

Marta PENCONI, PhD

CURRENT POSITION

Research Scientist at Institute of Chemical Science and Technologies “Giulio Natta” (SCITEC) of the National Research Council (CNR), via Fantoli 16/15, 20138 Milan (Italy)

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PREVIOUS POSITIONS

2019 PostDoc fellowship at Institute of Macromolecules Studies (ISMAC) of the National Research Council (CNR), Milan (Italy)

2014 - 2018 PostDoc fellowship at Institute of Molecular Science and Technologies (ISTM) of the National Research Council (CNR), Milan (Italy)

2012 - 2013 PostDoc fellowship at Laboratoire des Interactions Moléculaires et Réactivité Chimique et Photochimique (IMRCP) of the National Centre for Scientific Research (CNRS), Toulouse (France)

EDUCATION

2012 Ph.D. in Chemical Sciences - Physical Chemistry, University of Perugia (Italy)

2008 Master degree in Chemistry - Physical Chemistry, University of Perugia (Italy)

2006 Bachelor degree in Chemistry, University of Perugia (Italy)

Scientific activity

She received her PhD in Chemical Sciences (2012) from the University of Perugia working on photocatalysts for hydrogen production and up-conversion of incoherent light. She held a postdoctoral position (2012-2013) at the IMRCP-CNRS in Toulouse on photopolymerization processes in microheterogeneous systems. Later she was post-doc at the ISTM and ISMAC institutes of the CNR in Milan (2014-2020), where she also contributed to the setup and start-up of the SmartMatLab facility dedicated to the preparation and characterization of smart materials, thin films and devices.

As researcher at SCITEC-CNR, her research interests cover an interdisciplinary area and her main activities are focused on:

- development of novel near-infrared materials and their application in optoelectronic devices (OLEDs, DSSCs, polymeric and small molecules bulk heterojunction solar cells)
- thin film engineering for sensing and electrode protection
- photophysics of luminescent molecules, exciplex-forming pairs and charge transfer complexes.

She is co-author of 27 publications in peer reviewed international journals and 2 book chapters. She attended 14 national/international conferences.

She is a member of the Italian Photochemistry Group (GIF), part of the EPA, European Photochemistry Association.

She is a staff member of the organization secretary at the conferences 'New trends in organic synthesis' Milano, Editions 2015, 2016 and 2017

Scientific skills and expertise

Material science and devices:

- preparation of organic and inorganic thin films by means of physical vapour deposition (PVD), spin coating, screen printing and inkjet printing techniques
- assembling and opto-electrical characterization of optoelectronic devices (OLED and dye sensitized solar cells -DSSCs, polymeric and small molecules bulk heterojunction solar cells)

Photochemistry and photophysics:

- photophysical characterization (steady state and time resolved) of organic and organometallic compounds, exciplex-forming molecular pairs and charge transfer complexes in solution and thin film
- kinetic and thermodynamic study of photochemical reactions
- triplet-triplet annihilation based photon up-conversion mechanism for photovoltaic
- water (sono)photocatalysis for solar hydrogen production by metal oxide semiconductors
- photochromic reactions in non-transparent monomer-in-water miniemulsion medium

Analytical techniques:

- HPLC and mass spectrometry

Synthesis:

- inorganic solid solutions of metal oxides
- organic synthesis of chiral ionic liquid precursors
- synthesis of iridium, platinum and boron organometallic complexes

Partecipation at research project

- SAMSUNG GRO 2020 'PRIORITY: Towards effective Photoacid UV-Responsive hybrid biopolymers: from composites to all-in-one systems'
- PRIN 2017 (grant n° 2017FJCPEX) '3D-FARE: functional 3D architectures for electrochemiluminescence applications'
- ENI (grant no. 3500047796) 'Fabbricazione e caratterizzazione fotofisica di dispositivi OPV'
- Accordo Quadro tra Regione Lombardia e Consiglio Nazionale delle Ricerche 'I-ZEB Verso Edifici Intelligenti a Energia Zero per la crescita della città intelligente'
- SAMSUNG GRO 2014 and 2nd year extension 'Exciton- and polaron-induced OLED degradation by combined ab-initio molecular dynamics and experiments'
- Progetto Integrato Regione Lombardia and Fondazione CARIPLLO 'Laboratorio multifunzionale e centro di formazione per la caratterizzazione e la sperimentazione pre-applicativa di smart-materials' (grant numbers 12689/13, 7959/13, Azione 1 e 2, "SmartMatLab centre" and Cariplo Foundation grant 2013-1766)
- Fondazione Cariplo (grant n° 2011-1851) 'Inherently Chiral Ionic Liquids'
- ANR (CDII, ANR-2012-CDII-006-02) 'PHOTOEMULSION Emulsion Photopolymerization: Development of Processes and Photoreactors'
- PRIN 2008 (20088NTBKR) 'Spettroscopia e dinamica di composti organici: effetto della struttura e del mezzo sulle proprietà degli stati elettronici eccitati'

Papers in international peer-reviewed journals

- 1) M. Penconi, G. Bianchi, A. Nitti, A. Savoini, C. Carbonera, D. Pasini, R. Po, S. Luzzati, *A Donor Polymer with a Good Compromise between Efficiency and Sustainability for Organic Solar Cells*, Adv. Energy Sustainability Res., [2100069](#) (2021).
- 2) M. Penconi, L. Ferraro, J. Waluk, L. Duò, F. Ciccacci, A. Bossi, M. Campione, G. Bussetti, *Porphycene*

Films Grown on Highly Oriented Pyrolytic Graphite: Unveiling Structure–Property Relationship through Combined Reflectance Anisotropy Spectroscopy and Atomic Force Microscopy Investigations, Proceedings, 56 (2020) 44.

- 3) R. Sorrentino, **M. Penconi**, A. Andicsová-Eckstein, G. Scavia, H. Švajdlenková, E. Kozma, S. Luzzati, *An N-type Naphthalene Diimide Ionene Polymer as Cathode Interlayer for Organic Solar Cells*, *Energies*, 14 (2021) 454.
- 4) A. Bossi, J. Waluk, R. Yivlialin, **M. Penconi**, M. Campione, G. Bussetti, *Porphycene Protonation: A Fast and Reversible Reaction Enabling Optical Transduction for Acid Sensing*, *Chem. Photo. Chem.*, 4 (2020) 5264-5270.
- 5) **M. Penconi**, R. Yivlialin, G. Bussetti, L. Duò, A. Bossi, A. Orbelli Biroli, *Customised porphyrin coating films for graphite electrode protection: An investigation on the role of peripheral groups by coupled AFM and cyclic voltammetry techniques*, *Appl. Surf. Sci.*, 507 (2020) 145055.
- 6) M. Cazzaniga, F. Cargnoni, **M. Penconi**, A. Bossi and D. Ceresoli, *Ab Initio Many-Body Perturbation Theory Calculations of the Electronic and Optical Properties of Cyclometalated Ir(III) Complexes*, *J. Chem. Theory Comput.*, 16 (2019) 1188-1199.
- 7) S. Belviso, E. Santoro, **M. Penconi**, S. Righetto and F. Tessore, *Thioethyl Porphyrazines: Attractive Chromophores for Second-Order Nonlinear Optics and DSSCs*, *J. Phys. Chem. C*, 123 (2019) 13074-13082.
- 8) **M. Penconi**, M. Cazzaniga, W. Panzeri, A. Mele, F. Cargnoni, D. Ceresoli and A. Bossi, *Unraveling the degradation mechanism in FIrpic based blue OLEDs: II. Trap and detect molecules at the interfaces*, *Chem. Mat.*, 31 (2019) 2277-2285, 'back to back' paper.
- 9) M. Cazzaniga, F. Cargnoni, **M. Penconi**, A. Bossi and D. Ceresoli, *Unraveling the degradation mechanism in FIrpic based blue OLEDs: I. A theoretical investigation*, *Chem. Mat.*, 31 (2019) 2269-2276, 'back to back' paper.
- 10) **M. Penconi**, M. Cazzaniga, S. Kesarkar, C. Baldoli, P. Mussini, D. Ceresoli and A. Bossi, *β -diketonate Ancillary Ligands in Heteroleptic Iridium Complexes: a balance between synthetic advantages and photophysical troubles*, *Photochem. Photobiol. Sci.*, 17 (2018) 1169-1178.
- 11) L. Latterini, G. Massaro, **M. Penconi**, P. L. Gentili, C. Roscini and F. Ortica, *Molecular-based upconversion in homo/heterogeneous liquids and in micro/nanostructured solid materials*, *Dalton Trans.*, 47 (2018) 8557-8565.
- 12) R. Yivlialin, **M. Penconi**, G. Bussetti, A. Orbelli Biroli, M. Finazzi, L. Duò, A. Bossi, *Morphological changes of porphine films on graphite by perchloric and phosphoric electrolytes: An electrochemical-AFM study*, *Appl. Surf. Sci.*, 442 (2018) 501–506.
- 13) **M. Penconi**, M. Cazzaniga, S. Kesarkar, P. R. Mussini, D. Ceresoli, A. Bossi, *Upper limit to the ultimate achievable emission wavelength in Near-IR emitting cyclometalated Iridium complexes*, *Photochem. Photobiol. Sci.*, 20 (2017) 1220-1229.
- 14) L. Manzoni, A. Samela, S. Barbini, S. Cairati, **M. Penconi**, D. Arosio, D. Lecis and P. Seneci, *4-Connected azabicyclo[5.3.0]decane Smac mimetics-Zn²⁺ chelators as dual action antitumoral agents*, *Bioorg. Med. Chem. Lett.*, 27 (2017) 2336-2344.
- 15) R. Yivlialin, G. Bussetti, **M. Penconi**, A. Bossi, F. Ciccacci, M. Finazzi and L. Duò, *Vacuum-Deposited Porphyrin Protective Films on Graphite: Electrochemical Atomic Force Microscopy Investigation during Anion Intercalation*, *Appl. Mater. Interfaces*, 9 (2017) 4100–4105.
- 16) S. Kesarkar, W. Mróz, **M. Penconi**, M. Pasini, S. Destri, M. Cazzaniga, D. Ceresoli, P. R. Mussini, C. Baldoli, U. Giovanella, A. Bossi, *Near-IR Emitting Iridium(III) Complexes with Heteroaromatic β -Diketonate Ancillary Ligands for Efficient Solution-Processed OLEDs: Structure–Property Correlations*, *Angew. Chem.*, 128 (2016) 2764-2768.
- 17) **M. Penconi**, A. Cesaretti, F. Ortica, F. Elisei, P.L. Gentili, *Photoluminescence properties of La_{2x}Ga_{2y}In_{2z}O₃ solid solutions used as photocatalysts for water splitting and promising panchromatic emitters*, *J. Lumin.*, 177 (2016) 314–324.
- 18) A. Chemtob, E. Lobry, A. Rannée, F. Jasinski, **M. Penconi**, E. Oliveros, A. M. Braun and A. Criqui, *Flash Latex Production in a Continuous Helical Photoreactor: Releasing the Brake Pedal on Chain Radical Polymerization*, *Macromol. React. Eng.*, 10 (2016) 261-268.
- 19) **M. Penconi**, F. Rossi, F. Ortica, F. Elisei, P.L. Gentili, *Hydrogen Production from Water by Photolysis, Sonolysis and Sonophotolysis with Solid Solutions of Rare Earth, Gallium and Indium Oxides as Heterogeneous Catalysts*, *Sustainability*, 7 (2015) 9310-9325.

- 20) **M. Penconi**, E. Lobry, F. Jasinski, A. Chemtob, C. Croutxe-Barghorn, A. Criqui, A. Braun, E. Oliveros, *The use of chemical actinometry for the evaluation of light absorption efficiency in scattering photopolymerizable miniemulsions*, *Photochem. Photobiol. Sci.*, **14** (2015) 308-319.
- 21) E. Lobry, F. Jasinski, **M. Penconi**, A. Chemtob, C. Croutxe-Barghorn, E. Oliveros, A. Braun, A. Criqui, *Synthesis of acrylic latex via microflow miniemulsion photopolymerization using fluorescent and LED UV lamps*, *Green Proc. Synth.*, **3** (2014) 335-344.
- 22) E. Lobry, F. Jasinski, **M. Penconi**, A. Chemtob, C. Croutxe-Barghorn, E. Oliveros, A. Braun, A. Criqui, *Continuous-flow synthesis of polymer nanoparticles in a microreactor via miniemulsion photopolymerization*, *RSC Adv.*, **4** (2014) 43756-43759.
- 23) E. Lobry, F. Jasinski, **M. Penconi**, A. Chemtob, C. Croutxe-Barghorn, E. Oliveros, A. Braun, A. Criqui, *Absorption and scattering in concentrated monomer miniemulsions: static and dynamic investigations*, *Macromol. Chem. Phys.*, **215** (2014) 1201-1211.
- 24) **M. Penconi**, P.L. Gentili, G. Massaro, F. Elisei, F. Ortica, *A triplet-triplet annihilation based up-conversion process investigated in homogeneous solutions and oil-in-water microemulsions of a surfactant*, *Photochem. Photobiol. Sci.*, **13** (2014) 48-61.
- 25) **M. Penconi**, F. Ortica, F. Elisei, P.L. Gentili, *New molecular Pairs for Low Power Non-Coherent Triplet-Triplet Annihilation Based Upconversion: Dependence on the Triplet Energies of Sensitizer and Emitter*. *J. Lumin.*, **135** (2013) 265-270.
- 26) P.L. Gentili, **M. Penconi**, F. Costantino, P. Sassi, F. Ortica, F. Rossi, F. Elisei, *Structural and photophysical characterization of some $La_{2x}Ga_{2y}In_{2(1-x-y)}O_3$ solid solutions, to be used as photocatalysts for H_2 production from water/ethanol solutions*, *Sol. Energy Mater. Sol. Cells*, **94** (2010) 2265-2274.
- 27) P.L. Gentili, **M. Penconi**, F. Ortica, F. Cotana, F. Rossi, F. Elisei, *Synergistic effects in hydrogen production through water sonophotolysis catalyzed by new $La_{2x}Ga_{2y}In_{2(1-x-y)}O_3$ solid solutions*, *Int. J. Hydrog. Energy*, **34** (2009) 9042-9049.

Book chapters

- 1) P.L. Gentili, F. Rossi, **M. Penconi**, F. Ortica, F. Elisei, *Hydrogen production through sono-photolysis of water in the presence of solid solutions of metal oxides as photocatalysts*, Expert Commentary in 'Hydrogen Production: Prospects and Processes', Editors D.R. Honnery and P. Moriarty, Nova Science Publishers, Inc. 2011, Ch.14, pp. 413-422.
- 2) A. Bossi, **M. Penconi**, R. Yivlialin, L. Duo` and G. Bussetti, *Exploring the Role of Porphyrin Films in Graphite Electrode Protection*, in 'Encyclopedia of Interfacial Chemistry: Surface Science and Electrochemistry', Ed. K. Wandelt, Elsevier, 2018, vol. 3, pp. 107-118.

Attended Conferences

- XXVII Congresso Nazionale della Società Chimica Italiana, web conference, September 14th-23rd 2021
- UK-IT Joint Meeting on Photochemistry 2019 Lipari, June 24th-26th 2019
- The Next Generation IV PV Materials, Groningen (Netherlands), June 9th-12th 2019
- Italian Photochemistry Meeting, Perugia, December 14th-16th 2017
- Nanoscience and Nanotechnology 2017, INFN – LNF, Frascati, October 16th-20th 2017, **invited speaker** 'From tailored molecules to advanced nanomaterials'
- Joint Congress of the French and Italian Photochemists and Photobiologists, Bari, September 19th-22nd 2016
- Chemistry Materials and Light, Bologna, September 21st -23rd 2015
- Italian Photochemistry Meeting, Cascina Caremma, Milano, November 27th-29th 2014
- International Conference on Photochemistry ICP, Leuven (Belgium), July 21st-26th 2013
- Journées de Printemps 2013 du Groupe Français de Photochimie, Photophysique et Photosciences GFP2P, Grenoble (France), May 30th-31st 2013
- X National Congress on Supramolecular Chemistry, Perugia, September 25th-28th 2011
- XXX Convegno Interregionale TUMA 2011, Perugia, June 30th – July 1st 2011
- Italian Photochemistry Meeting, Giardini Naxos, Messina, June 10th-12th 2011
- XXVIII Convegno Interregionale TUMA 2009, Tirrenia, Pisa, September 20th-22nd 2009