

PERSONAL INFORMATION

Date of birth: **17/02/1970**. Place: **Bologna**, Italy. Sex: **M**. Marital status: **Married, two sons**. Nationality: **Italian**. Researcher ID: **H-4450-2011**. ORCID: **0000-0003-2546-9801**. www.unibo.it/sitoweb/alberto.credi

EDUCATION, PROFESSIONAL EXPERIENCE AND ACADEMIC CAREER

11/2019– Full professor of Chemistry, Dipartimento di Chimica Industriale, Università di Bologna (UniBo), Italy
 10/2016– Associate Research Director, Institute for Organic Synthesis and Photoreactivity, Consiglio Nazionale delle Ricerche (CNR), Bologna, Italy
 2016–2019 Full professor of Chemistry, Dipartimento di Scienze e Tecnologie Agro-alimentari, UniBo
 2005–2015 Associate professor of Chemistry, Dipartimento di Chimica “G. Ciamician”, UniBo, Italy; tenured 2008
 1999–2005 Assistant professor of Chemistry, Dipartimento di Chimica “G. Ciamician”, UniBo; tenured 2002
 4–9/1999 Research assistant (temporary contract), UniBo
 1995–1999 PhD in Chemical Sciences, UniBo
 6–11/1995 NATO Supramolecular Chemistry Fellow, University of Virginia, Charlottesville, USA
 1994–1995 Ciba-Geigy Scholarship, Dipartimento di Chimica “G. Ciamician”, UniBo
 1994 Laurea *cum laude* in Chemistry, UniBo

MAJOR TEACHING ACTIVITIES AT THE UNIVERSITÀ DI BOLOGNA

2016– Course of General and Inorganic Chemistry, first cycle degree in Agricultural Technologies
 2008–2022 Course of Molecular Nanotechnology, master degree in Photochemistry and Molecular Materials
 2008–2015 Course of General and Inorganic Chemistry, first cycle degree in Biotechnology
 2003–2015 Course of Chemistry, first cycle degree in Astronomy
 2002– Module of Complements of Inorganic Chemistry, doctorate school in Chemical Sciences

MAJOR TEACHING ACTIVITIES IN OTHER HIGHER EDUCATION INSTITUTIONS

2012 Module in the course Molecular Nanodevices, Scuola Superiore di Catania
 2004–2009 Course of Supramolecular Machines, International Master in Nanotechnologies, Venezia

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

More than 30 undergraduate internship theses, 18 PhD theses, and >20 post-doctoral fellows for >45 person-years. Three foreign professors have visited the PI's lab for a period longer than 3 months with independent funding.

MAJOR INSTITUTIONAL RESPONSIBILITIES

2021–2024 Vice Rector for Research, Alma Mater Studiorum – Università di Bologna
 2017– Director of the Center for Light Activated Nanostructures, a UniBo-CNR joint research laboratory
 2017– Board member of the doctorate course in Nanoscience for Medicine and Environment
 2010–2012 Member of the executive board of the Dipartimento di Chimica “G. Ciamician”
 2007–2012 Board member of the doctorate course in Chemical Sciences

ORGANISATION/SCIENTIFIC COMMITTEES OF CONFERENCES

>40 Conferences, including: Mach-5 2024, 2022 (chair); 3rd Telluride Conference on Molecular Rotors, Motors and Switches, 2018 (chair); 8th International Symposium on Photochromism, 2016, 2019; Congresso Nazionale di Chimica Inorganica, 2018, 2016, 2015; Faraday Discussion on Supramolecular Photochemistry, 2015; Italian Photochemistry Meeting, 2017, 2016, 2015, 2014, 2012, 2008; 4th International Conference on Molecular Sensors and Molecular Logic Gates, Shanghai, 2014; Corso Nazionale di Introduzione alla Fotochimica, Bologna, 2013, 2010, 2007, 2004; International Conference on Molecular Electronics-ELECMOL, Grenoble, 2012, 2010, 2008, 2006; International Symposium ‘The Photochemistry of the Future-100 years later’, Bologna, 2012, EuCheMS Chemistry Congress, 2018, 2012; XXIV IUPAC Symposium on Photochemistry, Coimbra, 2012.

COMMISSIONS OF TRUST AND EDITORIAL BOARDS

Major tasks as evaluator of projects and grants: Ministero dell'Istruzione Università e Ricerca (SIR, PRIN, VQR), European Research Council (AdG, SyG, StG, CoG), FP7 ICT-FET Program, ESF Eurocores Program, Leverhulme Trust, International Center for Frontier Research in Chemistry (Strasbourg), Science Foundation Ireland, Royal Society of New Zealand, Netherlands Organization for Scientific Research, Israel Science Foundation, Swiss National Science Foundation, Petroleum Research Fund-American Chemical Society, Agence Nationale de la Recherche, Université Franco-Italienne, Università di Padova.

Member of examination boards: Permanent positions in Italian Universities and CNR; tenure track positions, Technical University of Tampere, Finland (2014); “Gian Piero Spada” award, doctorate school in Chemical Sciences, Bologna (2014); Admission to membership, Third World Academy of Science (2013); European Young Chemist Award (2012). Member of >10 PhD examination boards in Italy and abroad since 2007.

Editorial/advisory board member: Australian Journal of Chemistry (2013–), European Journal of Inorganic

Chemistry (2009–), Polyhedron (2011–2012), ChemPhotoChem (2016–), ChemistryOpen (2017–2021)

Referee: Regular reviewer activity for the main journals in Chemistry/Materials Science/Nanoscience.

MAJOR AWARDS AND PRIZES

- 2023 Premio Lamberto Malatesta, Società Chimica Italiana
2022 Holger Erdtman Lecture, Royal Institute of Technology, Sweden
2021 SCF French-Italian Prize, Société Chimique de France
2021 The Netherlands Scholar Award for Supramolecular Chemistry
2019 Riccardo Ferro Lectureship, Università di Genova
2018 Bologna-Brown Lectureship, Università di Bologna
2016 Enrico Santoro award, Accademia Nazionale dei Lincei, Roma
2008 Raffaello Nasini award, Italian Chemical Society. *Awarded annually to the best independent Italian researcher under 40 in any field related to inorganic chemistry*
2007 Grammaticakis-Neumann international award for Photochemistry, Swiss Chemical Society. *Awarded annually to a promising scientist under 40 for outstanding independent research in photochemistry, photophysics or molecular photobiology*
2002 Vincenzo Caglioti International Award in Chemistry, Accademia Nazionale dei Lincei, Roma. *Awarded every three years to outstanding researchers under 35 in all fields of Chemistry*
2000 IUPAC Prize for Young Chemists. *Awarded annually to the best graduate work worldwide*
1999 Award for the best PhD thesis in Inorganic Chemistry, Italian Chemical Society

EDITORIAL ACTIVITIES

Book Editor: Electrochemistry of Functional Supramolecular Systems, Wiley, Hoboken, 2010, 613 pp.

Guest Editor of journals: Top. Curr. Chem. (volume on Semiconductor Quantum Dots, 2017); Chem. Comm. (issue on Molecular Logic Gates and Information Processing, 2015); Top. Curr. Chem. (volume on Molecular Machines, 2014); Chem. Soc. Rev. (issue on Photochemistry of Supramolecular Systems and Nanostructured Assemblies, 2014); Aust. J. Chem. (issue on Dendrimers, 2011; Supramolecular Polymers, 2010; Molecular Logic, 2010), Adv. Funct. Mater. (issue on Molecular Machines and Switches, 2007).

MEMBERSHIP/OFFICE IN SCIENTIFIC SOCIETIES

- 2014– Executive Board member, Fondation de la Maison de la Chimie, Paris, France
2025–2029 Member of the Steering Board, Fondazione Cassa di Risparmio in Bologna
2018–2022 Member of the Executive Committee, European Photochemistry Association
2017–2019 Member of the International Relations Committee, Italian Chemical Society
2015–2020 President of the Gruppo Italiano di Fotochimica
2015–2020 Executive Board member/treasurer, Inorganic Chemistry Division, Italian Chemical Society
2009–2014 Executive Board member, Gruppo Italiano di Fotochimica
Member: European Academy of Sciences (Fellow), Royal Society of Chemistry (Fellow), Italian Chemical Society, American Chemical Society, European Photochemistry Association, American Nano Society.

INVITED LECTURES AND SEMINARS

120 Invited lectures in international/national meetings/schools, including the following plenary/keynote lectures: 8th EuCheMS Congress, 2022; Central European Conference on Photochemistry, 2020; 14th ISMSC, 2019; 8th International Conference on Molecular Electronics, 2018; 2nd Caparica Christmas Conference on Translational Chemistry, Lisbon, 2017; Austrian Chemistry Days, Innsbruck, 2015; 21st ISPPCC, Krakow, 2015; Beilstein Nanotechnology Symposium, Potsdam, 2014; ISACS'10, Kyoto, 2013; Congresso Nazionale di Chimica Supramolecolare, Perugia, 2011; International Workshop on Molecular Logic, Leiden, 2011; Congresso della Società Chimica Italiana, Sorrento, 2009; 21st Solvay Conference in Chemistry, Bruxelles, 2007; Fall Meeting of the Swiss Chemical Society, 2007; CERC3 Young Chemists Workshop, Baden Baden, 2005. 70 Invited seminars in Universities and Research Institutes in Italy and abroad. 30 Invited conferences for scientific dissemination.

PUBLICATIONS

Monographs: 1) Molecular Devices and Machines – A Journey into the Nano World, Wiley-VCH, 2003; translated in Chinese and Japanese. 2) Handbook of Photochemistry, CRC, 2006. 3) Molecular Devices and Machines – Concepts and Perspectives for the Nanoworld, Wiley-VCH, 2008; translated in Chinese. 4) Le Macchine Molecolari, 1088press, 2018. 5) Molecular machines, 1088press, 2020. Textbooks. 6) Viaggio nella Chimica (textbook), Edises, 2023.

Publications: 267 papers listed in ISI (333 including non-ISI articles and book chapter) and 1 patent. Total citations (Google Scholar): 33400. *h* = 79. Complete list: centri.unibo.it/clan/en/publications

MAJOR CURRENT COLLABORATIONS

M. Garavelli (Univ. Bologna; computational photochemistry), M. Lucarini (Univ. Bologna; EPR spectroscopy), M. Cavallini (CNR Bologna; surface science), A. Secchi (Univ. Parma; supramolecular organic synthesis), E. Fois (Univ. Insubria; molecular modelling), L. Persano (CNR Pisa; nanomaterials), S. Diez (Univ. Dresden; microscopy), N. Giuseppone (Univ. Strasbourg; polymer chemistry).

1994-2000

From the beginning of his scientific career, Alberto Credi focused his research on the study of the photochemical and redox properties of molecular and supramolecular species, in collaboration with leading international research groups, e.g. that of Prof. Jean-Marie Lehn (*JACS* **1994**, *116*, 5741). Supported with a NATO fellowship, he carried out research in the laboratory of Prof. Fred Richardson (University of Virginia, USA) on the chiro-optical properties of metal complexes, reporting for the first time the circularly polarized luminescence properties of a chiral Osmium polypyridine complex (*Inorg. Chem.* **1997**, *36*, 426).

During his Ph.D. under the supervision of Prof. Vincenzo Balzani he investigated several families of rotaxanes, catenanes and correlated species, mainly in collaboration with the group of Prof. Fraser Stoddart (at the time based at the University of Birmingham, UK, and later at the University of California, Los Angeles). These studies led to prominent results, such as the first example of implementation of the XOR logic function with an artificial chemical system (*JACS* **1997**, *119*, 2679), dendrimer-based interlocked compounds (*JACS* **1996**, *118*, 12012) and luminescent antenna systems (*JACS* **1999**, *121*, 6290), and several examples of molecular machines based on rotaxanes (e.g.: *CEJ* **1997**, *3*, 152; **2000**, *6*, 3558; *JACS* **1998**, *120*, 11932) and catenanes (*JACS* **1995**, *117*, 11171; **2000**, *122*, 3542; *ACIE* **1998**, *37*, 333; *JOC* **2000**, *65*, 1924). Prof. Credi also had a primary role in understanding the physico-chemical properties of higher order catenanes (*JACS* **1998**, *120*, 4295), and in the design and investigation of molecular plug/socket devices (*CEJ* **1999**, *5*, 984) and three-pole switches (*CEJ* **1997**, *3*, 1992; *JACS* **1999**, *121*, 3951). He is the co-author of the first comprehensive review on molecular machines (*ACIE* **2000**, *39*, 3348; nearly 3000 citations).

2001-2010

Prof. Credi's transition to scientific independence occurred gradually, as it usually happens in the Italian academic system. On the one hand, he continued to perform research on functional supramolecular species for molecular machinery and information processing. His most significant achievements in this field are the "molecular elevator" (*Science* **2004**, *303*, 1845; *JACS* **2006**, *128*, 1489; featured in the poster of the Nobel Prize in Chemistry 2016), sunlight-powered molecular shuttles (*PNAS* **2006**, *103*, 1178; *ACIE* **2008**, *47*, 3536; *CEJ* **2010**, *16*, 11580), the first molecular machine based on photoinduced proton transfer (*JACS* **2007**, *129*, 13378), molecular extension cables (*JACS* **2002**, *124*, 12786; *PNAS* **2006**, *103*, 18411; *JACS* **2007**, *129*, 4633), multistable catenanes and rotaxanes (*JACS* **2007**, *129*, 12159; **2010**, *132*, 1110), surface-deposited rotaxanes (*Adv. Mater.* **2006**, *18*, 1291), cavitand- and calixarene-based host-guest systems (*JOC* **2004**, *69*, 5881; *Chem. Eur. J.* **2008**, *14*, 98; **2008**, *14*, 8694; **2009**, *15*, 3230), novel photochromic compounds (*CEJ* **2004**, *10*, 2011; *JACS* **2007**, *129*, 3198), and chemical logic circuits (*CEJ* **2008**, *14*, 26; **2009**, *15*, 178; *J. Phys. Chem. C* **2010**, *114*, 3209), including the first unimolecular multiplexer/demultiplexer (*ACIE* **2008**, *47*, 6240).

On the other hand, Alberto Credi took advantage of his background in supramolecular photochemistry and electrochemistry to study research problems beyond his traditional interests. These include the redox and spectroscopic properties of functionalized semiconductor nanocrystals, with the dual aim of understanding the effect of surface derivatization on the physico-chemical properties of the particles (*J. Phys. Chem. C* **2010**, *114*, 7007; *ChemPhysChem* **2011**, *12*, 2280) and their interaction with molecular and supramolecular species (*J. Mater. Chem.* **2008**, *18*, 2022; *Dalton Trans.* **2011**, *40* 12083) for sensing purposes (*Chem. Commun.* **2011**, *47*, 325).

2011-present

In more recent years Prof. Credi has focused mainly on molecular-based systems than can use light energy to perform directionally controlled movements and operate continuously in non-equilibrium regimes. The appropriate combination of photoswitching and molecular recognition (*ACIE* **2012**, *51*, 1611; **2012**, *51*, 4223) led to the realization of photochemically driven molecular pumps (*Nat. Nanotechnol.* **2015**, *10*, 70; *ACIE* **2019**, *58*, 14341). These systems represent an important step forward toward the rational development of artificial chemical systems that can use light to operate away from thermal equilibrium. Such a concept is of high interest both for its scientific value and potential applications in various fields of technology and medicine (e.g. solar energy conversion, responsive materials for robotics, phototherapies), as witnessed by an Advanced Grant awarded by the European Research Council in 2016. The robust and modular design allowed the development of next-generation systems (*CEJ* **2021**, *27*, 11076; *JACS* **2021**, *143*, 10890; **2022**, *144*, 10180). Prof. Credi's studies on the structural and dynamic properties of threaded complexes and related mechanically interlocked molecules (*CEJ* **2012**, *18*, 16203; **2020**, *26*, 534, *JACS* **2014**, *136*, 14245; *Chem. Comm.* **2015**, *51*, 2810; **2017**, *53*, 6172; **2023**, *59*, 13159) produced groundbreaking results that include kinetic self-sorting of molecular components (*JACS* **2013**, *135*, 9924), intramolecular signal communication by co-conformational allostereism (*PNAS* **2018**, *38*, 9385), precision molecular threading/dethreading (*ACIE* **2020**, *59*, 14825), chemically switchable co-conformational mechanically planar chirality of rotaxanes (*JACS* **2019**, *141*, 9129), chemically induced mismatch

of rings and stations (*JACS* **2021**, *143*, 8046) and control of sequence isomerism (*Chem. Sci.* **2021**, *12*, 6419) in [3]rotaxanes, *E-Z* isomerization of [2]rotaxanes by concomitant and independent molecular rotation and supramolecular shuttling mechanisms (*Chem* **2021**, *7*, 2137), and multistate-multifunctional molecular shuttles (*ACIE* **2025**, *64*, e202414609). More recently, his research became increasingly focused on the study of supramolecular architectures that can exploit light or other forms of energy supply to operate away from chemical equilibrium (*Nat. Nanotechnol.* **2022**, *17*, 746; *ACIE* **2023**, *62*, e202214265; *Chem* **2024**, *10*, 3644; *Chem* **2025**, *11*, 102375; *Trends Chem.* **2025**, in press).

He continued to perform research on photoactive semiconductor quantum dots (*Langmuir* **2013**, *29*, 13352; *Nanoscale* **2014**, *6*, 741; *J. Mater. Chem. C* **2014**, *2*, 2877), describing a method for facile surface functionalization and modulation of solubility (*Chem. Comm.* **2014**, *50*, 11020; Patent WO/2014/171245). Particularly worth of note is the engineering of a long luminescence lifetime in quantum dots by reversible electronic energy transfer (*ACIE* **2018**, *57*, 3104). On the front of photochromism (*Chem. Comm.* **2012**, *48*, 8652; **2015**, *51*, 13886; **2022**, *58*, 11236), the extension of Prof. Credi's interest to the solid state has led to the development of azobenzene-based porous molecular crystals that exhibit reversible photoswitchable gas adsorption and photoinduced isothermal phase transition (*Nat. Chem.* **2015**, *7*, 634; *PPS* **2019**, *18*, 2281). Studies on single molecules (*ACIE* **2018**, *57*, 15034) and on thin films (*JACS* **2018**, *140*, 12323; *J. Mater. Chem. C* **2022**, *10*, 10132) were also performed. The modulation of photochromic behaviour by molecular threading (*Chem. Sci.* **2019**, *10*, 5104) or encapsulation (*JACS* **2020**, *142*, 14557) and the use of photoswitches to control the regiochemistry of fullerene bis-adducts (*ACIE* **2021**, *59*, 14825) are other significant achievements. Prof. Credi is also interested in the study of molecular switches and machines in bilayer membranes (*CEJ* **2014**, *20*, 10737; *Langmuir* **2014**, *30*, 13667).

All these research activities, centered around the synergistic combination of spectroscopy and photochemistry and spectroscopy with supramolecular chemistry, materials science and nanoscience, are being implemented in the Center for Light Activated Nanostructures (CLAN; centri.unibo.it/clan), a joint research laboratory between Università di Bologna and National Research Council founded by Prof. Credi in 2017. The mission of CLAN under his scientific direction is to develop light-sensitive molecular, supramolecular systems, devices and materials as well as promote and engage in the collection and sharing of resources, structures (spaces, equipment and services) and skills to carry out frontier research in the field of chemical and physical sciences. Prof. Credi's team currently comprises associate and assistant professors, post-doctoral fellows, PhD students and undergraduate internship students, for a total of between 10 and 20 people.

Recognition and diffusion

Alberto Credi has published more than 330 scientific articles and book chapters, with a *h*-index of 79 and more than 33000 citations (Google Scholar). His monographs on *Molecular Devices and Machines* (1st ed. 2003, 2nd ed. 2008), co-authored with V. Balzani and M. Venturi and published by Wiley-VCH, received 3000+ citations. The *Handbook of Photochemistry*, 3rd ed., co-authored with M. Montalti, L. Prodi and M. T. Gandolfi and published by CRC in 2006, received 2400+ citations. In more recent times he co-authored with V. Balzani a booklet on *Molecular Machines* (Italian ed. 2018, English ed. 2020), released in open access form by 1088Press, the publishing house of the Università di Bologna. Prof. Credi edited two books and guest-edited seven themed collections and journal issues.

Alberto Credi has authored or co-authored several review and perspective articles in high impact journals, that have become highly cited and influential in the areas of molecular machines and motors (*ACIE* **2000**, *39*, 3348; *Acc. Chem. Res.* **2001**, *34*, 445; *Chem. Soc. Rev.* **2009**, *38*, 1542; *Chem. Comm.* **2011**, *47*, 2483; *ChemistryOpen* **2018**, *7*, 169; *Chem. Rev.* **2020**, *120*, 200; *ACS Energy & Fuels* **2021**, *35*, 18900; *JACS Au* **2023**, *3*, 1301), molecular logic (*ChemPhysChem* **2003**, *4*, 49; *ACIE* **2007**, *46*, 5472; *Coord. Chem. Rev.* **2021**, *428*, 213589), supramolecular photochemistry (*ChemSusChem* **2008**, *1*, 26; *Chem. Soc. Rev.* **2014**, *43*, 4068; *Coord. Chem. Rev.* **2021**, *433*, 213758) and semiconductor quantum dots (*Chem. Soc. Rev.* **2012**, *41*, 5728; **2015**, *44*, 4275; *ChemistryOpen* **2020**, *9*, 200).

Prof. Credi has received numerous awards for his research achievements, and has been invited to speak at more than 120 conferences and schools worldwide. He has delivered invited seminars at more than 70 Universities and research institutes. He is also engaged in the dissemination and popularization of science and chemistry, through lectures delivered in science festivals, public events, and schools.

Five most cited papers (excl. reviews):

1. A molecular elevator. *Science* **2004**, *303*, 1845. 1200+ citations.
2. An XOR gate based on a molecular machine. *JACS* **1997**, *119*, 2679. 640+ cit.
3. Autonomous artificial nanomotor powered by sunlight. *PNAS* **2006**, *103*, 1178. 570+ cit.
4. Light-powered autonomous motion [...] self-assembling system. *Nat. Nanotechnol.* **2015**, *10*, 70. 470+ cit.
5. Acid-base controllable molecular shuttles. *JACS* **1998**, *120*, 11932. 460+ cit.