

PERSONAL INFORMATION Luigi Lay

POSITION STUDIES APPLIED FOR Full Professor
 Degree in Chemistry
 Sex M | Date of birth 19/06/1965 | Nationality Italian

WORK EXPERIENCE

-
- From 01/10/2017** **Full Professor**
 University of Milan, Department of Chemistry (www.chimica.unimi.it/ecm/home), via Golgi, 19 - 20133 Milan
 - Research and teaching
 - Organic chemistry, academia
- From 01/11/2010 to 30/09/2017** **Associate Professor**
 University of Milan, Department of Chemistry (www.chimica.unimi.it/ecm/home), via Golgi, 19 - 20133 Milan
 - Research and teaching
 - Organic chemistry, academia
- From 01/06/2000 to 31/10/2010** **Researcher with tenure (university)**
 University of Milan, Department of Chemistry (www.chimica.unimi.it/ecm/home), via Golgi, 19 - 20133 Milan
 - Research and teaching
 - Organic chemistry, academia
- From 01/09/1996 to 31/05/2000** **Researcher**
 National Research Council (CNR), via Mancinelli - 20131 Milan
 - Research
 - Organic Chemistry

EDUCATION AND TRAINING

From 02/1995 to 08/1996 **Post-doctoral fellowship**
[Add separate entries for each course. Start from the most recent.]

University of Konstanz
 (Germany), Institut für
 Organische Chemie
 Organic synthesis of
 glycoconjugates

From 11/1991 to 10/1994 **PhD in Chemical Sciences**
 Università degli Studi di Milano
 (Italy), Dept. of Organic and
 Industrial Chemistry (currently
 Dept. of Chemistry)
 Oligosaccharides and molecular
 recognition phenomena

From 02/1991 to 10/1991 Post Master Degree fellowship
 Università degli Studi di Milano
 (Italy), Dept. of Organic and
 Industrial Chemistry (currently
 Dept. of Chemistry)
 Synthesis of Oligosaccharides

14/11/1990 Master in Chemistry (*cum laude*)
 Università di Sassari (Italy), Dept.
 of Organic Chemistry
 Iron and ruthenium metal
 complexes as catalysts for aldol
 reactions.

PERSONAL SKILLS

[Remove any headings left empty.]

Mother tongue(s) Italian

Other language(s)

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken interaction	Spoken production	
English	B2	C2	C1	C1	C2
French	C1	C2	C2	C1	B2
German	A1	A1	A1	A1	A1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2 Proficient user
[Common European Framework of Reference for Languages](#)

Communication skills

- Excellent communication skills and abilities to work in a multicultural environment acquired during the post-doc in Germany;
- Excellent relationships with students (every year I receive an excellent evaluation score by students)

Organisational / managerial skills

- Long-lasting experience in the coordination of research groups. Specifically, I supervised a large number of Master and PhD students, and post-doctoral fellows. Currently my research group is composed of 7 Master students, 5 PhD students and one post-doc.

Job-related skills

My research activity is focused on carbohydrate chemistry and the use of synthetic glycans to investigate their biological properties. In particular, my research interests span over two main research areas: synthesis of glycomimetics and synthesis of glycosides and oligosaccharides of biomedical interest. More recently, I started to develop new saccharide ligands for metal-based catalysts.

With regard to the first research area, I developed the synthesis of non-metabolisable analogues of natural saccharides, such as C-glycosides, C-glycosyl aminoacids and C-disaccharides. Moreover, I contributed to the development of a new and versatile procedure for the synthesis of azasugars, structural analogues of carbohydrates where the endocyclic pyranose oxygen is replaced by a nitrogen atom.

In relation to carbohydrates of biomedical interest, I carried out a great deal of research activity on new methods for the synthesis of glycosides and oligosaccharides, with a focus on the reactivity of the anomeric carbon, even in non-conventional reaction media such as ionic liquids. In addition, I explored the use of continuous-flow chemistry in glycosylation, the most important and challenging transformation in oligosaccharides synthesis.

A significant portion of my scientific activity was devoted to the synthesis of differently sulfated fragments of glycosaminoglycans heparin/heparan sulfate, which are critically involved in a great deal of biological and physiological processes, such as blood clotting and angiogenesis.

Moreover I investigated the use of enzymes as biocatalysts for the preparation of mono- and disaccharide building blocks. Such chemo-enzymatic approach has been employed in the synthesis of a number of human milk oligosaccharides, as it can be inferred from several publications concerning this subject.

During my post-doc at the University of Konstanz I synthesised numerous oligosaccharide building blocks occurring in biologically relevant natural glycoconjugates.

In collaboration with Prof. Darcy (Dublin University College) I developed the synthesis of glycosylated and amphiphilic β -cyclodextrins which, besides being excellent drugs carriers, can be employed in specific molecular recognition studies (carbohydrate-lectin interactions).

In the early stage of my scientific career I worked on the synthesis of tumor-associated saccharide antigens.

In the course of the last decade my research has been focusing on the design and synthesis of pathogen-associated oligosaccharides and their mimics, with potential immunological activity. Synthetic saccharide antigens, i.e. able to raise an immune response, and the study of their bioimmunological properties may give a significant contribution to the development of novel and more efficient vaccines to protect at-risk patients, in particular newborns and young children, from several infectious diseases. In this area, currently my major research interest, I carried out the synthesis of a number of capsular polysaccharide fragments (e.g., *Streptococcus pneumoniae*, *Clostridium difficile*, *Staphylococcus aureus*, *Neisseria meningitidis*, *Salmonella typhi*), and I established important collaborations with research groups from the private (Novartis Vaccines & Diagnostics, GSK, Sanofi-Aventis) and academic (University of Padova, University of Piemonte Orientale, University of Pavia, University of Perugia, and many others). In particular, I synthesised hydrolytically stable analogues of the capsular polysaccharide of *Neisseria meningitidis* type A, such as *C-phosphono* and *carba* analogues. These compounds have been conjugated to the surface of metal nanoparticles (gold and iron oxide) in order to enhance their immunological activity by taking advantage of the so-called *multivalency effect*. In addition, the same structural analogues, as well as oligosaccharide fragments of *Neisseria meningitidis* type X, have been covalently linked to immunogenic protein carriers to investigate the biological properties of the corresponding glycoconjugates.

More recently, in a closely related area I applied the reaction sequence olefins ring closing metathesis (RCM)-selenocyclization to the synthesis of a pseudo-trisaccharide structural analogue of the repeating unit of *Streptococcus pneumoniae* 19F polysaccharide.

Finally, in collaboration with Prof. Benaglia (Department of Chemistry, University of Milan) I carried out the synthesis of a small family of saccharide-based bifunctional catalysts closely related to the (thio)ureido Takemoto organocatalyst. In addition, in collaboration with Prof. Gallo (Department of Chemistry, University of Milan) I reported the synthesis of new glycoporphirin ligands employed for the preparation of metal complexes. Their catalytic performance has been evaluated in C-H bonds amination reactions with organic azides.

Digital skills

SELF-ASSESSMENT

Information processing	Communication	Content creation	Safety	Problem solving
Basic user	Proficient user	Basic user	Independent user	Independent user

Levels: Basic user - Independent user - Proficient user
[Digital competences - Self-assessment grid](#)

- good command of office suite (word processor, spread sheet, presentation software)
- excellent command of chemistry drawing softwares

Driving licence B

ADDITIONAL INFORMATION

- Publications** Author/co-author of 85 publications (29 as corresponding author) on international peer-reviewed journals, 3 book chapters and two international patents.
Bibliometry:
Citations number (Scopus): 1874;
h Index = 29
The full list of my scientific publications is available on Web of Science:
<http://www.researcherid.com/rid/F-2409-2012> (Researcher ID n. F-2409-2012).
- Projects** I am scientific responsible of national and international projects financed according to competitive calls for applications.
Ongoing national research projects
Scientist in charge of the research Unit of Milan in PRIN 2015 (prot. N. 2015RNVJAM_002, from February 2017) programme, “Nanoplatforms for enhanced immune responses” (Coordinator: Prof. Paolo Scrimin).
Ongoing international research projects
I am beneficiary of the H2020 Marie Skłodowska-Curie ITN- European Training Network (Call H2020-MSCA-ITN-2015, Grant Agreement N. 675671) “A training network for the rational design of the next generation of well-defined glycoconjugate vaccines (GLYCOVAX)” (from November 2015, 48 months).
I am beneficiary of the H2020 Marie Skłodowska-Curie Individual Fellowships (Call H2020-MSCA-IF-2014_GF, Grant Agreement N. 661138) “New generation of carbohydrate-based vaccines via rational understanding of their immunological mechanism (NEWCARBOVAX) (from January 2017, 36 months).
I am beneficiary of the H2020 Marie Skłodowska-Curie ITN- European Training Network (Call H2020-MSCA-ITN-2018, Grant Agreement N. 814236) “ Glyco-Nanoparticles for Applications in Advanced Nanomedicine (NanoCarb)” (from October 2018, 48 months).
I am Main Proposer and Chair of the COST Action CA18103 “Innovation with Glycans: new frontiers from synthesis to new biological targets - INNOGLY (from April 2019, 48 mesi).
- Conferences** Author of numerous poster and oral communications at national and international conferences (13 invited lectures)
- Honours and awards** In 2016 I have been awarded the Research Prize “*Organic Chemistry for Life Sciences*”, by the Organic Chemistry Division of the Società Chimica Italiana (Italian Chemical Society).
- Memberships** SCI (Società Chimica Italiana) and ACS (American Chemical Society) member. I am also associated to the Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali (INSTM).
- Courses** Currently, I’m Professor of the course Laboratory of Organic Chemistry (Bachelor degree in Chemistry, 5 ECTS) and the course Organic Chemistry (Bachelor degree in Biotechnology, 8 ECTS).

 ANNEXES

- Personal information** I authorize the handling of personal information in this curriculum, according to D.Lgs n. 196/03 and following modifications and Regulations EU 679/2016 (General Regulations concerning Data Protection or GRDP) and art. 7 of University Regulations concerning protection of personal information.
- I authorize, according to D.lgs 14/03/2013 n. 33 concerning transparency, in case of conferment of the position and of the fellowship, the publication of this curriculum in the web site of Università degli Studi di Milano in the section “Amministrazione trasparente”, “Consulenti e collaboratori”.

Milan, 12/03/2019

