

Lorenzo M Mosca, PhD

(he/him they/them)

Assistant Professor of Chemistry

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Education and Training

Doctorate in chemistry (PhD) | University of Pavia, Italy | November 2007 – January 2010

Advisor: Prof Luigi Fabbrizzi

Dissertation title: *Anion Receptors from hydrogen bonding and metal-to-ligand interactions.*

Laurea in chemistry *summa cum laude* (MSc) | University of Pavia, Italy | October 2005 – September 2007

Advisor: Prof. Luigi Fabbrizzi

Dissertation title: *Anion-thiourea interaction controlled by metal centres.*

Diploma in chemical sciences (BSc) | University of Pavia, Italy | October 2002 – October 2005

Advisor: Prof. Luigi Fabbrizzi

Dissertation title: *Molecular machines based on π - π interactions.*

CIRTL Associate Certification | Searle Center for Advanced Learning and Teaching | Northwestern University
September 2020

5th national school of photochemistry | September 2010 | University of Bologna – Italy

Work Experience

Northwestern University | 2145 Sheridan Road, Evanston IL, 60208

Advisor: Prof Sir J Fraser Stoddart

Post-doctoral | August 2016 – July 2021 | I develop supramolecular systems that can form fibrils via a self-assembly–replication process (in collaboration with Professor Douglas Philp) and I study the effect of molecular building blocks on the operation and efficiency of molecular pumps.

Lab Manager | March 2017 – July 2021 | I supervise the day-to-day operations and long-term reorganization of a group of 30+ people (mostly post-doctoral) during the integration of Prof Douglas Philp's and Dr Mark A. Olson's lines of research. I manage capital and non-capital equipment expenditures of \$ 1.5M spread over 3 years. I successfully reorganized and streamlined maintenance, safe practices, chemical inventory, waste generation and disposal, group jobs, onboarding/offboarding of group members. Currently I am developing a web-based system for the seamless integration of equipment reservation/logging, inventory, SOPs, ELN, safety, and group collaborations.

Service | March 2021 | External Program Review for the Department of Chemistry at NU, Postdoctoral scholar panel.

Service | March 2021 | Judge for the Illinois Junior Academy of Sciences (IJAS) section 9 Science fair.

Bowling Green State University | 1001 Wooster St., Bowling Green, OH, 43403

Advisor: Prof Pavel Anzenbacher, Jr

Post-doctoral | January 2012 – July 2016 | I developed a systematic, modular approach to the colorimetric and fluorimetric sensing of explosives. This approach for sensing relied on the reactivity of the explosive molecule toward a functional group; I installed the functional group on reporting groups (colorimetric or fluorometric) to obtain a sensor. Through this approach, I successfully managed to achieve the first example of selective turn-on fluorescence sensing of RDX.

Grant Writing | DoD fully funded (\$ 585'000) a project related to the development of colorimetric and fluorometric sensors for explosives in late 2012, originating from my preliminary results and proposal writing. I have written

several grant proposals with my advisor, Prof Pavel Anzenbacher. I wrote detailed research plans containing original ideas and preliminary results for NSF's CHE- and CMI-divisions, and Samsung GRO funding.

Organizational Skills | September 2013 – July 2016 | I supervised the day-to-day operations a group of 10+ students and post-docs. I managed grant agency reporting and expenditures of about \$ 2M over 3 years. I supervised the refurbishment and modernization of laboratories and office for group members. I managed operations and maintenance MALDI-TOF-HRMS and HPLC-ESI-TQ (Shimadzu), two SPC-Fluorimeters (EI), and absolute quantum yield integrating sphere (Hamamatsu) from 2013 to 2016.

University of Pavia | viale Taramelli 12, 20900, Pavia, Italy

Advisor: Prof Luigi Fabbrizzi

Cariplo trust post-doctoral research fellow | November 2010 – October 2011 | I developed a strategy for the capture and conversion of CO₂ into chemical intermediates using electrocatalysis with square-planar complexes of nickel(II).

Grant Writing | I assisted in the preparation of several grant proposals for PRIN (National Interest Research Projects), MIUR (Department of Education, University and Research), Cariplo Trust Foundation, FIRB (Future in Basic Research). I lead the operations and maintenance of Thermo-Fisher ESI/APCI LTQ Mass Spectrometer for the period 2007–2011.

Teaching Experience

7 courses, 250+ hours

Organic chemistry mechanisms – CHEM 4420/5420 Graduate program in Photochemical Sciences

Total: 10+ hours per semester | 4 semesters | Bowling Green State University | January 2012 – May 2016

Course teacher: Professor Pavel Anzenbacher, Jr.

Organic chemistry – CHEM 3410/3440 – Total: 10+ hours per semester | 3 semesters

Bowling Green State University | Fall Semesters | August 2013 – December 2015

Course teacher: Professor Pavel Anzenbacher, Jr. | Dr. Jeremy K. Klosterman (now at UCSD)

Lecturer (short-term) – inorganic chemistry (undergraduate program in Chemistry for working students)

Total: 6 credits, 50 hours | University of Pavia | Spring semester | March 2009 – July 2009

Lecturer (short-term) – inorganic and organic chemistry

Total: 20 hours | Preparatory lectures and assignments for the Italian Team at the International Chemistry Olympiad Almo Collegio Borromeo | University of Pavia | June 2008

Lecturer (short-term) – general chemistry (undergraduate program in Biological Sciences)

Total: 30 hours | 4 semesters

University of Pavia | Fall semesters | October 2005 – February 2009

Lecturer (short-term) – general chemistry (undergraduate program in Chemistry and Pharmaceutical Sciences)

Total: 30 hours | 1 semester

University of Pavia | Fall semesters | October 2007 – February 2008

Laboratory teaching assistant – general chemistry (undergraduate program in Biological Sciences)

Total: 30 hours | 3 semesters

University of Pavia | Fall semesters | October 2004 – January 2007

Publications

Citations: 1300+ h-index: 17

Exploiting Zn(II) and Cu(II) fluorescent complexes for enantiomeric excess determination of hydroxycarboxylates. Sheykhi, S.; Mosca, L.; Pushina, M.; Anzenbacher, P. Jr. *Chem. Commun.* **2020**, 56, 8964–8967.

Cyclotris(paraquat-p-phenylene).

Anamimoghadam, O.; Cooper, J. A.; Nguyen, M. T.; Guo, Q.-H.; Mosca, L.; Roy, I.; Sun, J.; Stern, C. L.; Redfern, L.; Farha, O. K.; Stoddart, J. F. *Angew. Chem. Int. Ed.* **2019**, 58, 13778–13783. **Hot Paper.**

An indicator displacement assay recognizes enantiomers of chiral carboxylates.

Sheykhi, S.; Mosca, L.; Durgala, J. M., Anzenbacher, P. Jr. *Chem. Commun.* **2019**, 55, 7183–7186.

Controlling dual molecular pumps electrochemically.

Pezzato, C.; Nguyen, M. T.; Kim, D. J.; Anamimoghadam, O.; Mosca, L.; Stoddart, J. F. *Angew. Chem. Int. Ed.* **2018**, *57*, 9325–9329.

Toward wearable sensors: optical sensor for detection of ammonium nitrate-based explosives, ANFO and ANNM.
Sheykhi, S.; Mosca, L., Anzenbacher, P. Jr. *Chem. Commun.* **2017**, *53*, 5196–5199.

A tale about simplicity and imagination.

Mosca, L. *Chem.* **2017**, *2*, 160–161.

Bowl-shaped Tröger's bases and their recognition properties.

Mosca, L.; Čejka, J.; Dolenský, B.; Havlík, M.; Jakubek, M.; Kaplánek, R.; Král, V.; Anzenbacher, P. Jr.; *Chem. Commun.* **2016**, *52*, 10664–10667.

Fluorescent zinc and copper complexes for detection of Adrafinil in paper-based microfluidic devices.

Caglayan, M. G.; Sheykhi, S.; Mosca, L., Anzenbacher, P., Jr. *Chem. Commun.* **2016**, *52*, 8279–8282.

Tetraaryl pyrenes: photophysical properties, computational studies, crystal structures, and application in OLEDs.

El-Assaad, T. H.; Auer, M.; Castañeda, R.; Hallal, K. M.; Jradi, F. M.; Mosca, L.; Khnayzer, R. S.; Patra, D.; Timofeeva, T. V.; Brédas, J.-L.; List-Kratochvil, E. J. W.; Wex, B.; Kaafarani, B. R. *J. Mater. Chem. C* **2015**, *4*, 3041–3058.

Small-molecule turn-on fluorescent probes for RDX.

Mosca, L.; Karimi Behzad, S.; Anzenbacher, P. Jr. *J. Am. Chem. Soc.* **2015**, *137*, 7967–7969.

Sensing of enantiomeric excess in chiral carboxylic acids.

Akdeniz, A.; Mosca, L.; Minami, T.; Anzenbacher, P. Jr. *Chem. Commun.* **2015**, *51*, 5770–5773.

Sensing of TNT and 2,4-DNT in the solid state with photo-luminescent Ru(II) and Ir(III) complexes.

Mosca, L.; Khnayzer, R. S.; Lazorski, M. S.; Danilov, E. O.; Castellano, F. N.; Anzenbacher, P. Jr. *Chem. Eur. J.* **2015**, *21*, 4056–4064.

First supramolecular sensors for phosphonate anions.

Esipenko, N. A.; Koutník, P.; Minami, T.; Mosca, L.; Lynch, V. M.; Zyryanov, G. V.; Anzenbacher, P. Jr. *Chem. Sci.* **2013**, *4*, 3617–3613.

The interaction of fluoride with fluorogenic ureas: An ON¹–OFF–ON² response.

Amendola, V.; Bergamaschi, G.; Boiocchi, M.; Fabbrizzi, L.; Mosca, L. *J. Am. Chem. Soc.* **2013**, *135*, 6345–6355.

Host-guest complexes of pentyptcene receptors display edge-to-face interaction.

Mosca, L.; Koutník, P.; Lynch, V. M.; Zyryanov, G. V.; Esipenko, N. A.; Anzenbacher, P. Jr. *Cryst. Growth Des.* **2012**, *12*, 6104–6109.

Iptycene-based fluorescent sensors for nitroaromatics and TNT.

Anzenbacher, P. Jr.; Mosca, L.; Palacios, M. A.; Zyryanov, G. V.; Koutník, P.; *Chem. Eur. J.* **2012**, *18*, 12712–12718.

Moderate and advanced intramolecular proton-transfer in urea-anion hydrogen-bonded complexes.

Baggi, G.; Boiocchi, M.; Fabbrizzi, L.; Mosca, L. *Chem. Eur. J.* **2011**, *17*, 34, 9423–9429.

Urea-, squaramide-, sulfonamide-based anion receptor: a thermodynamic study.

Amendola, V.; Fabbrizzi, L.; Mosca, L.; Schmidtchen, F.-P. *Chem. Eur. J.* **2011**, *17*, 21, 5972–5981.

Anion recognition by hydrogen bonding: urea-based receptors.

Amendola, V.; Fabbrizzi, L.; Mosca, L. *Chem. Soc. Rev.* **2010**, *39*, 3889–3915. **Top ten most accessed review in September 2010:** <http://blogs.rsc.org/cs/2010/11/04/top-ten-most-accessed-articles-in-september/>

Octahedral copper(II) and tetrahedral copper(I) double-strand helicates: chiral self-recognition and redox behavior.

Amendola, V.; Boiocchi, M.; Brega, V.; Fabbrizzi, L.; Mosca, L. *Inorg. Chem.* **2010**, *49*, 997–1007.

Template synthesis of azacyclam metal complexes using primary amides as locking fragments.

Fabbrizzi, L.; Licchelli, M.; Mosca, L.; Poggi, A. *Coord. Chem. Rev.* **2010**, 254, 1628–1636.

Templated synthesis of copper(II) azacyclam complexes using urea as locking fragment and their metal-enhanced binding tendencies towards anions.

Boiocchi, M.; Fabbrizzi, L.; Garolfi, M.; Licchelli, M.; Mosca, L.; Zanini, C. *Chem. Eur. J.* **2009**, 15, 11288–11297.

Metal-controlled anion-binding tendencies of the thiourea unit of thiosemicarbazones.

Amendola, V.; Boiocchi, M.; Fabbrizzi, L.; Mosca, L. *Chem. Eur. J.* **2008**, 14, 9683–9696.

Other Publications

Optical Probes and Sensors.

Anzenbacher, P. Jr.; Mosca, L.; Chapter 12 in *Supramolecular Chemistry in Water*, pp. 449–499. Edited by Stefan Kubik, John Wiley and sons. ISBN: 978-3-527-34467-3.

Awards

2019 Stoddart Group Presentation Award | January 2020

2019, 2018, 2017 Stoddart Group Good Samaritan Awards | January 2020, December 2018, December 2017

Cariplo trust research fellowship | November 2010 – October 2011

Macrocyclic Ni(II) complexes as mediators of electron transfer to CO₂

Doctoral fellowship | November 2007 – October 2011

MIUR (Italian Department of Instruction, University, Research)

Anion Receptors from hydrogen bonding and metal-to-ligand interactions.

Foresight institute workshop | September 20-21, 2019, Evanston, IL | Contemporary Materials Science. How can Molecular Machines Help? | Co-led a proposal **An Active Transport Toolbox for Life and Materials Science** won both the Jury and Popular Prizes. A video of the proposal, presented by Dr James Cooper, can be viewed at the link: <https://youtu.be/VRjIY-iX8Ok>

Foresight institute workshop | April 27-28, 2019, Palo Alto, CA | Healing the planet: Atomic Precision for Clean Energy & Clean Air | My proposal **CarbonAct: converting CO₂ into value** was selected to compete in the Final round-of-five. A video of the proposal can be viewed at the link: <https://youtu.be/fIIvSr4FwS0>

Awarded talk | September 25–28, 2011 | 10th CNCS (National Conference on Supramolecular Chemistry). Perugia, Italy. *Moderate and advanced proton transfer in urea-anion hydrogen-bonded complexes.*

Invited Talks

Invited talk – April 19th, 2021 – University of Rhode Island, Kingston, RI

Harnessing the power of weak interactions: fluorescent sensors and molecular machines.

Invited talk – April 14th, 2021 – University of New Haven, New Haven, CT

My journey through supramolecular chemistry: two stories on fluorescent sensors and molecular machines.

Invited talk – April 7th, 2021 – Carleton College, Northfield, MN

My journey through supramolecular chemistry: two stories on fluorescent sensors and molecular machines.

Invited talk – March 31st, 2021 – Fairleigh Dickinson University, Florham, NJ

A journey through supramolecular chemistry: two tales on fluorescent sensors and molecular machines.

Oral presentation – July 7th, 2015 – 13th International Conference on Calixarenes

Calix[4]pyrroles-based anion sensors. Giardini-Naxos, Italy

Invited talk – February 20th, 2014 *Detection of Explosives by Small Fluorescent Molecules.*

Department of Applied Chemistry – Tokyo Metropolitan University, Japan. Prof. Y. Kubo.

Invited talk – January 10th, 2013 *Detection of Explosives: Small-Molecule Fluorescent Sensors.*

Department of Chemistry – University of Pavia, Italy.

Mentoring Undergraduate and Graduate Students

James W. Seale, graduate student | December 2019 – July 2021 | **NU**

Gabrielle J. Wolfe, summer intern | June 2019 – August 2019 | **NU**

Kui Xiao, visiting student | September 2017 – February 2018 | **NU**

Sara Karimi-Behzad, PhD visiting scholar | September 2014 – August 2015 | **BGSU**

Roy Naoum Taoutel, MD, visiting student | May 2014 – September 2014 | **BGSU**

Sara Sheyki, PhD | April 2013 – July 2016 | **BGSU**

Aleksei Berdiuzhenko, MSc | January 2013 – October 2015 | **BGSU**

Gabriela Andarcia-Blanco, MSc, visiting student | May 2012 – September 2012 | **BGSU**

Mariel Rivas, MSc, visiting student | May 2012 – September 2012 | **BGSU**

Ali A. Akdeniz, PhD | January 2012 – July 2016 | **BGSU**

Arturo Broglia, MSc | October 2009 – September 2010 | **UniPV**

Cristiano Bronzi, MSc | October 2009 – July 2010 | **UniPV**

Andrea Fermi, PhD | February 2009 – December 2010 | **UniPV**

Giorgio Baggi, PhD | October 2008 – December 2011 | **UniPV** | Supervisor for MSc dissertation (2009)

Valentina Brega, PhD | September 2008 – December 2011 | **UniPV** | Supervisor for MSc dissertation (2009)

Claudio Pagano, MSc | September 2008 – July 2009 | **UniPV** | Supervisor for MSc dissertation (2009)

Languages

Italian | Mother tongue

French | Moderate writing and speaking

English | Fluent

Latin | Basic knowledge