

BIOGRAPHICAL DATA

Jean-Marie Pierre LEHN

Born on September 30, 1939 at Rosheim, Bas-Rhin

Address

ISIS, Université de Strasbourg
8 allée Gaspard Monge,
F-67000 Strasbourg

Tel. +33-368-855-145

Fax +33-368-855-140

E-mail lehn@unistra.fr

Presently

- Professor at the University of Strasbourg Institute for Advanced Study (USIAS),
Chair of Chemistry of Complex Systems
- Honorary Professor at the Collège de France, Paris
- Emeritus Professor at the University of Strasbourg

Director

- Director of ISIS (Institut de Science et d'Ingénierie Supramoléculaires),
Strasbourg, 1997-2004.
- Director of the Laboratoire de Chimie Supramoléculaire, ISIS, Université de Strasbourg
- Director at the Nanotechnology Institute of the Karlsruhe Institute of Technology, since 1998
- Honorary Director, "Lehn Institute of Functional Materials", Sun Yat Sen University, Guangzhou,
since 2010

Education

Undergraduate Studies, University of Strasbourg: Licence ès-Sciences (Bachelor of Sciences),
Strasbourg, 1960; Graduate work on "Conformational Studies of Triperpenes" with Professor
Guy OURISSON, University of Strasbourg; Doctorat-ès-Sciences (Ph.D.), University of
Strasbourg, 1963; Post-Doctoral Research Fellow at Harvard University, 1964: work on Vitamin
B₁₂ total synthesis with Professor Robert B. WOODWARD.

Appointments

Member of the Centre National de la Recherche Scientifique (CNRS), 1960-66.
Maître de Conférences (Assistant Professor) at the University of Strasbourg, 1966-69.
Professeur sans chaire (Associate Professor) at the University Louis Pasteur of Strasbourg, 1970.
Professor of Chemistry at the University Louis Pasteur of Strasbourg, 1970-1979.
Professor at Collège de France, Paris, Chair of Chimie des Interactions Moléculaires 1979-2010.
Visiting Professor of Chemistry at Harvard University, 1972 (*Spring*), 1974 (*Spring*),
and on a part time basis *until* 1980.
Visiting Professor of Chemistry at the E.T.H. Zürich, 1977.
Alexander Todd Visiting Professor of Chemistry, Cambridge University, 1984.
Visiting Professor, University of Barcelona, 1985.
Rolf-Sammet Gastprofessor, Frankfurt University, 1985-86.

Heinrich-Hertz Gastprofessor, Karlsruhe University, *Nov., Déc. 1989*.
Robert Burns Woodward Visiting Professor, Harvard University, *1997, 2000*.
Newton Abraham Professor, Lincoln College, Oxford University, *1999-2000*.
Adjunct Professor at the Asian Institute of Technology, Bangkok, *2005*.
Chair Professor-at-Large, City University of Hong Kong, *2008-2012*.
Honorary Director and Professor at Large, Lehn Institute for Functional Materials, Sun Yat Sen University, Guangzhou, *2010*.
Emeritus Professor, Université de Strasbourg, *2010-*
Professor, University of Strasbourg Institute of Advanced Study (USIAS, Chair of Chemistry of Complex Systems, *2012-*
Visiting Distinguished Professor, City University of Hong Kong, *2013-2014*.
Visiting Chair Professor-at-Large, Macau University of Science and Technology, *2014*.

Honorary Degrees

— ***Honoris Causa Doctorates***: Hebrew University of Jerusalem, *1984*; Universidad Autonoma, Madrid, *1985*; Georg-August University of Göttingen, *1987*; Université Libre of Bruxelles, *1987*; Iraklion University, *1989*; Università degli Studi di Bologna, *1989*; Charles University of Prague, *1990*, University of Sheffield, *1991*; University of Twente, *1991*; University of Athens *1992*; Polytechnical University of Athens, *1992*; Polytechnic University of Bucarest, *1994*; Illinois Wesleyan University, *1995*; Université de Montréal, *1995*; University of Bielefeld, *1998*; Weizmann Institute of Science, Rehovot; *1998*, Faculté des Sciences Appliquées, Université Libre de Bruxelles, *1999*; Nagoya University, *2000*; Université de Sherbrooke, *2000*; Università di Trieste, *2001*; Royal Institute of Technology, Stockholm, *2003*; University of St. Andrews, *2004*; Heriot Watt University, Edinburgh, *2005*; Technical University, St Petersburg, *2005*; Mazaryk University, Brno, *2005*; Kyushu University, *2005*; M.V. Lomonosov Moscow State University, *2006*, Aristotle University of Thessaloniki, *2006*; Kazan State University, *2006*; Novosibirsk State University, *2006*; University of Patras, *2008*; Babeş-Bolyai University Cluj-Napoca, *2008*; Università della Basilicata, Potenza, *2008*; Taras Shevchenko University, Kiev, *2009*; Technion, Israel, *2009*; University of Ljubljana *2009*; City University Hong Kong, *2010*; Queen's University, Belfast, *2012*; Lviv Polytechnic National University, *2012*; University of Oxford (Dr. Sci.), *2014*, Macau University of Science and Technology (MUST), *2015*; University of Malaga, *2015*.

— ***Honorary Professorships***: University of Science and Technology of China, Hefei, *1998*; Honorary Professor, Southeast University, Nanjing, *1998*; Peking University, *2001*; Honorary Professor, Shanghai Jiao Tong University, *2003*; Honorary Professor, Nanjing University, *2003*; Beijing University, *2005*; Zhejiang University, Hangzhou, *2007*; Honorary Professor, Shaanxi Normal University, Xi'an, *2007*; Special Honorary Professorship, Osaka Prefecture University, Sakai, *2008*; Novosibirsk State University, *2012*; Xiamen University, *2012*; Jilin University, *2013*; Shanxi University, *2013*.

Awards

Bronze Medal of the CNRS, *1963*; Adrian Prize of the Société Chimique de France, *1968*; Silver Medal of the CNRS, *1972*; Raymond Berr Prize of the Société Chimique de France, *1978*; Gold Medal of the Académie Pontificale des Sciences, *1981*; Gold Medal of the CNRS, *1981*; Pierre Bruylants Medal, Louvain, *1981*; Paracelsus Prize of the Swiss Chemical Society, *1982*; Alexander von Humboldt Forschungspreis, *1982*; Prize of the Commissariat à l'Énergie Atomique awarded by the Académie des Sciences, *1984*; Rolf-Sammet Prize, Frankfurt University, *1985*; Prize of the Fondation Alsace, *1986*; George Kenner Prize, University of Liverpool, *1987*; **Nobel Prize in Chemistry, 1987**; Sigillum Magnum, University of Bologna, *1988*; Minnie Rosen Award, *1989*; Vermeil Medal of the Ville de Paris, *1989*; Gold Medal of the Société d'Encouragement au Progrès, *1989*; Karl-Ziegler Prize, Gesellschaft Deutscher Chemiker, *1989*;

Grand Bretzel d'Or, Institut des Arts et Traditions Populaires d'Alsace, 1992; Bonner Chemiepreis, 1993; 1992 "Ettore Majorana-Erice-Science for Peace" Prize, 1994; Gold Medal of the Société Académique Arts–Sciences–Lettres, 1995; Gold Medal of Comenius University, Bratislava, 1995; Golden Memorial Medal of the Faculty of Sciences, Charles University, Prague, 1995; Honorary Medal of the Institute of Physical Chemistry, Polish Academy of Sciences, Warszawa, 1996; The Davy Medal of the Royal Society, 1997; Lavoisier Medal 1997 of the Société Française de Chimie; Top 75 Award, C&N, American Chemical Society, 1998; Allan R. Day Award of the Philadelphia Organic Chemists' Club, 1998; 1998 Messel Medal, Society of Chemical Industry, London; Gold Medal "Giulio Natta" of the Italian Chemical Society, 2003; JSPS Award (Japan Society for the Promotion of Science), 2003; Gold Medal of the 70th Anniversary of the Fondation de la Maison de la Chimie, 2004; Gold Medal of the University Paul Sabatier Toulouse III, 2005; Gold Medal, Scientific Partnership Foundation, Moscow, 2006; Johannes Gutenberg Award, Mainz, 2006; Burckhardt-Helferich Award, Leipzig, 2007; Distinguished Schulich Lectureship Award Colloquium, Technion, Haifa, 2008; Costin Nenitzescu Medal, 2008; Medal of the Czech Chemical Society, 2008; Sigilli d'Oro, Università degli Studi di Bari, 2008; Sigillum for the Avogadro Lecture, Società Chimica Italiana, University of Salento, 2011; Chandler Medal, Columbia University, 2011; MacDiarmid Medal, University of Pennsylvania, 2011; ERC Advanced Grant, 2011; Sir Derek Barton Gold Medal, Royal Society of Chemistry, 2012; Eucor Medal, 2013; Distinguished Senior Member of the Société Chimique de France, 2013; Chem Pub Soc Europe Honorary Fellow, 2015; Gold Medal of the Slovak Chemical Society, Bratislava, 2015; Dionyz Ilkovic SAS Medal of Honour of the Slovak Academy of Sciences, Bratislava, 2015; Medal of Merit of the University Adam Mickiewicz, Poznan, 2015.

Academies

Foreign Associate of the National Academy of Sciences of the USA, 1980.
Foreign Honorary Member of the American Academy of Arts and Sciences, 1980.
Foreign Member of the Royal Netherlands Academy of Arts and Sciences, 1983.
Member of the Académie des Sciences, Institut de France, 1985.
Foreign Member of the Deutsche Akademie der Naturforscher Leopoldina, 1985.
Foreign Member of the Accademia Nazionale dei Lincei, 1985.
Foreign Member of the American Philosophical Society, 1987.
Honorary Member of the Académie Européenne des Sciences, des Arts et des Lettres, 1987.
Honorary Member of the Royal Society of Chemistry (Belgium), 1987.
Member of the Academia Europaea, 1988.
Member of the Académie d'Alsace, 1989.
Foreign Associate of the Akademie der Wissenschaften und der Literatur-Mainz, 1989.
Honorary Member of the Yugoslav Academy of Sciences and Arts, 1990.
Member of the Akademie der Wissenschaften of Göttingen, 1990
Associate Member of the Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten, 1990.
Honorary Fellow of the Indian Academy of Sciences, 1991.
Foreign Member of the Polish Academy of Sciences, 1991.
Foreign Associate of the Academy of Arts and Sciences of Puerto Rico, 1991.
Foreign Member of the Ukrainian Academy of Sciences, 1992.
Honorary Member, Institut Grand Ducal, Luxembourg, 1992.
Foreign Member of the Royal Society, 1993.
Honorary Member of the Romanian Academy, 1993.
Honorary Foreign Member of the Korean Academy of Science and Technology (KAST), 1995.
Member of the Pontifical Academy of Sciences, 1996.
Foreign Member of the Third World Academy of Sciences, 1996.
Honorary Member of the Czech Learned Society, 1997.
Foreign Member of the Academy of Sciences of Turin, 1999.
Honorary Member of the Royal Irish Academy, Section Science, 1999.
Foreign Member of the Russian Academy of Sciences, 1999.

Member of the Académie des Technologies, Institut de France, 2001.
Honorary Member of the Hungarian Academy of Sciences, 2001.
Member of the International Academy of Humanism, 2001.
Corresponding Member of the Slovenian Academy of Sciences and Arts, 2003.
Foreign Member of the Chinese Academy of Sciences, 2004.
Honorary Member of the Académie des Sciences Inscriptions et Belles Lettres de Toulouse, 2005.
Honorary Member of the Real Academia Sevillana de Ciencias, 2005.
Associate Member of the Académie Royale des Sciences, des lettres et des beaux-arts de Belgique, 2009.
Charter Fellow, National Academy of Inventors, 2012.
Hong Kong Academy of Science, 2014.

Honorary member of Learned Societies

Honorary Member of the Union des Physiciens, 1986.
Honorary Fellow of the Royal Society of Chemistry (Great-Britain), 1987.
Honorary Fellow of Fondation de la Maison de la Chimie, 1989.
Honorary Member of the Gesellschaft Deutscher Chemiker, 1997.
Honorary Fellow of the Institute of Physics, 1999.
Honorary Fellow of the Singapore Institute of Chemistry, 2001.
Honorary Member of the Chemical Society of Japan (CSJ), 2002.
Honorary Fellow of the Chemical Research Society of India, 2002.
Honorary Member of the World Innovation Foundation, 2003.
AAAS Fellow, American Association for the Advancement of Science, 2003.
Honorary Fellowship of IChem^E Institution of Chemical Engineers, 2003.
President of the Academia Bibliotheca Alexandrinae, 2004.
Member of the Gesellschaft Österreichischer Chemiker, 2004.
Honorary Member of the Société Française de Chimie, 2005.
Honorary Membership of the Chemistry Society of Romania, 2008.
Honorary Member of the Société Philomathique de Paris, 2013.

Decorations

Chevalier dans l'Ordre National du Mérite, 1976; Chevalier dans l'ordre de la Légion d'Honneur, 1983; Officier dans l'ordre de la Légion d'Honneur, 1988; Chevalier dans l'Ordre des Palmes Académiques, 1989; Member of the Order "Pour le Mérite" für Wissenschaften und Künste (RFA), 1990; Officier dans l'Ordre National du Mérite, 1993; Commandeur dans l'Ordre de la Légion d'Honneur, 1996; Österreichisches Ehrenkreuz für Wissenschaft und Kunst, Erste Klasse, 2001 ; High Officer in the Order of Cultural Merit in Romania, section Scientific Research, 2004 ; Grosses Verdienstkreuz mit Stern der Bundesrepublik Deutschland, 2009 ; Grand Officier de la Légion d'Honneur, 2014 ; Officer of the Order of Merit of the Republic of Poland, 2015.

Scientific Work

966 publications ; 3 livres

“*Chemia Supramolekularna*”,
Collection of publications by J.-M. LEHN, organised and translated into Polish under the direction of Janusz Lipkowski, Institute of Physical Chemistry, Polish Academy of Sciences, 1985.

B. DIETRICH, P. VIOUT, J.-M. LEHN,
“*Aspects de la chimie des composés macrocycliques*”,
InterEditions/Editions du CNRS, 1991.

“Macrocyclic Chemistry – Aspects of Organic and Inorganic Supramolecular Chemistry”,
VCH, Weinheim, **1993**.

J.-M. LEHN,
“Supramolecular Chemistry – Concepts and Perspectives”,
VCH, **1995**.

“La chimie supramoléculaire : Concepts et perspectives”,
Traduit de l’anglais par A. Pousse,
De Boeck Université, Bruxelles, **1997**.

- Portuguese Version, translated by M.J. Calhorda, R. Delgado, A.M. Martins, V. Gageiro Machado, N. Miranda, **2007**;
- Japanese Version, translated by Y. Takeuchi, Kagaku Dojin, Tokyo, **1997**;
- Russian Version, translated by E.V. Boldyreva ; coeditors, V.V. Vlassov and A.A. Varnek; Nauka, Novosibirsk, **1998**;
- Chinese Version, translated by X. Shen, Peking University, Beijing, **2002**.

RELATIONSHIPS AND ACTIVITIES WITH THE PRIVATE SECTOR

MAJOR ACTIVITIES:

Member of the Board of Directors of:

- Ciba-Geigy (Verwaltungsrat) until the merger with Sandoz to form Novartis. Thereafter,
- Ciba Specialty Chemicals, until the merger with BASF in 2009.
- Hoechst AG (Aufsichtsrat) until the merger with Rhône-Poulenc to form Aventis.
- Bruker France (Conseil de Surveillance, until 2010).

Science Advisor/Advisory Boards:

- Rhône-Poulenc
- Aventis (until merger with Sanofi).
- Reliance Innovation Council, Mumbai.
- Sanofi-Aventis (2010-2011).
- Novartis Venture Fund.
- and numerous small(er) companies

Co-founder of:

- Therascope (sold).
- Normoxys
- AC Immune
- InCellArt

FIELDS OF RESEARCH OVER THE YEARS

Theoretical Organic Chemistry: Ab initio conformational analysis; computation of nitrogen and phosphine inversion, of the electronic structure of hydrocarbons, of stereoelectronic effects on chemical reactivity; theoretical studies of molecular receptors and recognition processes.

Dynamic Nuclear Magnetic Resonance: Studies of conformational rate processes, internal rotation and nitrogen inversion.

Molecular Dynamics and Liquid Structure from Nuclear Magnetic Relaxation data. Nuclear Quadrupole Resonance.

SUPRAMOLECULAR CHEMISTRY:

Cryptates: Design, synthesis and properties of ligands forming stable and selective inclusion complexes with metal ions; **di-** and **poly-**nuclear cryptates; bioinorganic models; **photoactive** and **electroactive** cryptates; cluster cryptates; energy and electron transfer processes.

Molecular Recognition, Molecular Receptors and Coreceptors: Design, synthesis and properties of macropolycyclic complexing agents binding selectively one or several molecular substrates: **metalloreceptors**; **photoactive** receptors; **cyclointercalands**.

Anion Coordination Chemistry: Anion cryptates; receptors and coreceptors for anionic substrates; selective complexation of organic, inorganic and biological anions.

Supramolecular Catalysis: Design and properties of molecular catalysts performing a reaction on bound substrate species; enzyme models; **cocatalysis**.

Transport Processes: Design of selective carriers; transport of anions, cations and molecules; thermodynamic and kinetic properties; transport **regulation**; **coupling** to chemical potentials (protons, electrons) and to light.

Supramolecular Materials: Recognition materials, supramolecular polymers, liquid crystals, vesicles, inorganic materials.

Chemionics: Molecular Photonic, Electronic and Ionic Devices: Photoactive and electroactive cryptates; energy and electron transfer processes; light conversion; photo-antenna; ion transfer; molecular and ionic switching and amplifying processes; molecular protonics.

Semiochemistry: Generation and processing of optical, electronic and ionic chemical signals; ion detection; ion pulses; non-linear optical properties.

Photochemistry and Solar Energy Storage: Photochemical activation of small molecules by means of transition metal complexes; photogeneration of hydrogen and oxygen; **water photolysis**; photoreduction of CO₂; design of photoinduced **charge separation** systems.

Structural and Dynamic Studies by Multinuclear NMR on supramolecular complexes (in collaboration with the NMR Laboratory).

Bioorganic Chemistry and Biological Applications: Models of biological receptors, of enzymes and of biological transport processes; immunological labelling agents, selective nucleic acid reagents, helical and metallo-nucleic complexes; artificial gene transfer vectors.

Allosteric Effectors of Hemoglobin: Oxygen fixation to haemoglobin; modified red blood cells; biological effects (cardiovascular, oncological).

SELF-ASSEMBLY AND SELF-ORGANIZATION

Programmed Chemical Systems: Design of systems generating given supramolecular architectures by molecular recognition directed spontaneous assembly of the components; self-organization by design and with selection; hydrogen bonding and coordination interactions; multiple expression of molecular information.

Self-Organization of Organic Architectures: Generation of hydrogen bonding entities; hydrogen bonding patterns; polymolecular assemblies, recognition vesicles, recosomes; structural codons and molecular motions.

Self-Organization of Inorganic Architectures: Double and multiple helicates; grid-type architectures; multicomponent self-assembly; nanocylinders; physicochemical properties of multinuclear arrays.

CONSTITUTIONAL DYNAMIC CHEMISTRY

Dynamic Covalent Chemistry: Dynamic combinatorial libraries; constitutional dynamic processes; reversible chemical reactions, implementation, efficiency and selectivity; multiple dynamic processes.

Biological Systems: generation and identification of substrates for receptors and enzyme inhibitors; dynamic deconvolution.

Dynamic Materials: Dynamers, dynamic polymers; modulation of properties by component recombination (optical, mechanical, hydrophobic features); biodynamers (glycodynamers, dynamic nucleic acid analogs); controlled release materials.

Adaptation and Selection: Component selection in equilibrium systems; effect of physical and chemical triggers (temperature, electric field, protons, ions, medium, etc.); constituent adaptation in switching processes; adaptation in self-organization; coupling to non-equilibrium processes.