

## LUCIA BANCI

### Curriculum Vitae

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Lucia Banci is Professor of Chemistry at the University of Florence. Lucia Banci has a high international reputation for her original contributions and breakthroughs in Structural Biology and in biological NMR. She is recognized as world class leader in the characterization of functional processes in a cellular context with atomic resolution. She has addressed and unraveled many aspects of the biology of metal ions in biological systems, from their homeostasis processes to the trafficking and metal incorporation in the final receiving proteins. She developed a molecular systems biology approach which integrates information on structural, dynamical, and interaction features of the biomolecules with the thermodynamic properties of the processes, so to have a unified picture of the pathways responsible of metal ion trafficking, with particular focus on copper transport and on the biogenesis of iron-sulfur cluster proteins.

Most recently she developed new approaches for in cell NMR which are raising a very high interest in various scientific communities, either interested in new methodological advancements in NMR or in the striking new knowledge obtained on biological processes. The innovative in cell NMR approach developed by Lucia Banci and her group allows for the detection of human individual proteins (a single one or more such as partner proteins) in living human cells with atomic level resolution. This approach realizes the bridge between cellular studies (which maintain the cellular environment but lack atomic information) and structural characterization (which provides a detailed, atomic level description in vitro).

Over the recent years Lucia Banci also exploited the extensive knowledge of structural biology approaches through NMR expertise to develop an absolutely innovative approach to vaccine design, which she first named «*Structural Vaccinology*» based on the knowledge of the structure of the pathogen antigens and of the interaction pattern with antibodies, to design structure-based vaccines. With this approach she provided an essential contribution to the development of a vaccine against meningococcus B pathogen, which is characterized by several variants, each exhibiting different epitopes on a very effective antigen. The knowledge of the structural properties allowed the design of a chimera antigen which has complete protectivity against all the variants, this approach is now being exploited for early stages of vaccine design against other pathogens.

She has published more than 420 research articles on peer reviewed journals, which received more than 24.000 citations, and she has solved above 150 protein structures. (H-Index (Google Scholar) = 81).

Lucia Banci is one of the founders and former Director of the Center of Magnetic Resonance (CERM) of the University of Florence, which features an impressive battery of NMR spectrometers. She is the Head of the Italian Core Center of the ESFRI Reasearch Infrastructure INSTRUMENT, and a member of the INSTRUMENT Executive Committee and of the Council.

Over the years, she is and has been recipient of grants from Italian and Regional agencies, and from the European Commission Framework Programs 4 through H2020 and from private institutions.

She is and has been member of the Editorial Board of several international journals and regularly acts as referees of most of the top level journals in her scientific fields. She has been organizer and chair of several International Conferences and Workshops.

### **Place and Date of birth**

Florence, May 20, 1954

### **Degree**

Doctorate in Chemistry, 110/110 cum laude, July 1978, University of Florence

### **Positions held** (all at the University of Florence)

Coordinator of the International Doctorate in Structural Biology (2019-)  
Director of CERM (Centro di Risonanze Magnetiche)- University of Florence 2011-2017  
Professor of Chemistry (Faculty of Science) 1999-present  
Associate Professor of Chemistry (Faculty of Science) 1989-1999  
Associate Professor of Chemistry (Faculty of Pharmacy) 1987-1989  
Tenured researcher 1983-1987 (Tutor in Chemistry, Faculty of Sciences)  
Postdoctorate 1978-1983

### **Honors and Awards**

2018 Premio Scienza Madre  
2017 "Instruct Bertini Award" for Integrated Structural Biology  
2015 «Fiorino d'Oro della Città di Firenze» Gold Medal of the City of Florence  
2015 IUPAC Award «Distinguished Woman in Chemistry»  
2015 Elected ISMAR Fellow  
2014 Elected member of Academia Europaea  
2013 Appointed Member of AcademiaNet

2012 Elected Member of EMBO (European Molecular Biology Organization)  
2011 Listed among the 45 Top Italian Female Scientists  
2011 Director of the Magnetic Resonance Center (CERM) of the University of Florence  
2009 Executive Committee of ISGO (International Structural Genomics Organization (2009-2014))  
1998 Premio Federchimica – “Per un Futuro Intelligente”  
1994 “Raffaele Nasini” Medal of the Inorganic Division of the Italian Chemical Society.

### **Committee Services**

2014 Appointed Member of the EMBL and EMBC Councils  
2014 Member of the Strategic Working Group “Health and Food” of ESFRI  
2013 Member of the ISGO (International Structural Genomics Organization) Executive Committee  
2013 Member of the Scientific Committee for “Life, Environment and Geo Sciences” of Science Europe (2013-2015)  
2011 Member of the ISMAR Council (2011-2014 and 2014-2017)  
2009 Member of the Executive Committee of EUROMAR (2009-2014)  
2008 Chair of the ICMRBS Council (2008-2010)  
2008 Member of the HFSP (Human Frontier Science Program) Review Committee  
2006 Scientific Secretary of the Society of Biological Inorganic Chemistry (1999-2006)  
2005 Societa' Chimica Italiana – Chair of the Chemistry of Biological Systems Division  
2004 Joint Gold Medal of GIDRM (Italian Group on Magnetic Resonance) and GIRM-SCI (Interdivisional Group on Magnetic Resonance of the Italian Chemical Society).  
2000 Member of the ICMRBS Council

### **Organization of Conferences**

Member of the Organizing Committee of the "Workshop on Zinc Enzyme", San Miniato, 1985; Workshop on "Genetic and Physico-Chemical Approaches for the Analysis of Biological Catalysts", Florence 1986; scientific secretary of the 2nd "Chianti Workshop on Magnetic Resonance: Electron and Nuclear Relaxation in Biological and Model Systems", San Miniato, 1987; scientific secretary of the 3rd "Chianti Workshop on Magnetic Resonance: Nuclear and Electron Relaxation", San Miniato, 1989; organizer of the Conference “Frontiers of the Chemistry of Metal Ions approaching the Year 2000”, Florence, 1990; organizer of the "Workshop on Structure and Function of Mutated Proteins", Florence, 1991; organizer of the 5th "Chianti workshop on Magnetic Resonance", San Miniato, 1993; chair of the Organizing Committee of the EUROBIC II Conference, Florence, 1994; director of the NATO Advance Workshop on “Molecular Modeling and Dynamics of Biological Molecules Containing Metal Ions”, San Miniato, 1997; organizer of the 7th "Chianti workshop on Magnetic Resonance ", San Miniato, 1997;. organizer of the European Training Course on “Advance Computing in NMR Spectroscopy”, Florence, 1997, 1999; 2001, Executive manager “XIX International Conference on Magnetic Resonance in Biological Systems”, Florence, 2000, member of the Organizing Committee of the 10th ICBIC, Florence, 2001, member of the Organizing Committee of the 10<sup>th</sup> “Chianti workshop on Magnetic Resonance” San Miniato, 2003,

Organizer of the European Training Course on Advanced computing in NMR spectroscopy, Florence, 2003, member of the Organizing Committee of the "XI Chianti workshop on Magnetic Resonance" Vallombrosa, 2007, member of the Organizing Committee of the "NMR to Lay the Bricks for Molecular Systems Biology, Montecatini Terme, 2008, Co-chair of the Joint EUROMAR 2010 and 17th ISMAR Conference, Florence, 2010, member of the Organizing Committee of the 12<sup>th</sup> Chianti/INSTRUCT workshop on BioNMR, Montecatini Terme, 2012, member of the Organizing Committee of the "EMBO workshop on Magnetic Resonance for Cellular Structural Biology, Principina Terra, 2014, member of the Organizing Committee of the 14<sup>th</sup> Chianti workshop on BioNMR, Principina Terra, 2016.

Member of the Scientific Committee of several international conferences, among which of EUROMAR 2009, EUROMAR 2011, ICMRBS 2016, ISMAR 2017, INSTRUCT Biennial Conference 2015 and 2017

### **Journal Services and Society Memberships**

She is member of the Editorial Board of Scientific Reports and of Scientific Data; she has been member of the Editorial Board of: Journal of Magnetic Resonance, Biomolecular NMR Assignments, JBIC, Journal of Structural Proteomics, and of EurJIC (European Journal of Inorganic Chemistry). She is a referee of many international journals, among which there are PNAS (Proceedings of the National Academy of Sciences), JACS (Journal of the American Chemical Society), EMBO Journal, Nature Structural & Molecular Biology, Nature Chemical Biology, the Journal of Biological Chemistry.

She is a member of Societa' Chimica Italiana, of the Ampere Society, of ISMAR, of ISGO, Honorary member of the National Magnetic Resonance Society of India. She is member of the ISMAR Council (2011-2014), of the Executive Committee of ISGO (International Structural Genomic Organization), of the Executive Committee of EUROMAR (2009-2014), has been Chair of the ICMRBS Council (2008-2010), Scientific Secretary of the Society of Biological Inorganic Chemistry (1999-2006).

### **Evaluation and Advisor Services**

She is and has been member of evaluation committees for many Funding Institutions at the international level: Member of the HFSP (Human Frontier Science Program) Review Committee (2008-2012), of ERC Evaluation Panel, member of the international assessment committee Building Blocks of Life of the Netherlands Organization for Scientific Research (NOW) and ad hoc reviewer for EC (Cooperation and Marie Curie types of projects), DFG (German Research Foundation), EMBO (European Molecular Biology Organization), NIH (National Institutes of Health), NSF (National Science Foundation), AERES (French Evaluation Agency for Research and Higher Education), as well as of several funding applications for many European and International Countries. Member of the Chemistry Committee for the Evaluation of the Italian Research.

She is and has been member of Advisor Board of several European institutions. She has acted as external member of the PhD jury for a number of European Universities

Lucia Banci is and has been very active in promoting gender balance in academic positions particularly in stimulating and motivating young female scientists in aiming to and working for achieving successful careers. On this respect she has been the promoter of the establishment of the Equal Opportunity Committee of the University of Florence. Her attention to promote the active participation of women in scientific activities and in obtaining relevant positions is witnessed by the Faculty composition of CERM, directed by her already for the second term, which includes 6 women out of 13 members. She has supervised 44 PhD students, 25 out of whom are women. In recognition of her leading role in developing policy for gender balance she has been invited to present her experience and her vision in several events. Among these she has been included in an Italian initiative supported by EC, which selected 100 « Excellent Experts in STEM » area to be presented in the web as reference personalities in the various research areas.

### **Fellowships and Collaborations**

Visiting Professor, Princeton, 2002

Visiting Scientist, Harvard Medical School, 1994

Visiting Scientist, Pennsylvania State University, 1993

NATO grant with the Department of Chemistry, Pennsylvania State University, 1991.

Visiting Scientist, University of California at San Francisco, 1990 and 1991

NATO Fellow, University of California at San Francisco, July-August 1989

Visiting Researcher, University of California at Davis, USA, April-May 1987,

January 1988, July-August 1988

Head of the Italian Core Center of the ESFRI Research Infrastructure INSTRUMENT, member of the Executive Committee and of the Council.

She is and has been Coordinator or Principal Investigator of projects funded at European, National and regional levels. Among the most recent there are:

Partner of the EC H2020 projects: iNEXT, West-Life, CORBEL, Instruct-ULTRA

Partner in the MEDINTECH project of the Italian National Cluster for Life Sciences "ALISEI".

Coordinator of the Regional Research Infrastructure project "BioEnable".

### **Patents**

Use of matrix metalloproteinases, mutated and not mutated, for the preparation of pharmaceutical compositions, and mutated metalloproteinases with increased stability - **WO 2007020223 A1**

Modified meningococcal fhbp polypeptides - **WO 2011051893 A1**

### **A Summary of Scientific Activity**

She is the author of more than 370 publications, in scientific journals of international renown. After her initial work in the field of Inorganic Chemistry, where she characterized magnetic properties (such as magnetic coupling between metal ions, electron and nuclear relaxation, hyperfine coupling) of small complexes and biological cofactors, through EPR and NMR spectroscopies, she provided a strong contribution to the comprehension of relaxation phenomena of nuclear spins in paramagnetic systems. She is co-author, together with I. Bertini and C. Luchinat, of the book "Nuclear and Electron Relaxation", VCH, Weinheim, which presents a unified picture of the relaxation processes for nuclear and electron spins, combining a pictorial description of the relaxation processes for nuclear and electron spins with a rigorous mathematical presentation.

In the eighties, when recombinant DNA techniques produced a major revolution in the study of biological systems, she applied her background knowledge and expertise to the spectroscopic characterization, in particular through NMR spectroscopy and  $^1\text{H}$  NMRD measurements, of paramagnetic metalloproteins, such as superoxide dismutase, alkaline phosphatase, carbonic anhydrase, iron-sulphur proteins, peroxidases, and of their mutants or derivatives modified by metal substitution. Advanced (in those days) NMR techniques, like NOE and 2D NOESY and COSY experiments on highly paramagnetic systems, were used for obtaining structural characterization of the active site of the paramagnetic metalloproteins and of their adducts with inhibitors. These studies allowed and are still allowing a deeper understanding of the structural and catalytic properties of the investigated proteins and enzymes and the correlation between structural features and functional and enzymatic behavior.

In the meantime, she developed approaches for molecular dynamics calculations applied to metal-containing proteins, in order to rationalize their structural and dynamical behavior when they are interacting with the solvent, to interpret the NMR data and to analyze the factors affecting the protein-substrate interactions. These calculations were applied to metalloproteins, where the presence of one or more metal ions requires, for a correct description of the system, the development of their force-field parameters, which is still one of the frontiers in this area of research. These force-field parameters were developed by Lucia Banci for several metal ion centers of various proteins.

In the nineties, Lucia Banci developed spectroscopic and computational methodologies for the determination of solution structures of paramagnetic metalloproteins through NMR spectroscopy. The combined use of standard 2D and 3D experiments together with experiments tailored for systems characterized by broad signals spread over a large spectral width allowed the resolution of the first solution structure of a paramagnetic metalloprotein. This structure broke a dogma stating that, "solution structures of paramagnetic proteins could be never determined" This achievement took also advantage of the force field parameters she developed on metal ions. Her research in this area was devoted to the structural and dynamical characterization of several electron transfer proteins. Having optimized the methodology for structural determination of these "difficult" proteins, she then addressed and is addressing more challenging projects, such as the determination of the internal motions on very large time scales, the comprehension of the factors determining the folding of

the protein and of those determining molecular recognition between two partners during the biological process, and the structural and dynamical features which lead to misfolding and protein aggregation. The answer to these fundamental questions is important for several aspects of Science.

After the Genome revolution, Lucia Banci has been an active player in Structural Genomics projects. Her approach was driven by the “function perspective” more than a broad coverage of genome products, as several Structural Genomics projects are organized. Target selection was focused on all the proteins involved in the pathways under investigation. In particular, she provided unique contributions to the understanding of the processes of copper transfers and of copper incorporation in a few systems, such as the Golgi system and cytochrome c oxidase. The latter process involves several proteins that were not structurally characterized before or not even identified. Through bioinformatic tools and browsing the available genomes she identified new proteins and for most of them (new or already reported) she determined the structure and characterized the interaction with the metal cofactor and with the potential partners. From all these studies a picture of the various steps of copper transfer in cytochrome c oxidase has been obtained. She has also worked on the pathway of copper transfer from the soluble chaperone to the soluble domains of membrane Cu-binding ATPases, and then to the membrane-embedded metal binding site. Overall she provided unique contributions to the understanding of the processes of copper transport in the cell and its incorporation into the final targets. Within this frame, she has also addressed the weak, transient protein-protein interactions which are at the basis of a large number of biological processes. From her work a new feature of the interactome emerged, i.e. that a portion of the protein-protein interaction network is metal mediated. In other words, the interactions among proteins are mediated by metal ions. In the frame of this cellular, system-wide, approach she also addressed, within a structural and functional perspective, the processes of protein import in mitochondria and their folding and how these processes are tightly interconnected with those of metal transport and homeostasis as well as with electron transfer processes. Within this functional approach, she has also addressed the weak, transient protein-protein interactions which are at the basis of a large number of biological processes.

She has a long time experience in the structural and functional characterisation of SOD1, more recently focusing on the mechanism and factors inducing protein aggregation. She has proposed a new mechanism for the latter process allowing the rationalization of the behavior all the SOD1 mutants related to ALS. She is now developing new strategies and identifying molecules which prevent this aggregation.

She has characterized and is characterizing proteins which are naturally unstructured, at least locally, as required by their function. This feature has profound effects on their properties and pattern of interactions. On the contrary, local structural disorder in naturally ordered proteins is appearing as one of the factors leading to toxic protein aggregates, whose formation is also triggered by metal or by the lack of native metal ions, in several cases. She is providing important contributions to the understanding of these processes.

She has been pioneer in developing the field of “Structural Vaccinology”, a new and innovative strategy to design effective vaccines. Based on the knowledge of the structure of the antigens, of the location of the various epitopes and on the interaction mode with antibodies, new vaccines with very broad protection coverage can be designed and produced. This innovative approach has been successful.

Finally, she is now developing new challenging approaches for in cell NMR and for their exploitation for characterizing biomolecules directly in living cells with atomic resolution. Within this approach she is studying folding, protein maturation and metal uptake also through the coordinated expression of the various proteins involved. Finally the most recent line of research, i.e in cell NMR is raising a very high interest in various scientific communities, either interested in new methodological advancement in NMR or in the striking new knowledge obtained in biological processes. This innovative in cell NMR approach allows the detection of human individual proteins (a single one or more such as partner proteins) with atomic level resolution in living cells human cells. This approach is covering the bridge between cellular studies (which maintain the cellular environment but lack atomic information) with structural characterization (which provides a detailedm, atomic level description).

She has published more than 420 research articles on peer reviewed journals and has solved above 150 protein structures, all deposited in the PDB.

## **Conferences and Seminars**

She has been invited to present lectures at the following meetings:

### **1985**

“VIII School-Symposium on Inorganic Biochemistry and Molecular Biophysics”, Wroclaw, Poland.

### **1986**

“IIIrd Swiss-Italian Meeting on Inorganic and Bioinorganic Chemistry”, Ferrara, Italy.

### **1988**

“Trends in Bioinorganic Chemistry”, Firenze, Italy; “Inorganic Chemistry Workshop of the Italian Chemical Society”, Siena, Italy; “XIII International Conference on Magnetic Resonance in Biological Systems”, Madison, WS, USA

### **1989**

NATO - ASI School: “Enzymatic and Model Carboxylation and Reduction Reactions for Carbon Dioxide Utilization”, Riva dei Tessali, Italy; “IV International Conference on Bioinorganic Chemistry”, Cambridge, MA USA.

### **1990**

“2nd EurAsia Conference on Chemistry”, Seoul, Korea

### **1992**

2nd Joint Israel-Italy Symposium on Magnetic Resonance in Biological and Material Science, Siena, Italy; 2nd Italian-Portuguese-Spanish meeting in Inorganic Chemistry,



Algarve, Portugal; "Structure-Function Relationship in Peroxidases and Cytochromes P-450: from Genetics to Biophysical Characterizations and Chemical Modelling", Le Bischenberg, France

**1993**

Workshop on "Magnetic Spectroscopy on Bioinorganic Transition Metal Centers", Homburg, Germany; European Research Conference on "Chemistry of Metals in Biological Systems", Algarve, Portugal; VI International Conference on Bioinorganic Chemistry, La Jolla, U.S.A; NATO/EMBO/FEBS International Summer School on "Molecular and Cell Biology", Spetsai, Greece; 2nd Siena-Kyoto Symposium, Kyoto, Japan

**1994**

International Workshop on Iron-Sulphur Proteins, Kostanz, Germany; FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium; NATO Advanced Research Workshop on "Nuclear Magnetic Resonance of Paramagnetic Macromolecules", Sintra, Portugal; Symposium on Molecular Modeling in Genetic and Protein Engineering, Sopron, Hungary

**1995**

Workshop on "Structural Characterization of Proteins by NMR, X-ray Diffraction, and Computational Methods, Ripa d'Orcia, Italy; European Research Conference on "Chemistry of Metals in Biological Systems", San Miniato, Italy; FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium; 3rd Greek-Italian-Spanish-Portuguese Meeting, Senigallia, Italy; International Workshop on "Peroxidase Biotechnology and Application", Pushchino, Russia; International meeting on Copper in Biological Systems, Santa Severa, Italy

**1996**

FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium

**1997**

NATO Workshop on "Molecular Modeling and Dynamics of Bioinorganic Systems", San Miniato, Italy; European Research Conference "Chemistry of Metals in Biological Systems", Tomar, Portugal; Eighth International Conference on Bioinorganic Chemistry, Yokohama, Japan; 4th French-Greek-Italian-Portuguese-Spanish Meeting in Inorganic Chemistry, Corfu, Greece; Workshop of European Science Foundation on "Molecular Recognition in Metalloproteins", Sevilla, Spain; Vth International Symposium "Magnetic Field and Spin Effects in Chemistry and Related Phenomena" Jerusalem, Israel

**1998**

FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium; "Forth European Biological Inorganic Chemistry Conference, Seville, Spain; European Summer School "Structure of Metalloproteins" Oeiras, Portugal

**1999**

2<sup>nd</sup> International Workshop on "Structural Characterization of Proteins by NMR, X-Ray Diffraction and Computational Methods", Verona, Italy; International Colloquium "Molecular Bioenergetics" Mauloff, Germany; 5<sup>th</sup> International Symposium on Applied Bioinorganic Chemistry, Corfu Greece; Symposium of the Inorganic Chemistry Division, American Chemical Society Annual Meeting, Anaheim, USA; Symposium of the Cellulose Chemistry Division, American Chemical Society Annual Meeting, Anaheim, USA; FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium;

Ninth International Conference on Bioinorganic Chemistry, Minneapolis, USA; Gordon Conference on "Computational Aspects of Biomolecular NMR", Barga, Italy.

#### **2000**

Gordon Conference "Metals in Biological Systems", Ventura, CA, USA; FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium; 2<sup>nd</sup> International Conference on Superoxide Dismutase, Paris, France; International Conference on "Basic and Clinical Enzymology 2000", Naples, Italy; First International Conference on Porphyrins and Phthalocyanines, Dijon, France; International Symposium on Advances in Bioinorganic Chemistry, Tata Institute, Mumbai, India.

#### **2001**

Frontiers of Biomolecular NMR, Ljubljana, Slovenia; 42<sup>nd</sup> Experimental Nuclear Magnetic Resonance Conference (ENC), Orlando, USA; Tenth International Conference on Bioinorganic Chemistry, Florence, Italy; 3<sup>th</sup> International Workshop on Structural Characterisation of Proteins by NMR, X-Ray Diffraction and Computational Methods, San Vito di Cadore, Italy; XXXI National Congress of the Italian Society of Crystallography, Parma, Italy; CECAM/ESF Psi-k Workshop, Lyon, France.

#### **2002**

International School on Biophysical Characterization of Biological Molecules, Venezia, Italy; Symposium honoring Peter Kollman "Molecular Simulations in Structural Biology and Drug Discovery", San Francisco, USA; IX DBMS - IBS Workshop "Metals in Biology", Autrans (Grenoble), France; FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium; XX International Conference on Magnetic Resonance in Biological Systems (ICMRBS) Toronto, Canada.

#### **2003**

Conference of the Royal Australian Chemical Society, Melbourne, Australia; AsiaBIC, First Asian Bioinorganic Chemistry Conference, Okasaki, Japan; FEBS-ESF Advanced Course "Chemistry of Metals in Biological Systems", Louvain-la Neuve, Belgium; Summer School on NMR Spectroscopy, Otocez, Slovenia; Meeting on Copper Proteins, Konstanz, Germany.

#### **2004**

7<sup>th</sup> European Biological Inorganic Chemistry Conference, Garmisch-Partenkirchen, Germany; Copper Homeostasis and its Disorders: Molecular and Cellular Aspects, Ischia, Italy; Genome Base Drug Discovery, Florence, Italy; XXXIV National Congress of Magnetic Resonance, Alghero, Italy; 4<sup>th</sup> International Workshop on Structural Characterisation of Proteins by NMR, X-Ray Diffraction and Computational Methods, San Vito di Cadore, Italy; Symposium "Chemistry and Biology - the transition between the two centuries", Accademia dei Lincei, Roma, Italy; Second Asian Biological Inorganic Chemistry Conference, Goa, India; II SPINE Congress, London, UK.

#### **2005**

XXI International Conference on Magnetic Resonance in Biological Systems (ICMRBS) Hyderabad, India, EUROMAR 2005, Veldhoven, The Netherlands; ESF Conference "NMR in Molecular Biology", Scania, Sweden; III SPINE Congress, Montecatini, Italy, Third European Conference on Research Infrastructures, Nottingham, UK

#### **2006**

37<sup>th</sup> International Conference of Coordination Chemistry, Cape Town, South Africa, 3<sup>rd</sup> Asian Biological Inorganic Chemistry Conference (AsBIC-III) Nanjing University, Nanjing, China, 5<sup>th</sup> International Copper Meeting: Copper and Related Metals in Biology, Alghero,

Italy, 1st European Chemistry Congress Budapest, Hungary, 8th European Biological Inorganic Chemistry Conference, Aviero, Portugal, 4th International Conference on Structural Genomics, Beijing, China

#### **2007**

Gordon Research Conference “Metals in Biology and Medicine”, Ventura, CA, USA; European Symposium of the Protein Society, Stockholm, Sweden; EMBO Workshop on Intrinsically Unfolded Proteins, Budapest, Hungary; Mutant SOD1 and familial ALS: from the molecule to man, Milan, Italy; 16<sup>th</sup> Triennial International Conference of the International Society of Magnetic Resonance, ISMAR, Taiwan

#### **2008**

49th ENC, Asilomar, CA, USA; Gordon Research Conference “Environmental Bioinorganic Chemistry”, Waterville, NH, USA; 4th International Conference on Metals and Genetics (ICMG 2008), Paris, France; XXIII ICMRBS, San Diego, CA, USA, 2nd EuCheMS Chemistry Congress, Turin, Italy; 5<sup>th</sup> International Conference on Structural Genomics (ICSG 2008), Oxford, UK; Workshop on "Intrinsically Unfolded Proteins and Complementary Methods in Structural Biology, EMBL-Hamburg, Germany

#### **2009**

Keystone Symposium: Frontiers of NMR in Biology, Santa Fe, NM, USA, Symposium on Advanced Biological Inorganic Chemistry (SABIC-2009), Tata Research Institute, Mumbai, India; International Symposium on Protein Structures, Nara Institute of Technology, Nara, Japan

#### **2010**

Proteine2010, Parma, Italy; EUROBIC10, Thessaloniki, Greece; 35th FEBS Congress, Goteborg, Sweden; XXIV ICMRBS, Cairns, Australia; ESF-EMBO Symposium on Molecular Perspectives on Protein-Protein Interactions, Sant Feliu de Guixols, Spain; Accademia dei Lincei Symposium “Protein Structure and Dynamics”, Rome, Italy.

#### **2011**

EMBO Global Exchange Lecture Course “ Structural and Biophysical Methods for Biological Macromolecules in Solution”, Beijing, China; International Conference on Structural Genomics (ICSG 2011), Toronto, Canada; International Conference on Bioinorganic Chemistry, Vancouver, Canada; 13th Central European NMR Symposium & 13th Central European Bruker Users, Eötvös Loránd University, Budapest, Hungary; Workshop on Metals in Biology, Goteborg, Sweden; 2011 Cold Spring Harbor Asia Conference on Protein Structure Based Drug Design, Suzhou, China; Structure – & Computer– Aided Design Workshop: Bioactive Molecules & Materials, Athens, Greece.

#### **2012**

Breakthroughs in NMR of Structural Biology The 2nd Bio-NMR Annual User Meeting, Portorož, Slovenia; XXIV ICMRBS, Lyon, France, Plenary Lecture; EMBO Global Exchange Lecture Course, Hyderabad; The 3rd annual BioStruct conference 2012 Jægtvolden, Trøndelag; Advanced Mass Spectrometric and NMR Methods Athens, Greece; Copper in Biology 2012 Alghero, Italy; 3rd Annual East-NMR User Meeting Lasko, Slovenia

**2013** CEITEC NMR meeting, Brno, Czech Republic; EUROMAR 2013, Crete, Greece; XXXIV Biennial Congress of the Royal Spanish Society of Chemistry, Santander, Spain; EMBO Members meeting, Heidelberg, Germany; XVIII Argentinian Congress of Physical and Inorganic Chemistry, Rosario, Argentina; International Conference on Bioinorganic

Chemistry (ICBIC), Grenoble, France; XXXV German-Italian Magnetic Resonance Discussion Group Meeting, Munich, Germany; 4th International Symposium on Metallomics, Oviedo, Spain; 36<sup>th</sup> Annual Meeting of the Molecular Biology Society of Japan, Kobe, Japan; Trends in Biomolecular Structure; from Chemistry to Function, Ljubljana, Slovenia; Inauguration of REGPOT-SEEDRUG NMR Facility, Patras, Greece.

**2014** EMBO Global Exchange Lecture Course, Sao Paulo, Brasil; RRR Workshop, Osaka and Kyoto, Japan; Annual Conference of the Indian Magnetic Resonance Society, Tizpur, India; Structure And Dynamics of Biological Macromolecules, Roma, Italy; 4th Annual User group Meeting of Bio-NMR, Warsaw, Poland; EMBO Workshop on Magnetic resonance for cellular structural biology, Grosseto, Italy; The FEBS EMBO 2014 Conference, Paris, France, IUPAP International Conference on Biological Physics (ICBP2014, Beijing, China; 9th International Copper Meeting, Copper2014, Vico Equense, Italy; 2014 FASEB Summer Research Conference "Trace Elements in Biology and Medicine", Steamboat Spring, USA; EUROBIC12, Zurich, Switzerland; AsBIC-7 (Plenary Lecture), Queensland, Australia.

**2015** European-Winter School on Physical Organic Chemistry, Bressanone, Italy Plenary Lecture, ISMAR, Shanghai, China; International Conference on Structural Genomics (ICSG 2015), Weizmann, Israel; International Conference on Bioinorganic Chemistry (ICBIC), Beijing, China; EMBO Global Exchange Lecture Course, Taipei, Taiwan; PacificChem, Honolulu (USA).

**2016** Metals in Genetics, Chemical Biology and Therapeutics (ICMG), Bangalore, India; EMBO Global Exchange Course, Suwon, South Korea; Korean Biophysical Society Meeting, Seoul, Korea; International Conference on Magnetic Resonance in Biological Systems (XXVII ICMRBS), Kyoto, Japan; Women in Structural Biology Symposium, Grenoble, France; 10th International Copper Meeting, Sorrento, Italy; 42nd Naito Conference in the Vanguard of Structural Biology: Revolutionizing Life Sciences, Sapporo, Japan; New Horizons and Emerging Biomedical Challenges for Biophysics (BBS 2016) Liverpool, UK; Summer School on BioPhysics, Erice, Italy; EUROMAR 2016-Aarhus, Denmark; FEBS-IUBMB Workshop on Biointeractomics, Seville, Spain; 50 Cool Ways to Do NMR, Frankfurt, Germany; Structural and functional annotation of bioinorganic systems: perspectives and challenges from theory and experiments, Pisa, Italy.

**2017** 5<sup>th</sup> Symposium on Advanced Biological Inorganic Chemistry (SABIC-2017), Kolkata, India; 42<sup>nd</sup> Lorne Conference on Protein Structure and Function, Lorne, Victoria, Australia; 2<sup>nd</sup> Annual Users Meeting of iNEXT, Brno, Czech Republic;

Gordon Research Conference "Computational Aspects of Biomolecular NMR", Newry, ME, US; EUROMAR 2017, Warsaw, Poland; ISMAR 2017 Québec City, Canada; EMBO Practical Course NMR 2017, Basel, Switzerland; 42<sup>nd</sup> FEBS Congress, Jerusalem, Israel; EMBO Global Exchange Lecture Course, Singapore.

**2018** 62<sup>nd</sup> Annual Meeting Biophysical Society (BPS18), San Francisco; USA, 43<sup>rd</sup> FEBS Congress, Prague, CZ; 39th Steenbock Symposium, Madison, Wisconsin, USA; 28th ICMRBS, Dublin, Ireland.

**2019** International Conference "NMR: a tool for Biology", Institut Pasteur, Paris, France; Enova Training School, Siena, Italy; Twinning TIMB3 Training Course on Chemistry of Metals in Biological Systems, Lisbon, Portugal; 7<sup>th</sup> International Symposium on Metallomics, Warsaw, Poland; 44<sup>th</sup> FEBS Congress, Krakow, Poland; 2019 Cell Biology of Metals Gordon Research Conference, Castelldefels, Spain; EMBO Practical Course "Structure, dynamics and function of biological macromolecules by solution NMR", Garching, Germany; 19<sup>th</sup>

International Conference on Biological Inorganic Chemistry (ICBIC-19), Interlaken, Switzerland; EUROISMAR 2019, Berlin, Germany, EMBO Global Exchange Lecture Course Santiago, Chile.

**2020** International On-line Bioinorganic Symposium (IOBS) 2020; EMBL Hamburg P12 virtual user workshop, 18 November 2020.

She has actively participated at many national meetings and advanced schools.

She has been invited to present seminars at the following institutions:

**1982**

Washington State University, Pullman, USA

**1985**

Tsinghua University, Beijing, China

**1986**

University of Saarland, Homburg, Germany

**1987**

University of California at Davis, USA; University of Lausanne, Switzerland; University of Basel, Switzerland; University of Padua, Italy; University of Valencia, Spain; University of Barcelona, Spain

**1988**

Scripps Clinics, San Diego, USA; University of California at S. Francisco, USA; University of Minnesota, Minneapolis, USA; University of New Mexico, Albuquerque, USA; Massachusetts Institute of Technology, Cambridge, USA

**1989**

University of California at Davis, USA; University of California at San Diego, USA; Stanford University, USA

**1990**

University of British Columbia, Vancouver, Canada; Kyoto University, Japan; Nagoya University, Japan

**1991**

Pennsylvania State University, USA; The University of Arizona, Tucson, USA; Columbia University, New York, USA

**1992**

University of Pisa, Italy

**1993**

Nagoya University, Japan; Tokyo Institute of Technology, Japan

**1994**

IBM Research Laboratories, Zurich, Switzerland

**1996**

University of Norwich, UK; University of Cambridge, UK

**1997**

University of Milan, Italy

**2000**

University of Naples, Italy; Centro de Investigaciones Biologicas (CSIC), Madrid, Spain.

**2001**

University of Catania, Italy; Florida State University, Tallahassee, USA

**2002**

Princeton University, USA

**2003**

Osaka University, Japan; Leiden University, The Netherlands

**2004**

Forschungsinstitut fuer Molekulare Pharmakologie (FMP) Berlin, Germany

**2006**

Peking University, Beijing, China

**2008**

UCSF, San Francisco, USA; UCLA, Los Angeles, USA

**2009**

University of Tokyo, Japan

**2010**

German Research School for Simulation Sciences, Julich, Germany; University of Sydney, Australia; University of Zurich, Switzerland

**2011**

ETH, Zurich, Switzerland; Nankai University, Tianjin, China

**2013**

Marburg University, Marburg, Germany; ETH Lugano, Switzerland

**2014**

Tsinghua University, Beijing, China; Stanford University, USA

**2015**

Peking University, Beijing, China; Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences; Scuola Normale Superiore, Pisa, Italy; University of Siena, Italy

**2016**

Università La Sapienza, Roma, Italy

**2017**

Monash University, Melbourne, Australia

The University of Melbourne, Melbourne, Australia

Utrecht University, Utrecht, The Netherlands

**2020**

Select Science Webinar, "NMR for understanding functional cellular pathways: Metal transport and homeostasis" 9 Dec 2020.