;
- Spectrochimica Acta.

#### **Recent collaborations:**

- Dipartimento di Chimica, Università degli Studi di Milano (Prof. M. Pizzotti; Prof. P. R. Mussini);
- Dipartimento di Scienze Chimiche e Farmaceutiche, Università degli Studi di Ferrara (Prof. S. Caramori);
- Istituto di scienze e tecnologie chimiche "Giulio Natta" (CNR- SCITEC) di Milano (Dr. A. Bossi);

- Dipartimento di Fisica, Politecnico di Milano (Prof. G. Bussetti; Prof. A. Calloni);
- Dipartimento di Energia, Politecnico di Milano (Prof. Carlo Casari);
- Dipartimento di Fisica, Università di Milano (Prof. G. Onida, Prof. G. Fratesi, Dr. S. Achilli);
- Elettra-Sincrotrone/Istituto Officina dei Materiali (CNR-IOM) di Trieste (Dr. L. Floreano).

**Teaching:**

2016-2020: 'General and Inorganic Chemistry and Stoichiometry', Degree in Pharmacy at the University of Milan (10 CFU – 96 hours).

2016: 2 lessons entitled 'Film thickness determination: the stylus method' and 'Thin film deposition from liquid phase' covering a total of 4 hours within the course 'Smart Material and Devices: Deposition and Characterization Techniques' foreseen by the official teaching plan of the PhD School in Chemistry (XXIX-XXXI cycle) of the University of Milan.

2020-present: 'General and Inorganic Chemistry', Degree in Medicinal Chemistry and Pharmaceutical Technology at the University of Pavia (9 CFU – 72 hours).

2021-present: 'Fundamentals of Chemistry', Degree in Conservation and Restoration of Cultural Heritage at the branch in Cremona of the University of Pavia (3 CFU – 18 hours).

2022-present: 'Chemistry Lab' (GRP 2), Degree in Chemistry at the University of Pavia (3 CFU – 36 hours).

**Supervision of Students:**

Co-supervisor of 4 Master and 14 Bachelor thesis students in Chemistry and Industrial Chemistry at the University of Milan.

Supervisor of research fellows and postdocs recruited within funded projects.