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## Education

### November 2015–2018

- **Ph.D, Chemical and Pharmaceutical Sciences**, Università degli Studi di Siena (Italy) in collaboration with CNR-ICCOM (Italian National Research Council-Institute of Chemistry of Organometallic Compounds). Dissertation title: “*Design and synthesis of new compounds for photovoltaic applications and photocatalytic H<sub>2</sub> production*”. Tutor: Dr. Gianna Reginato.

### February - June 2018

- **Visiting Ph.D. Student**, POLYMAT, Donostia-San Sebastián, (Spain) Project: “*Synthesis and characterization of new Hole Transporting Materials(HTMs) for perovskite solar cells (PCSS) applications*”. Tutor: Prof. Juan Luis Delgado

### November 2012- April 2015

- **Master degree, Scienze Chimiche (LM54)** at Università degli Studi di Firenze (Firenze), Italy  
Curricula: Synthesis, structure and properties of organic compounds Thesis title: “*Design and synthesis of organic photosensitizers for third- generation solar cells (DSSCs) application with sulfur anchors groups.*”
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## Work Experience

### April 2023 - Current

- **Researcher (RTDa)**, Università degli studi Milano Bicocca, department of Materials Science and Milano-Bicocca Solar Energy Research Center – MIB-Solar

### July 2019 - January 2023

- **Postdoctoral collaboration contract**, Tissue Electronics lab, Center for Advanced Biomaterials for Healthcare (CABHC), Istituto Italiano di Tecnologia (IIT), Italy. P.I.Prof. Francesca Santoro
- **Co-founder of BRYLA**, a startup project featured by Istituto Italiano di Tecnologia (Italy), with the aim of developing a photovoltaic platform for cell stimulation in the wound care field.

### February - July 2019

- **Assegno di ricerca “professionalizzante”**, CNR-ICCOM, Italian National Research Council-Institute of Chemistry of Organometallic Compounds, Firenze, 50019, Italy. P.I. Dr. Alessandro Mordini

### May-September 2015

- **Post degree Internship**, Chalmers Tekniska Hogskola, Maskingränd, Göteborg (Sweden), with the Erasmus+ program (EU programme for education, training, youth and sport.) Project “*Effect of Cation Size on Solid Polymer Electrolyte Based Dye- Sensitized Solar Cells*” Tutor: Prof. Bengt-Erik Mellander
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## Abroad Experiences

### September 2009-April 2010

- **Visiting bachelor student** at the “Universitat de València” with the Erasmus Programme (“EuRopean Community Action Scheme for the Mobility of University Students”).

### May- September 2011

- **Post degree Internship** at Chalmers Tekniska Hogskola, Maskingränd, Göteborg (Sweden), with the Erasmus+ program, EU programme for education, training, youth and sport.

### February-June 2018

- **Visiting Ph.D. Student**, POLYMAT, Donostia-San Sebastián, (Spain).

## Teaching activities

### 2018-Current

- Supervisor of pre and post graduate students and PhD students.
- Cotutor of pre and post graduate students and PhD students.

### October 2023

- Professor of the course: "**Laboratorio di Chimica Organica II**" (*Organic Chemistry Lab II*) of the beachelor degree course "*Scienze e tecnologie chimiche*" at the Material Science Department, Università degli Studi Milano Bicocca.

### October 2024

- Professor of the course: "**Laboratorio di Chimica Organica II**" (*Organic Chemistry Lab II*) of the beachelor degree course "*Scienze e tecnologie chimiche*" at the Material Science Department, Università degli Studi Milano Bicocca.

### September 2024

- Professor of the post degree course: "**Didattica e metodologie didattiche e laboratoriali della Chimica organica e della biochimica**" (*Teaching and teaching and laboratory methodologies of organic chemistry and biochemistry*) (A34), Università degli Studi Milano Bicocca.

### April 2025

- Professor of the PhD course: "**Light-to-Electricity Devices, from Silicon Integration to Biological Frontiers**" at the Material Science Department, Università degli Studi Milano Bicocca.

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## Institutional roles

### January 2022- 2024

- Società Chimica Italiana (SCI)  
**Gruppo Interdivisionale di Diffusione della Cultura Chimica**  
Member of the Board of Directors

### January 2025- 2027

- Società Chimica Italiana (SCI)  
**Gruppo Interdivisionale di Diffusione della Cultura Chimica**  
Coordinator of the Board of Directors

## Other roles

- Review Editor for Organic Chemistry of the Open Access Research Publishers **Frontiers**

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## Technical skills and competences

- **Synthetic skills:** Organic and organometallic synthesis techniques, C-H activation/ Cross-Dehydrogenative Coupling, Click Chemistry and organicsurface functionalization.
- **Electrochemical skills:** Electrochemical and photoelectrochemical measurements monitored through the use of IC (Ion chromatography) and GS (Gas chromatography) instruments.
- **Chemical analysis techniques:** mass spectrometry (ESI-MALDI), HPLC,  $^1\text{H}$  and  $^{13}\text{C}$  NMR, UV-vis and fluorescence spectroscopy.
- **Devices Fabrication and characterization:** Good expertise in the fabrication and characterization of DSSCs (Dye sensitized solar cells), OPVs (Organic photovoltaic devices), OECTs (Organic electrochemical Transistors).
- **Microfabrication:** Micromilling, UV-Ozone and Oxygen plasma surface treatment, photolithography, wet etching (piranha, acid assisted metal etching), electrodeposition techniques, spin coating, drop casting, thermal evaporation and sputtering.
- **Thin-film characterization techniques:** optical microscopy, optical and stylus profilometer, contact angle, Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM).

- **Electrical characterization:** electronic and optoelectronic devices (DSSCs, OPVs, OECTs), Cyclic voltammetry (CV), impedance spectroscopy (EIS).
  - **Cell culture:** maintaining aseptic technique, preparing media with the appropriate characteristics, splitting and plating, freezing and storage, recovering frozen stocks, and counting viable, fluorescent staining procedures and related fluorescent spectroscopy techniques.
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## Language skills

- **Italian** Mother tongue
  - **English** Fluent
  - **Spanish** Fluent
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## Digital and Informatics Skills

- Microsoft Office™, Adobe Illustrator
  - **Softwares for chemical analysis:** ChemDraw™, MarvinSketch, MestReNova, ACD labs
  - **Software for data analysis:** OriginPro 8.5, ImageJ, GraphPad
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## Organizational, managerial and softskills

- **Good organizational and leadership skills** acquired during periods of tutoring and training to undergraduate students.
- **Good social skills** and good ability of working in team and in multidisciplinary environments thanks to collaborations with different research groups.
- **Good managerial skills** acquired thank to the participation at several pre-acceleration programs with the startup project "BRYLA": *Startup Wise Guys* (SWG), *Bocconi for innovation* (B4i), *VulcanicaMente* and the Participation in the *18th edition of PNICube2020* (Premio Nazionale dell'Innovazione 2020) winning the "Equal Opportunity" Special Mention. Six-week project with *MBA student (MBA in International Business)* in the "*New Product Development*" course at MIB Trieste (Trieste School of Management). Lectures on "BRYLA project" and pitching sessions to help develop the customer experience and product concept.

### **Organizing activities details:**

- Local organizing committee of "SISOC X" 10th (Spanish Italian Symposium of Organic Chemistry 17-20th July 2014, Florence, Italy).
- Local organizing committee of "ENERCHEM1" First Congress of the Interdivisional - Group of the Italian Chemical Society on Chemistry of Renewable Energies, 18-20th February 2016, Florence, Italy.
- Local organizing committee of "ICOMC 2018" 28th International Conference on Organometallic Chemistry, 15th July 2018 Florence, Italy.
- Local organizing committee of "ORBITALY 2019" (Organic Bioelectronics Italy), 20th October 2019, Naples, Italy.
- Organizing committee of "SCI\*C 2022" (Scuola in comunicazione della chimica), 20th November 2022, Rimini, Italy.
- Organizing committee of "CHIMICAPISCE? 2022" (Concorso di comunicazione delle Scienze Chimiche per gli under 35, organizers: Gruppo Interdivisionale di Diffusione della Cultura Chimica), 24th May 2022, Rome, Italy.
- Organizing committee of "CHIMICAPISCE? 2023" (Concorso di comunicazione delle Scienze Chimiche per gli

under 35, organizers: Gruppo Interdivisionale di Diffusione della Cultura Chimica), 23th May 2023, Bari, Italy.

- Local organizing committee of "SCI2024" XXVIII Congresso Nazionale della Società Chimica Italiana, 26th - 30th of August 2024, Milano, Italy.

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## Peer-reviewed papers

- 15) G. Salerno, D. Franchi, A. Dessì, M. Bartolini, N. Manfredi, and A. Abbotto, \* O. Bettucci\*, *Optimizing DSSCs performance for indoor lighting: matching organic dyes absorption and indoor lamps emission profiles to maximize efficiency*, Chemistry open, 2025, e202400464
- 14) G. Salerno+, O. Bettucci+, N. Manfredi, L. Stendardo, E. Veronese, P. Metrangolo, A. Abbotto, *Tailored Metal-Porphyrin Based Molecular Electrocatalysts for Enhanced Artificial Nitrogen Fixation to Green Ammonia*, Global Challenges, 2024, 8, 2300345
- 13) U. Bruno, D. Rana, C. Ausilio, A. Mariano, O. Bettucci, S. Musall, C. Lubrano, F. Santoro, *An organic brain-inspired platform with neurotransmitter closed-loop control, actuation and reinforcement learning*. Mater Horiz. 2024, 11, 2865
- 12) O. Bettucci, G. Salerno, N. Manfredi, A. Abbotto, *Molecular electro- and photocatalytic approach to artificial nitrogen fixation for the synthesis of green ammonia*, Tetrahedron Green Chem, Volume, 2024, 3, 100040,
- 11) C. Lubrano+, O. Bettucci+, G. Dijk, A. Salleo, A. Giovannitti, F. Santoro, *The impact of hydrogen peroxide production in oects for in vitro applications*, J. Mater. Chem. C, 2023, 12, 1625
- 10) G. Salerno, B. Cecconi, O. Bettucci, M. Monai, L. Zani, D. Franchi, M. Calamante, Dr. A. Mordini, T. Montini, P. Fornasiero, N. Manfredi, A. Abbotto. *Enhanced Long-Term Stability of a Photosensitizer with a Hydroxamic Acid Anchor in Dye-Sensitized Photocatalytic Hydrogen Generation*, Eur. J. Org. Chem., 2023, 26, e202300924
- 9) F. Corrado, U. Bruno, M. Prato, A. Carella, V. Criscuolo, A. Massaro, M. Pavone, A. B. Muñoz-García, S. Forti, C. Coletti, O. Bettucci\*, F. Santoro\*. *Azobenzene-based optoelectronic transistors for neurohybrid building blocks*, Nat Commun, 2023, 14, 6760.
- 8) A. Ruggiero, V. Criscuolo, C. Grasselli, U. Bruno, C. Ausilio, C. L. Bovio, O. Bettucci\*, F. Santoro *Two-photon polymerization lithography enabling the fabrication of PEDOT:PSS 3D structures for bioelectronic applications*, ChemComm, 2022, 58, 9790-9793.
- 7) O. Bettucci\*, G.M. Matrone\*, F. Santoro, *Conductive polymer-based bioelectronic platforms towards sustainable and biointegrated devices: a journey from skin to brain across human body interfaces*, Advanced Materials Technologies, 2022, 7, 2100293.
- 6) O. Bettucci, J. Pascual, S.-H. Turren-Cruz, A. Cabrera-Espinoza, W. Matsuda, S. F. Völker, H. Köbler, I. Nierengarten, G. Reginato, S. Collavini, S. Seki, J.-F. Nierengarten, A. Abate, J. L. Delgado, *Dendritic-like Molecules Built on a Pillar[5]arene Core as Hole Transporting Materials for Perovskite Solar Cells*, Chemistry a European Journal, 2021, 27, 8110–81.  
- Front Cover (Chem. Eur. J. 31/2021): <https://doi.org/10.1002/chem.202101411>
- 5) O. Bettucci, T. Skaltsas, M. Calamante, A. Dessì, G. Reginato, A. Mordini P. Fornasiero L. Zani, *Combining dithienosilole-based organic dyes with a brookite/Pt photocatalyst towards enhanced visible light-driven hydrogen production*, ACS Applied Energy Materials 2019, 2, 5600.
- 4) O. Bettucci, D. Franchi, A. Sinicropi, M. di Donato, P. Foggi, F. Fabrizi de Biani, G. Reginato, L. Zani, M. Calamante, A. Mordini, *Tailoring the Optical Properties of Organic D- $\pi$ -A Photosensitizers: Effect of Sulfur Introduction in the Acceptor Group*, Eur. J. Org. Chem. 2019, 4, 812.
- 3) C. Papucci, T. A. Geervliet, D. Franchi, O. Bettucci, A. Mordini, G. Reginato, F. Picchioni, A. Pucci, M. Calamante, Lorenzo Zani, *Green/Yellow-emitting Conjugated Heterocyclic Fluorophores for Luminescent Solar Concentrators*, Eur. J. Org. Chem. 2018, 20, 2657.
- 2) O. Bettucci, V. S. Becerril, T. M. W. J. Bandara, M. Furlani, M. Abrahamsson, B.-E. Mellander, L. Zani, *Organic*

dye-sensitized solar cells containing alkaline iodide-based gel polymer electrolytes: influence of cation size, Phys. Chem. Chem. Phys., 2018, 20, 1276.

1) A. Macchia, O. Bettucci, E. Gravagna, D. Ferro, R. Albini, B. Mazzei, L. Campanella, *Calcium Hydroxide Nanoparticles and Hypogeum Environment: The Best Way of Application*, Journal of Nanomaterials, 2014, 1.

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## Conferences

- **ENERCHEM-1 The first Congress of the Interdivisional Group of the Italian Chemical Society on Chemistry of Renewable Energies (Firenze, Italy)** Poster: "Efficiency enhancement by mixed cation effect in dye-sensitized solar cells with PAN based gel polymer electrolyte".
- **Swiss Symposium and Summer School 2016: Solar Light to Chemical Energy Conversion (Les Diableret, Switzerland)** Poster: "Role of sulfur in the absorption spectrum bathochromic shift of organic dyes for DSSC".
- **XXXVII Convegno Nazionale della Divisione Chimica Organica (Venezia, Italy)** Oral communication: "Role of sulfur in the absorption spectrum bathochromic shift of organic dyes for DSSC".
- **ISOC: XI Edition of the International School of Organometallic Chemistry Organometallic chemistry San Benedetto, (Italy)** Poster: "Bathochromic shift induced by sulfur-containing anchoring groups of organic dyes for DSSC".
- **ISOS 2018. XLIII "A. Corbella" International Summer School on Organic Synthesis (Gargnano, Italy)** Oral communication: "D- $\pi$ -A Dyes for photoactivated H<sub>2</sub> production: the role of alkyl chains in dithienosilole core structures".
- **ICOMC 28th International Conference on Organometallic Chemistry (Firenze, Italy)** Poster: "D- $\pi$ -A Dyes for photoactivated H<sub>2</sub> production: the role of alkyl chains in dithienosilole core structures".
- **OESS Organic electronics Summer School 2019 (Bordeaux, France) The 13th edition of the International School on Hybrid and Organic Photovoltaics (ISOPHOS®) (Castiglione della Pescaia, Italy)**  
Poster: "Photovoltaic devices for cell-chip biological coupling".
- **OrBitaly 2019 Organic Bioelectronics Italy (Naples, Italy)** Poster: "Photovoltaic devices for cell-chip biological coupling".
- **OrBitaly 2022 Organic Bioelectronics Italy (Erice, Italy)** Oral communication: "Light-Responsive PEDOT:PSS for optically modifiable organic electrochemical transistors (OECTs)".
- **nanoGE conference-Light Actuators for Optical Stimulation of Living Systems (LIV-ACT) 2022** Oral communication: "Azobenzene-based PEDOT:PSS for optically modifiable organic electrochemical transistors (OECTs)".
- **CDCO XLI Convegno Nazionale della Divisione di Chimica Organica della Società Chimica Italiana 2023** Oral communication: "Light responsive PEDOT:PSS for optically modifiable organic photoelectrochemical transistor (OPECTs)".
- **NTOS: new trends in organic synthesis 2023** Poster: Azobenzene-based optoelectronic transistor and its applications as neurohybrid building blocks.
- **E-MRS (European Materials Research Society) SPRING MEETING 2024** Oral presentation: Azobenzene-based organic photoelectrochemical transistor (OPECT) transistor and its applications as neurohybrid building blocks.
- **"SCI2024" XXVIII Congresso Nazionale della Società Chimica Italiana, 2024** Oral presentation: Tailored Metal Porphyrin-Based Electrocatalyst for Applications in Artificial Nitrogen Fixation to Ammonia.

## Awards

- **Winners of 3<sup>rd</sup> place of “Premio Giovani Talenti 2024”** (Young Talents Award) of the University of Milan-Bicocca with the patronage of the Accademia Nazionale dei Lincei *“For scientific and analytical contributions to the development of biocompatible electronic devices for biomedical applications, including azobenzene-based optoelectronic transistors.”*
- **Winner of the 1<sup>st</sup> prize** at the competition “Famelab, talking science” Genova selection, Italy
- **Winners of 4<sup>th</sup> place in the “Startup Campania 2020”** competition and the “Equal Opportunity” Special Mention, with the startup project “BRYLA”
- **BEST ORAL PRESENTATION at nanoGE conference-Light Actuators for Optical Stimulation of Living Systems (LIV-ACT) (2022)** Oral communication: “Azobenzenes-based PEDOT:PSS for optically modulable organic electrochemical transistors (OECTs)”
- **BEST POSTER PRIZE at Swiss Symposium and Summer School 2016:** Solar Light to Chemical Energy Conversion (Les Diableret, Switzerland) Poster: “Role of sulfur in the absorption spectrum bathochromic shift of organic dyes for DSSC”

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## Outreach and dissemination activities

- **Creator of the scientific dissemination project:** StreetScience available on the social platforms.
- **Scientific writer and content creator** for *Mondadori Edu* and *Rizzoli Edu*.
- **Freelance scientific writer** for “Galileo, giornale di Scienza” and “Science in school” and “Sapere” (Dedalo).
- **Scientific coordinator of the didactic laboratory:** “Da Newton alla street art” at Festival della Scienza di Genova, (2022).
- *Scientific Organizers: Interdivisional group of “Diffusione della Cultura Chimica” (Società Chimica Italiana).*
- **Scientific coordinator of the didactic laboratory** “Transizione corpo macchina” at Futuro Remoto festival (Naples), (2021).
- *Scientific Organizers: Tissue Electronics lab, Istituto Italiano di Tecnologia, Italy.*
- **TV host of the children's RAI television program:** *La Banda dei Fuoriclasse*, RaiGulp. (2021).
- **Participation to the competition “Famelab, talking science”,** National final 2020, Trieste, Italy.