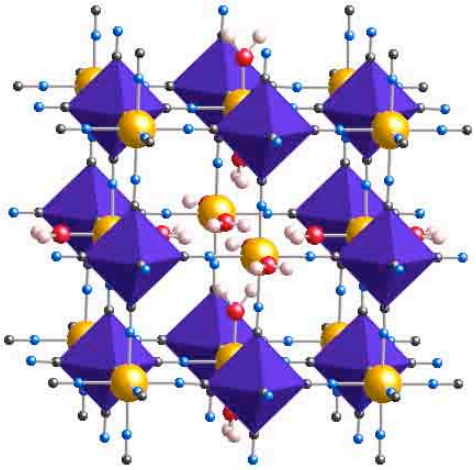
# MICHEL VERDAGUER

Emeritus Professor
Professeur émérite

*Curriculum vitae*
*Publications*



Institut Parisien de Chimie Moléculaire (IPCM)
UMR CNRS 7201
Université Pierre et Marie Curie Paris (UPMC)

Paris, Novembre / Octobre 2012

Structure d'un analogue du bleu de Prusse avec une température de Curie supérieure à la température ambiante.
Schematic structure of a Prussian blue analogue with a Curie temperature above room temperature.
See S. Ferlay, M.Verdaguer et al., *Nature*, **1995**, *378*, 701-703.


VERDAGUER MICHEL
Emeritus Professor
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**Michel Verdaguer's Short biography**

Following a career as a secondary school teacher, assistant professor at ENS de Saint-Cloud and a thesis in the laboratory of Olivier Kahn, **Michel Verdaguer** became Professor at Université Pierre et Marie Curie in Paris in 1988. Michel research endeavours concentrate on molecular magnetism, in which field he has developed a rational approach to new systems, from quantum chemistry to applications, from Haldane's gap systems to room temperature magnets (Prussian blue analogues). He is presently engaged in the study of multifunctional magnetic molecular materials, at the frontiers of the tiny and of the complex. He developed the use of synchrotron radiation in molecular inorganic chemistry (EXAFS, XANES, XMCD). Emeritus Professor since 2002, he is strongly committed to developing international cooperation (Molecular Magnets Programme of the European Science Foundation, Magmanet Network of Excellence) and to lecturing worldwide on molecular magnetism with recent visits to Americas, Asia and Europe. An award of the Royal Spanish Chemical Society recognized the robust and tight links that he established with Spanish chemists. He holds also awards from the French Chemical Society and from the French Academy of Sciences.
He is a fellow of Academia Europaea.

**Courte biographie de Michel Verdaguer**

Après un début de carrière comme professeur agrégé dans l'enseignement technique et assistant à l'Ecole Normale Supérieure de Saint-Cloud, enseignant-chercheur au laboratoire de spectrochimie des éléments de transition, bâtiment 420 à Orsay - où il a passé sa thèse d'Etat sous la direction d'Olivier Kahn -, chercheur associé au LURE, le centre français de rayonnement synchrotron, Michel Verdaguer est devenu professeur à l'Université Pierre et Marie Curie en 1988. Il y a dirigé le laboratoire de Chimie Inorganique et Matériaux Moléculaires et le D.E.A. interuniversitaire de chimie inorganique. Il a été membre des conseils scientifiques du LURE et de Soleil. Ses travaux de recherche sont centrés sur le magnétisme moléculaire où il a développé une approche rationnelle de nouveaux matériaux, de la chimie quantique aux applications, des chaînes antiferromagnétiques à gap de Haldane aux aimants à température ambiante. Avec ses collaborateurs, il participe aujourd'hui au développement de la chimie de matériaux magnétiques moléculaires multifonctionnels. Il a développé l'utilisation du rayonnement synchrotron en chimie inorganique moléculaire (EXAFS, XANES, XMCD).
Professeur émérite de l'université Pierre et Marie Curie depuis 2002, il est engagé dans le développement de la coopération internationale (Programme Molecular Magnets de la Fondation Européenne de la Science, réseau d'excellence Magmanet, European Institute of Molecular Magnetism) et dans la diffusion du magnétisme moléculaire, avec des conférences dans le monde entier. Il est auteur de plusieurs ouvrages, dont un livre d'expériences sur l'oxydoréduction. Il prépare un livre sur les « Electrons in Molecules » à paraître aux presses universitaires d'Oxford. Il est très engagé dans la préparation de l'année internationale de la Chimie 2011-Année Marie Sklodowska Curie 100.
Il a reçu des distinctions des sociétés de chimie française et espagnole et de l'académie des Sciences.
Il est membre de l'Academia Europaea.

## 1. INFORMATION GÉNÉRALE


| | |
|---|---|
| Name : | VERDAGUER Michel |
| Surname: | Michel, Pierre, Jean-Claude |
| Birth: | 16 January 1942, Bédarieux, Hérault (France) |
| Nationality: | French |
| Family Situation: | Married, three children, five grand children |
| Home Address: | Les Verdiers, 127 Avenue du Général Leclerc, 91120 Palaiseau, France |
| Professional Address: | Insitut parisien de chimie moléculaire (Molecular Chemistry Institute of Paris), C.N.R.S. Unit 7201, Case 42, Université Pierre et Marie Curie, 4 place Jussieu, 75252 Paris Cedex 05, France |
| Phone: | Home: (33)1 60 10 24 18; Laboratory: (33)1 44 27 30 59; Secretary: (33)1 44 27 30 33 |
| Fax: | (33)1 44 27 38 41 E.mail: michel.verdaguer@upmc.fr |
| Web Site: | http://www.jussieu.fr/cim2/activities/m3/m3.html |
| Diploma: | Professor " Certifié " and " Agrégé " in Physical Sciences (Chemistry), Doctor in Physical Sciences (Chemistry) (State Doctorate) |
| Present Grade: | Emeritus Professor, University Pierre et Marie Curie (Paris VI), Paris. |
| Functions: | Former head of the Laboratory Chimie Inorganique et Matériaux Moléculaires (Inorganic Chemistry and Molecular Materials, CIM2), C.N.R.S. Unit 7071, Paris (1994-2000). Former head of the D.E.A. "Inorganic Chemistry, from molecules to materials" (Universities Paris 6, 11 and Versailles, ENSCP and ESPCI) (1994-2000). |


## 2. UNIVERSITY CURSUS

| | |
|---|---|
| 1961-1965, Cachan | ENSET (Ecole Normale Supérieure de l'Enseignement Technique)<br>Licence (Chemistry), Faculty of Sciences, Paris, Orsay Centre<br>Diplôme d'Etudes Supérieures, E.N.S. Saint-Cloud<br>Secondary Schools' Professorship " C.A.P.E.T. " 1964 ; " Agrégation " 1965 |
| 1984, Orsay | Thesis (State Doctorate) in Physical Sciences (Chemistry). Supervisor: O. Kahn; Title: Interaction dans les systèmes polymétalliques: du complexe binucléaire à la chaîne ferrimagnétique (Interaction in polymetallic systems: from the dinuclear complex to the ferrimagnetic chain. |

## 3. CAREER

### 3.1. Positions

| | |
|---|---|
| 1965-1966, Creil | Professor "agrégé", Lycée Technique d'Etat (technical secondary school) |
| 1966-1987, St-Cloud | Assistant and Associate Professor at Ecole Normale Supérieure |
| 1987-1988, Orsay | Research Associate, Chargé de recherche First class, C.N.R.S. (U.A. 420) |
| 1988, Paris | Second Class Professor, University Pierre et Marie Curie |
| 1993, Paris | First Class Professor, University Pierre et Marie Curie |
| 1998, Paris | Exceptional Class Professor, University Pierre et Marie Curie |
| 2002- | Emeritus Professor, University Pierre et Marie Curie |

### 3.2. Laboratories

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|---|---|
| 1966 - 1977 | Laboratory "Vegetal pigments and model substances"; E.N.S. Saint-Cloud |

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| 1977 - 1989 | Laboratory " Spectrochemistry of transition elements " ; C.N.R.S. Unit 420, Paris-Sud University, Orsay |
| 1986 - 1993 | Associated researcher at "Use of electromagnetic radiation Laboratory" (LURE), (M.E.N., C.E.A., C.N.R.S.) Paris-Sud University, Orsay |
| 1989 - 1996 | Laboratory "Chemistry of Transition Metals", C.N.R.S. Unit 419, Pierre et Marie Curie University, Paris |
| 1994 - 1996 | Head of the laboratory |
| 1997-2000 | Laboratory "Inorganic Chemistry and Molecular Materials" (CIM2), C.N.R.S. Unit 7071 (Pierre et Marie Curie University, E.S.P.C.I., Paris) |
| | Head of the laboratory |
| 1989-2004 | Head of the team "Molecular Magnetic Materials" in the laboratory |
| 2005- | Member of the Molecular Magnetism team in the laboratory |

## 4. SCIENTIFIC ACTIVITY

### 4.1. Conferences, Communications, Publications

227 published or accepted articles, 2 Patents

more than 300 communications in scientific meetings

more than 70 invited conferences in international congresses

more than 150 invited seminars in universities and scientific institutions in Europe (Belgium, Germany, Italy, Poland, Portugal, Russia, Slovakia, Spain, Switzerland, Tchekia, The Netherlands, United Kingdom), in North America (United States, Canada, Mexico), in South America (Chile, Brazil), Asia (China, India, Japan, Philippines, Taiwan, Vietnam).

Beyond scientific seminars, M. Verdaguer is presenting since 2005, experimental conferences for non specialized audiences (How molecules go magnetic …) : Friday Evening Discourse at Royal Institution of Great Britain, London 2005, Festival della Scienza Genova 2006, Experimental Conferences of l' « Espace des Sciences » Paris, 2007, Science Festivals in Manchester 2007, in Poznan 2008, in Zabkowice Slaske 2009, Fête de la Science in Paris 2008 and Lyon 2009 and several universities in France, Brazil, Canada, Chile, China, Germany, India, Italy, Japan, Portugal, Philippines, Spain, The Netherlands.

He recently programmed 11 public conferences on « Magnetism Today from Homing pigeon to spintronics » in the frame of « Université de tous les savoirs » in Paris, giving one with Roberta Sessoli « Magnétisme des molécules, vers le stockage de l'information sur *une* molécule ? » See http://www.utls.fr.

He was awarded by the "Olivier Kahn Lecture" at ICMM 2010, Beijing, 8-12 october (International Conference on Molecule-based Magnets).

### 4.2. Some scientific achievements

| | |
|---|---|
| 1981 | First bimetallic chains |
| 1984 | Experimental and Theoretical Characterization of Tunable Exchange in Binuclear Copper(II) Dimers and Chains |

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|---|---|
| 1983-4 | Experimental and Theoretical Characterization of the First Ferrimagnetic Chain |
| 1986 | Experimental Characterization of the First Bimetallic Molecule-based Magnet ($T_C$ = 4.6K) |
| 1987 | First experimental characterization of an Haldane's gap system |
| 1992 | Ferromagnetic Molecule-based Magnet at $T_C$ = 90K |
| 1993 | Ferrimagnetic Molecule-based Magnet at $T_C$ = 240K |
| 1994 | First Application of X-Rays Magnetic Circular Dichroism to Molecule-based Magnets |
| 1995 | First Rationally Synthesized Ferrimagnetic Molecule-based Magnet with $T_C$ above Room Temperature ($T_C$ = 315K) |
| 1995-6 | First Rationally Synthesized High-Spin Molecules with S = 15/2 and 27/2<br>Use of L-edges X-Ray Absorption Spectroscopy for the Study of Chemical Bond and local magnetism in Molecule-based Magnets and paramagnetic high spin species |
| 2000 | First photo-induced diamagnetic-ferrimagnetic transition in a solid |
| 2001 | First rationally designed enantiomerically resolved optically active magnets |
| 2001 | First ferromagnetic bimetallic chain with slow relaxation of the magnetisation |
| 2002 | Double ferromagnetic chain with slow relaxation of the magnetisation (« Magnetic Nanowire» or « Single Chain Magnet ») |
| 2004 | First photomagnetic high spin molecule |
| 2007 | First synthesis by design of a Pd(II) complex with a triplet state in a $Pd(II)O_6$ surrounding. |
| 2008 | First experimental characterization of magnetochiral dichroïsm in a chiral magnet |
| 2011 | First synthesis by design of a chiral ionic conducting magnet, quartz-like |

**4.3. Some significant papers**


[1] A. Gleizes, M. Verdaguer
Ordered magnetic bimetallic chains: a novel class of one-dimensional compounds
*J. Am. Chem. Soc.* **1981**, *103*, 7373-7374

[2] Y. Pei, M. Verdaguer, O. Kahn, J. Sletten, J.P. Renard
Ferromagnetic transition in a bimetallic molecular system
*J. Am. Chem. Soc.* **1986**, *108*, 7428-7430

[3] J.P.Renard, M. Verdaguer, L.P. Regnault, W.A.C. Erkelens, J. Rossat-Mignod, W.G. Stirling
Presumption for a quantum energy gap in the quasi one-dimensional S = 1 Heisenberg antiferromagnet $Ni(C_2H_8N_2)NO_2(ClO_4)$
*Europhys. Letters* **1987**, *3*, 945-951

[4] V. Gadet, T. Mallah, I. Castro, M. Verdaguer, P. Veillet
High $T_C$ Molecular-based ferromagnets : $CsNiCr(CN)_6$ a ferromagnetic system with $T_C$ = 90K, *J. Am. Chem. Soc.* **1992**, *114*, 9213-9214

[5] T. Mallah, S. Thiébaut, M. Verdaguer, P. Veillet
High $T_C$ Molecular-based magnets : Ferrimagnetic mixed-valence chromium(III)-chromium(II) cyanides with $T_C$ = 240 and 190K.
*Science* , **1993**, *262*, 1554-1557

[6] S. Ferlay, T. Mallah, R. Ouahès, P. Veillet, M. Verdaguer

A Room-Temperature organometallic magnet based on Prussian Blue

*Nature*, **1995**, *378*, (6558), 14 décembre 1995, 701-703

[7] A. Scuiller, T. Mallah, A. Nivorozkhin, M. Verdaguer, P. Veillet
A Rational Route to High-Spin Molecules via Hexacyanometalates : A new $\mu$-cyano $Cr^{III}Mn^{II}_6$ Heptanuclear Complex With a Low-lying S = 27/2 Ground State,
*New J. Chem.* **1996**, *20*, 1-3

[8] M. Verdaguer
Molecular electronics emerges in molecular magnetism
*Science* **1996**, *272*, 698-699

[9] V. Eyert, B. Siberchicot, M. Verdaguer
Magnetic order and chemical bonding in the high $T_C$ molecule-based magnets CsM[Cr(CN)6] (M = Mn, Ni) from first principles, *Phys. Rev. B*, **1997**, *56*, 8959-8966

[10] E. Dujardin, S. Ferlay, X. Phan, C. Cartier dit Moulin, P. Sainctavit, F. Baudelet, E. Dartyge, P. Veillet, M. Verdaguer
Synthesis and Magnetization of New Room-Temperature Molecule-Based Magnets ;
Effect of stoichiometry on local magnetic structure by X-ray Magnetic Circular Dichroïsm
*J. Am. Chem. Soc.* **1998**, *120*, 11347-11352.

[11] M.-A. Arrio, A. Scuiller, Ph. Sainctavit, Ch. Cartier dit Moulin, T. Mallah, M. Verdaguer
Soft X-Ray Magnetic Circular Dichroism in Paramagnetic Systems: Element Specific Magnetization of Two Heptanuclear $Cr^{III}M^{II}_6$ High Spin Molecules
*J. Amer. Chem. Soc.,* **1999**, *121*, 6414-6420.

[12] R. Andrès, M. Gruselle, B. Malézieux, M. Verdaguer, J. Vaissermann
Enantiomeric synthesis of optically active polymeric homo and bimetallic oxalate-bridged networks $[M_2(Ox)_3]_n$
*Inorg. Chem.*, **1999**, *38*, 4637-4646.

[13] Kira E. Vostrikova, Dominique Luneau, Wolfgang Wernsdorfer, Paul Rey* and Michel Verdaguer
A S = 7 Ground Spin-State Cluster Built from Three Shells of Different Spin Carriers, Ferromagnetically Coupled Nitroxides and Transition-metal Ions.
*J. Am. Chem. Soc.* **2000**, *122*, 718-719.

[14] A. Bleuzen, C. Lomenech, V. Escax, F. Villain, F. Varret, C. Cartier dit Moulin, M. Verdaguer
Photo-induced Ferrimagnetic Systems in Prussian Blue Analogues $C^I_xCo_4[Fe(CN)_6]_y$ ($C^I$ = alkali cation). Part I. Conditions to Observe the Phenomenon,
*J. Am. Chem. Soc.* **2000**, *122*, 6648-6652.

[15] R. Andrés, M. Brissard, M. Gruselle, C. Train, J. Vaissermann, B. Malézieux, J.P. Jamet and M. Verdaguer Rational Design of Three Dimensional (3D) Optically Active Molecule-Based Magnets: Synthesis, Structure, Optical and Magnetic properties of $\{[Ru(bpy)_3]^{2+}, ClO_4^-, [Mn^{II}Cr^{III}(ox)_3]^-\}_n$ 1 and $\{[Ru(bpy)_2ppy]^+, [M^{II}Cr^{III}(ox)_3]^-\}_n$ with $M^{II}$=$Mn^{II}$ 2, $Ni^{II}$ 3 with: bpy=bipyridine, ppy=phenylpyridine, ox=$C_2O_4^{2-}$. X-ray Structure of: $\{[\Delta Ru(bpy)_3]^{2+}, ClO_4^-, [\Delta Mn^{II}\Delta Cr^{III}(ox)_3]^-\}_n$ 1-$\Delta$ and $\{[\Lambda Ru(bpy)_2ppy]^+, [\Lambda Mn^{II}\Lambda Cr^{III}(ox)_3]^-\}_n$ 2-$\Lambda$.
*Inorg. Chem.* **2001**, *40,* 4633-4640.

[16] R. Lescouëzec, J. Vaissermann, C. Ruiz-Pérez, F. Lloret, R. Carrasco, M. Julve, M. Verdaguer, Y. Dromzee, D. Gatteschi and W. Wersdorfer

Cyanide-Bridged Iron(III)-Cobalt(II) Double Zigzag Ferromagnetic Chains: Two New Molecular Magnetic Nanowires

*Angewandte Chem*. **2003**, *42*, 1483-1486.

[17] A. Bleuzen, V. Escax, A. Ferrier, M. Verdaguer, P. Münsch, J.P. Itié

Thermally induced electron transfer in a CsCoFe Prussian blue derivative : the specific role of the alkali metal ion

*Angew*. *Chem*. *Int*. *Ed*., **2004**, *43*, 3728 – 3731.

[18] J.M. Herrera, Valérie Marvaud, M. Verdaguer, J. Marrot, M. Kalisz, C. Mathonière

Reversible photo-induced magnetic properties in the heptanuclear complex $[Mo(IV)(CN)_2(CN\text{-}Cu\text{-}L)_6]^{8+}$ : a photomagnetic high-spin molecule

*Angew*. *Chem*. *Int*. *Ed*. **2004**, 43, 5468-5471.

[19] E. Ruiz, A. Rodríguez-Fortea, S. Alvarez, M. Verdaguer

Is it possible to get High $T_C$ Magnets with Prussian Blue Analogues ? A Theoretical Prospect

Chemistry, a european journal **2005**, 11, 2135-2144.

[20] B. Godin, Y. Chen, J. Vaissermann, L. Ruhlmann, M. Verdaguer, P. Gouzerh

Coordination Chemistry of the Hexavacant Tungstophosphate $[H_2P_2W_{12}O_{48}]^{12-}$ with Fe(III) ions: Towards Original Structures of Increasing Size and Complexity,

*Angew*. *Chem*. *Int*. *Ed*. **2005**, *44*, 3072-3075.

[21] R. Lescouëzec, L.M. Toma, J. Vaissermann, M. Verdaguer, F.S. Delgado, C. Ruiz-Perez, F.Lloret, M. Julve,

Design of single-chain magnets through cyanide bearing six-coordinated complexes.

*Coord*. *Chem*. *Reviews* **2005**, *249*, 2691-2729..

[22] Fabrice Pointillart, Cyrille Train, Françoise Villain, Christophe Cartier dit Moulin, Patrick Gredin, Lise-Marie Chamoreau, Michel Gruselle, Gabriel Aullon, Santiago Alvarez. Michel Verdaguer

Six-foldOxygen-Coordinated Triplet (S=1) Palladium(ii) Moieties Templated by Tris(bipyridine)ruthenium(ii) ions

*J*. *Am*. *Chem*. *Soc*. **2007**, *129*, 1327-1334.

[23] Cyrille Train, Ruxandra Gheorghe, Vojislav Krstic, Lise-Marie Chamoreau, Nikolai S. Ovanessyan, Geert L. J. A. Rikken, Michel Gruselle and Michel Verdaguer

Enantiopure Chiral Ferromagnets for the Observation of Strong Magneto-chiral Dichroism

*Nature Materials,* **2008,** *7*, 729-734 doi:10.1038/nmat2256

[24] Adrian-Raul Tomsa, Jose Martinez-Lillo, Yanling Li, Lise-Marie Chamoreau, Kamal Boubekeur, Fernanda Farias, Miguel Novak, Eduard Cremades, Eliseo Ruiz, Anna Proust, Michel Verdaguer, Pierre Gouzerh

A new family of oxime-based hexanuclear manganese(III) single molecule magnets with high anisotropy barriers

*Chem*. *Comm*. **2010,** *46*, 5106-5108. DOI:10.1039/c0cc00485e

[25] Emilio Pardo, Cyrille Train, Geoffrey Gontard, Kamal Boubekeur, Francesc Lloret, Hongbo Liu, Brahim Dkhil, Kosuke Nakagawa, Hiroko Tokoro, Shin-ichi Ohkoshi, Michel Verdaguer

High Protonic Conduction in a Chiral Quartz-like Ferromagnetic Metal Organic Framework

*J*. *Am*. *Chem*. *Soc*. **2011**, *133* (39), 15328-15331. doi:10. 1021/ja206917z

[26] Emilio Pardo, Cyrille Train, Hongbo Liu, Lise-Marie Chamoreau, Brahim Dhkil, Kamal Boubekeur, Francesc Lloret, Keitaro Nakatani, Hiroko Tokoro, Shin-Ichi Ohkoshi, and Michel Verdaguer

Multiferroics by rational design: implementing ferroelectricity in molecule-based magnets

*Angew*. *Chem*., *Int*. *Ed*., **2012**, *51*, 8356-8360

[27] Michel Verdaguer
A three-headed Janus material (News and views)
*Nature Chemistry*, **2012**, *4*, 871-872.

The complete chronological list of the 239 published articles and two patents is given below.

**4.4. Edition, Books**

-1- Special issue of "Journal de Chimie Physique", Proceedings of the workshop "*Applications du rayonnement synchrotron en chimie*", Congrès de la Société Française de Chimie, September 1988 (with H. Dexpert and A. Michalowicz).

-2- Jean Sarrazin, M. Verdaguer, *L'oxydoréduction, Concepts et expériences*
320 pages, Ellipses, Paris, 1991. More than 4000 copies. Second printing.

-3- Special issue of "Actualité Chimique", Proceedings of a C.N.R.S. Summer School "*Chimie de coordination aux frontières, de la réactivité, des matériaux et de la biologie…*" (with P. Braunstein, O. Kahn and J.J. Girerd) (December 1996).

-4- Special issue of "Actualité Chimique", "*Magnétisme Moléculaire*", a tribute to Olivier Kahn (with D. Olivier, J. Etourneau and J.J. Girerd) (June 2001).

-5- *Molecular Magnets : recent highlights,* Eds : W. Linert, M. Verdaguer
a) Special issue of "Monatshefte", December 2002
b) Book, Springer, Berlin/Wien, 2003.

-6- Special issue of « Actualité Chimique », « Molecular Chemistry and nanosciences » (October-november 2005)
Co-editor, professor Robert Corriu, Emeritus Professor, Languedoc's Sciences and Technlogy University, Montpellier.

-7- Thematic issue of Comptes Rendus de Chimie « New trends in Molecular Magnetism » around the laureates of the Olivier Kahn International Award.
Guest editor with Dante Gatteschi, Professor, Florence University

-8- Special issue of « Actualité Chimique », « Rayonnement synchrotron, une lumière pour comprendre la chimie » (October-november 2011)
Guest editor, doctor Marc Simon and a guest committee including V. Briois, C. Cartier dit Moulin, A. Tadjeddine and myself.

-9- In preparation :
Book « Electrons in Molecules : from Basic Principles to Molecular Electronics »
Co-author : professor Jean-Pierre Launay, Paul Sabatier University, Toulouse
To be published by Oxford University Press.

-10- Member of the editorial committee of "Actualité Chimique" , monthly publication of the French Chemical Society.

**4.5 Present research activity**

2008- Work in cooperation with different teams in the Institute, in France and abroad.

2008-2010 Responsible of the post-doctoral stay of Emilo Pardo on molecular multifunctional materials
Co-responsible with Pierre Gouzerh of the post-doctoral stay of Jose Martinez on magnetic polyoxometallates and Mn6 single molecule magnets.

## 5. ORGANISATION OF PERMAMENT TRAINING IN RESEARCH

### 5.1. Synchrotron radiation and X-ray absorption

Summer school “Structures fines d'absorption X en chimie" : des données expérimentales à leur analyse ; Garchy 19-24 September 1988 (50 participants) (with H. Dexpert et A. Michalowicz) and various workshops 1990-1993

### 5.2. Coordination Chemistry

C.N.R.S. Summer School "Chimie de coordination aux frontières de la réactivité, des matériaux et de la biologie…" (with P. Braunstein, O. Kahn et J.J. Girerd) ; Gujan-Mestras, 8-14 september 1996 (60 participants, 25 lecturers). [Actualité Chimique, 1996, N°7, December 1996] and workshops of U.R.A. 419 on X-ray diffraction and NMR.

## 6. INTERNATIONAL SCIENTIFIC ACTIVITY

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|---|---|
| 1990, 1991, 1993 | Head of an integrated spanish-french action "Picasso" (Paris, Orsay, Valencia, Barcelona). |
| 1993-1996 | Partner of the european network Human Capital and Mobility "Molecular Magnetic Materials", with19 other laboratories, Coordinator D. Gatteschi, Florence. |
| 1995-1997 | Head of a COST Action "New inorganic materials with tailored physical and electronic properties" |
| 1995-1997 | Head of an integrated algerian-french action (Alger). |
| 1996-1998 | Head of an integrated polish-french action (Wroclaw) |
| 1998-2001 | Partner of the european network Training and mobility for researchers "Molecular magnetism : from materials to devices", Coordinator O. Kahn, Bordeaux. |
| 1999-2000 | Head of an integrated israelian-french action (with Haïfa) |
| 2000-2002 | Partner of the european network Training and Mobility for Researchers "Molecular nanomagnets", Coordinator D. Gatteschi, Florence. |
| 1998-2002 | Chairman of the interdisciplinary Programme of the European Science Foundation programme interdisciplinaire de l'European Science Foundation "Molecular Magnets" (42 laboratories, 14 countries).<br>Organisation in this frame of several advanced scientific conferences and several training workshops for young european scientists<br>http://www.esf.org/<br>http://info.tuwien.ac.at/MOLECULAR-MAGNETS/ |
| 1996-2003 | Organizer of international scientific meetings<br>Chairman of the IIIrd European Workshop on Molecular Magnetic Materials (EWMMM'97), Aussois (France), 8-14 septembre 1996<br>Vice-Chairman (with S. Alvarez ; Chairman : M. Julve) of the Irst French-Spanish Workshop on Molecular Magnetism and Electronics, UIMP Valencia, 25-26 April 1997<br>Member of the Steering Committee of the XXXIIIth ICCC in Florence (August 1998) |

| | |
|---|---|
| | Member of the Scientific Committee of the International Conference on Molecular Magnetic Materials ICMMM'98 in Bordeaux (September 1998) |
| | CoChairman with Professor Ramasesha of the indo-french Workshop "Molecular Magnetism", Bangalore, December 4-8, 2000 |
| | Member of the International Advisory Committee of the International Conference on Molecular Magnetic Materials ICMMM'2000 in Texas (September 2000) ; ICMMM'02 in Valencia (October 2002), ICMMM'04 in Tsukuba (October 2004) ; ICMMM'06 Vancouver (August 2006) ; ICMMM'08 Florence (September 2008) ; ICMM'10 Beijing (October 2010) |
| 2005-2006 | Member of the european Network of Excellence « Magmanet » lead by Prof. Dante Gatteschi, in charge of instrumentation and Olivier Kahn International Award. http://www.magmanet-eu.net/ |
| 2008-2009 | Member of the european Network of Excellence « Magmanet » in charge of the "Olivier Kahn International Award." |
| 2010- | Member of European Institute of Molecular magnetism, in charge of the "Olivier Kahn International Award." |

## Invited Professor Positions

| | |
|---|---|
| 1995 | Invited Professor, University of Valencia. |
| 1995-1996-1997 | Invited Professor "Iberdrola", University of Barcelona (1 month x 3). |
| 2002 | Invited professor at Osaka University (Research Centre for Molecular Thermodynamics), 3 months. |
| 2003 | Invited professor at Tokyo Institute of Technology, 1 month. |
| 2003 | Invited professor at Nagoya University, two weeks. |
| 2003-2005 | Invited ICREA Researcher (Catalan Institution for Research and Advanced Studies) at University of Barcelona, 3 months each year. |
| 2006 | Invited professor at Peking University and in China, one month. |
| 2007 | Invited lecturer at Indian Institute of Sciences, Bangalore, two weeks |
| 2008 | Invited professor at the University of Chile, two weeks. |
| 2009 | Invited professor at the University of Chile and University of Santiago, one week (Series of doctoral lectures with Prof. E. Ruiz, University of Barcelona). |
| 2010-2011 | Invited professor at Nagoya University, three months. |

**7. EXPERTISES**

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|---|---|
| -1- | Consultant of foreign research organisms (Chile, Italy, United Kingdom, Slovakia, Spain, Switzerland, United States). |
| -2- | Referee in international journals in inorganic chemistry and physical chemistry (*Science, Journal of the American Society, Inorganic Chemistry*, *Journal of the Chemical Society,* |

*Inorganica Chimica Acta*, *Journal of Physical Chemistry*, *European Journal of Inorganic Chemistry, New Journal of Chemistry*…) and *Bulletin de l'Union des Physiciens* (teaching).

-3- Expert for the french Ministry of Universities and Research (Chemistry).

-4- Expert for the C.N.R.S. (Materials, Training).

-5- Member of the Scientific Committee of LURE (up to 2003) and SOLEIL (up to 2004), the old and new french synchtrotron radiation sources. SOLEIL was inaugurated on Monday 18th december 2006 and is running successfully.

**8. AWARDS**

1984 Award of the Coordination Chemistry Division of the French Chemical Society, shared with Alain Gleizes, Paul Sabatier University, Toulouse.

1997 Paul Pascal Award of the French Academy of Sciences.

2003 Pierre Süe Award of the French Chemical Society, shared with Professor Jean-Louis Rivail, Nancy University.

2004 Catalan-Sabatier Award of the Real Sociedad Española de Quimica.

2010 Fellow of the Academia Europaea (The Academy of Europe).

# Publications and Patents 1974-2010

## TEACHING

E1 M. Verdaguer, Cours de Chimie (Mathématiques supérieures et mathématiques spéciales M), Memento de Sciences Physiques, Ecole Nationale des Télécommunications, Paris (1974)

E2 M. Verdaguer Enoncés et corrigés d'exercices de chimie (Mathématiques supérieures et mathématiques spéciales M), Bulletin mensuel de la préparation au concours d'Ingénieur-Elève, Ecole Nationale des Télécommunications, Paris (1973-80)

E3 Concours des Grandes Ecoles, Enoncés et solutions de problèmes de Sciences Physiques, sous la direction d'A. Boussié, avec la collaboration de B. Bigot, L. David, M. Verdaguer et P. Vermeulin, Vuibert, Paris, 1980 et 1981

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Travaux pratiques de chimie, Agrégation de Sciences Physiques (Option Physique), E.N.S. Saint-Cloud, 1981

E5 M. Danion, M. Bottin, J. Soulivet, M. Verdaguer
Dissociation de l'eau, Enoncé et solution de l'Epreuve C, Agrégation de Chimie, 1986
*Bulletin de l'Union des Physiciens*, Numéro spécial concours, 161-202, 1987

E6 M.C. Paris, M. Bottin, M. Golfier, M. Verdaguer
Orbitales et symétrie ; biosynthèse du cholestérol
Enoncé et solution de l'Epreuve C, Agrégation de Chimie, 1987
*Bulletin de l'Union des Physiciens*, Numéro spécial concours, 161-202, 1988

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Enoncé et solution de l'Epreuve A, Agrégation de Chimie, 1988
*Bulletin de l'Union des Physiciens*, Numéros spéciaux concours, 29-41, 1988 et 1989

E8 I. Rico, F. Massias, J.C. Morlaès, M. Verdaguer
Matériaux conducteurs
Enoncé et solution de l'Epreuve A, Agrégation de Chimie, 1989
*Bulletin de l'Union des Physiciens*, Numéros spéciaux concours, 37-50, 1989 et 103-121, 1990

E9 J. Sarrazin, M. Verdaguer
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Ellipses, 320 pages, Paris, 1991

# RESEARCH

## 1. ARTICLES

**1972-1981**

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Protonation de la phtalocyanine de cuivre(II) et de son dérivé 4-4'-4"-4'" tétracarboxylé
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E.X.A.F.S. study and magnetic properties of copper(II) chloranilato and bromanilato chains : a new example of orbital reversal
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**1988**

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Magnetism and EPR spectra of $Mn^{2+}Cu^{2+}$ ferrimagnet chains
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Single crystal EPR spectra of copper-manganese bimetallic ferrimagnetic chains
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## Articles in preparation 2012

Pauline Higel, Françoise Villain, Michel Verdaguer, Eric Rivière, Anne Bleuzen
Reversible Chemical Breath of the Cubic Structure of a CoFe Prussian Blue Analogue through Proton-Induced Electron Transfer.
To be submitted for publication

Michel Verdaguer, Anne Bleuzen, Kazuhito Hashimoto, Shin-ichi Ohkoshi
Photomagnetism in Prussian blue analogues
To be submitted for publication in *Acc. Chem. Res.*

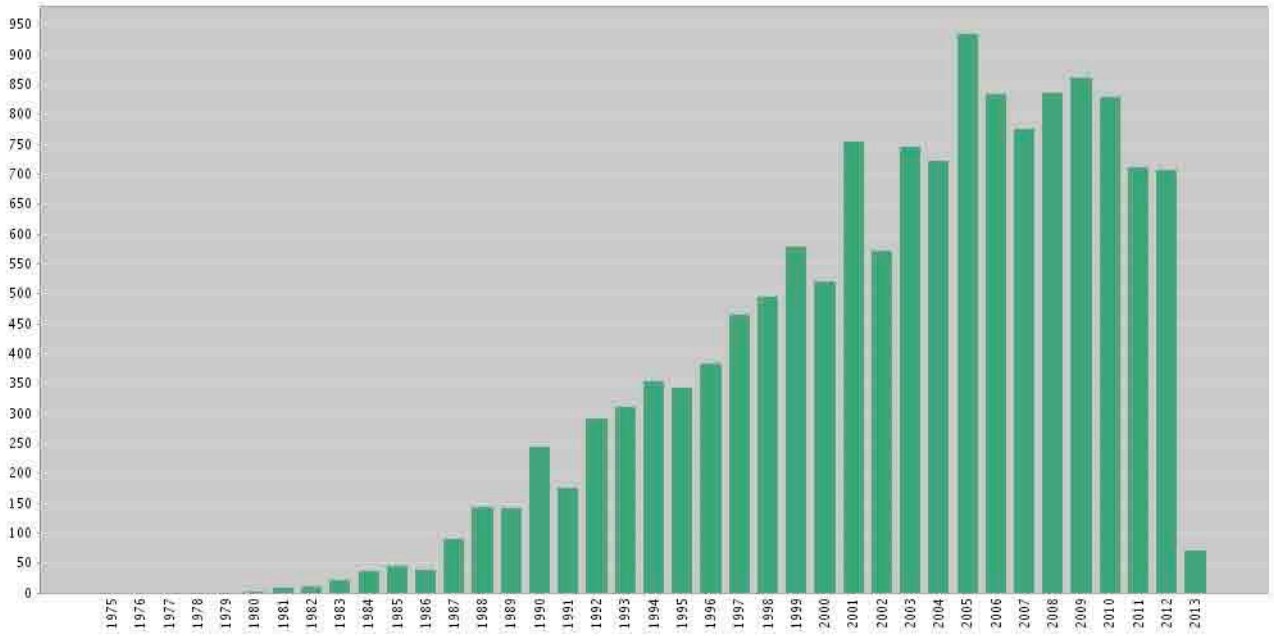
Michel Verdaguer, Gregory S. Girolami
The Search for Room Temperature Molecule-Based Magnets.
To be submitted in *Acc. Chem. Res.*

M. Julve, M. Verdaguer
Coordination chemistry of oxalates
invité dans *Chem. Rev.*

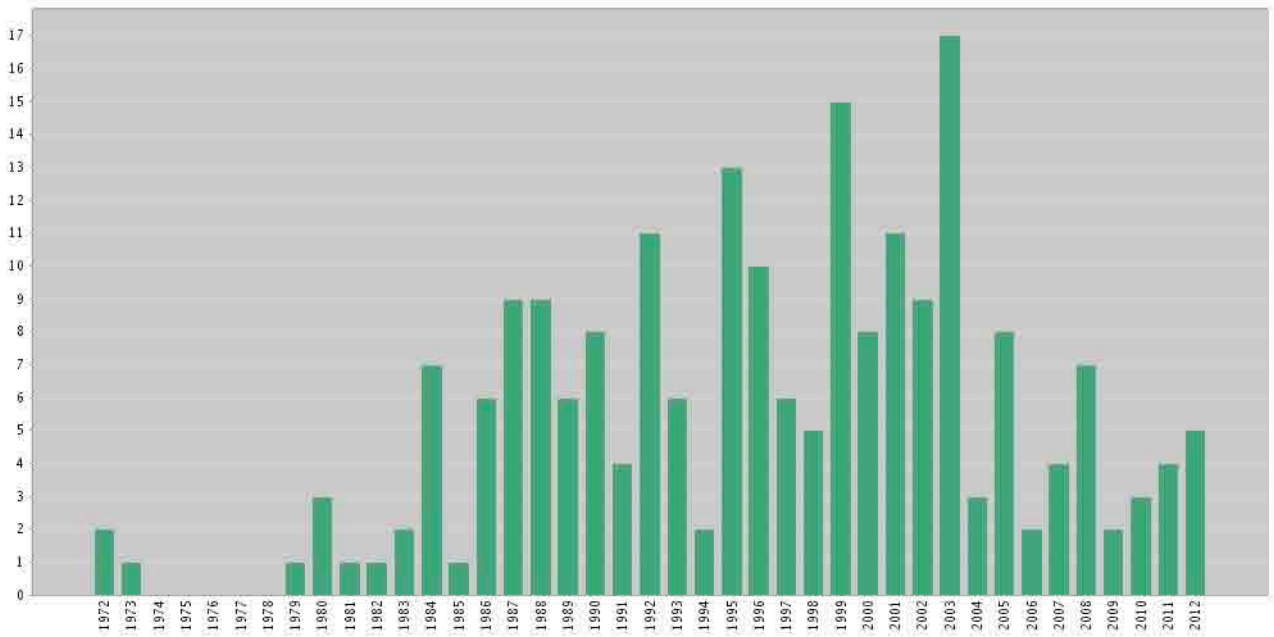
## 9. BIBLIOMETRIC INFORMATIONS / INFORMATIONS BIBLIOMÉTRIQUES

Everybody is aware of the limitations of automatized bibliometric data. Here are therefore, for mere information, the indications given by the « Web of sciences »
for Michel Verdaguer on march 3, 2013 :
Results found: 212 (without editorials, meeting abstracts …)
Sum of the Times Cited : 14095
Average Citations per Item : 66.49
h-index : 67
and the corresponding graphs : citations and publications per year

Citations per year




Publications per year



## 10. ANNÉE INTERNATIONALE DE LA CHIMIE 2011

M. Verdaguer s'est fortement engagé dans la préparation et les manifestations de l'année internationale de la chimie 2011 (AIC 2011)-Année Marie Sklodowska-Curie 100 (MSC100).

A cette fin, il a participé aux travaux du Comité national de la Chimie. Il a été membre de la commission nationale "communication" et du comité régional Ile de France de l'AIC France.

Il participe à l'animation du comité d'organisation de l'AIC-MSC100 à l'Université Pierre et Marie Curie où ont été réalisés (voir : http://www.anneechimie.upmc.fr/) :

- une exposition temporaire les minéraux, la nature et l'Homme avec la collection des minéraux de l'université ;
- des ateliers expérimentaux pour enfants en collaboration avec la collection des minéraux et le musée Curie ;
- une initiative « Les 117 heures » de la chimie en partenariat avec le festival "Sciences sur Seine" de la ville de Paris avec de nombreuses conférences, débats, ateliers, expériences, films, expositions ...
- l'enregistrement de documents audio-visuels sur des expériences de chimie amusantes, spectaculaires et significatives.
- une fête de la science colorée "Chimie"
- un travail de réflexion et de recherche pour la réhabilitation du pavillon Curie, 12 rue Cuvier, en relation avec des collègues de l'Institut de Physique du Globe et du musée Curie.

M. Verdaguer a préparé et donné également pour l'AIC des conférences pour tous publics, illustrées d'expériences :

- Comprendre la chimie avec l'expérience (et atelier expérimental, collaboration : F. Villain et V. Gadet) [1]
- Un monde magnétique, de la boussole aux molécules (et atelier expérimental, collaboration F. Villain) [2] ;
- De l'Antiquité au XXIème siècle, quelques jalons dans les relations Chimie-Société [3]
- La chimie de coordination par l'expérience (collaboration F. Villain) [4] ;
- Le dioxygène, une molécule qui a changé le monde [5] ;
- Bleu(s), blue(s) : chimie, art et société [6] ;

et trois cours (26 avril, 3 et 11 mai) dans le cadre de l'Université Inter-Ages de l'UPMC (un autre regard sur la chimie).

Il a été à l'initiative (avec K. Tatsumi, Président de l'IUPAC) de la traduction et de la circulation au Japon (2011-2012) de l'exposition « Marie Curie » du musée Curie (universités, musées de la science) avec le parrainage de l'ambassade de France.

[1] Ateliers le 25 octobre 2010, Reims, congrès de l'Union des professeurs de Physique et Chimie.
Conférence expérimentale le 17 janvier 2011 dans le cadre des conférences de l'Espace des Sciences de l'ESPCI.
Conférence le 15 juin, Palais de la Découverte, congrès IdF de l'Union des Professeurs de Physique et Chimie.
Conférences organisées par le rectorat de l'académie de Paris (14 octobre) et l'université de Strasbourg (20 octobre) ; Brive, Lycée d'Arsonval, 15 novembre.

[2] Maison des Sciences Chatenay-Malabry, 5 février ; Congrès de la SCF Champagne-Ardennes, le 15 avril ; Lycée Hoche, le 9 juin ; lycée Louis le Grand, 8 novembre. ; Institut de Physique de Rennes, 29 septembre.

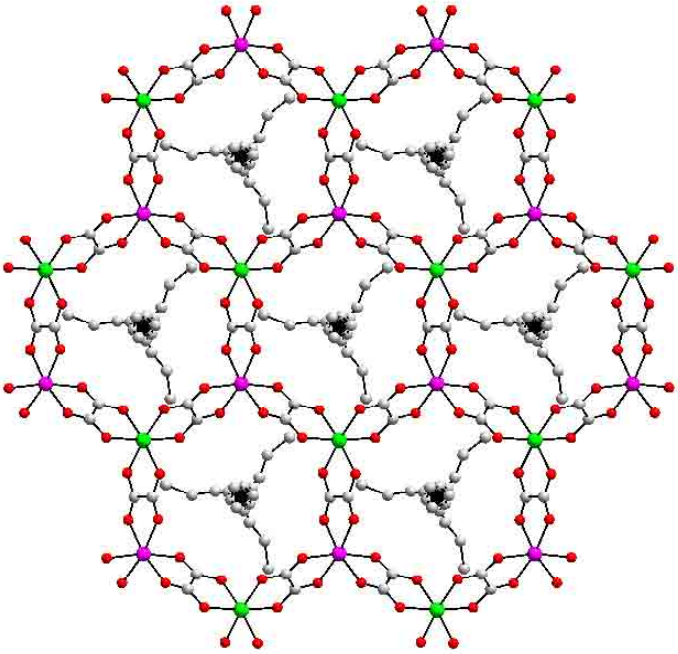
[3] Lycée d'Arsonval Saint-Maur, 2 février

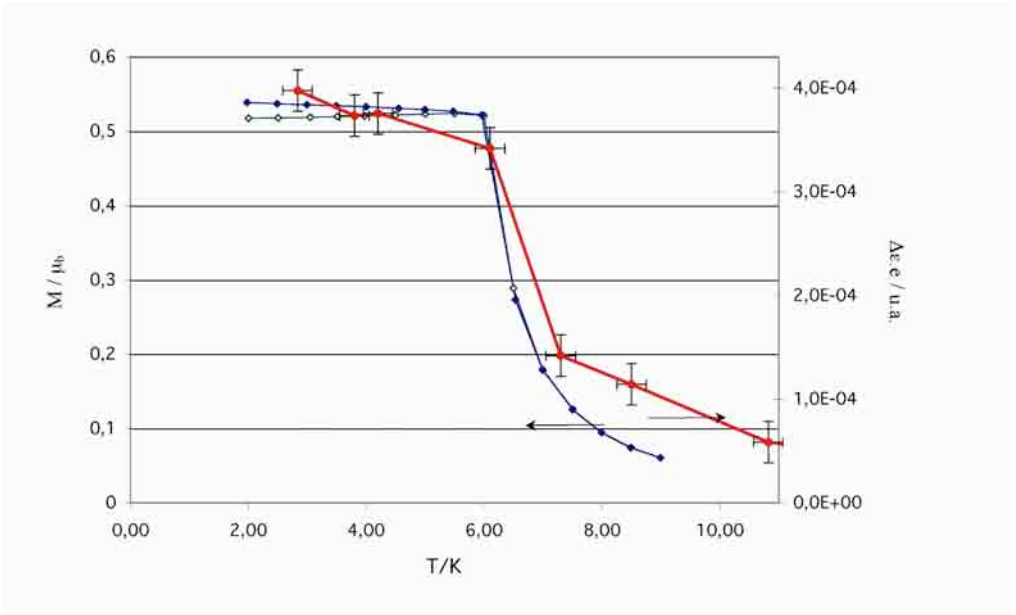
[4] Colloque franco-japonais de chimie de coordination, Rennes, 28 juin ;

[5] en préparation …

[6] Limoges, Espace des sciences, 6 juin ; Etrepagny 17 septembre, en l'Eglise ; Brive, Lycée d'Arsonval, 15 novembre.


**Figure** : L'affiche de l'année internationale de la chimie en France, préparée par la commission information de l'AIC France, en collaboration avec l'atelier de graphisme de l'Institut de Chimie du CNRS.






Première caractérisation du dichroïsme magnétochiral dans un aimant moléculaire chiral.

First characterization of magnetochiral dichroism in a chiral molecular magnet (structure and magnetochiral signal).

See C. Train, M. Gruselle, M. Verdaguer *et al*., *Nature Materials,* **2008,** *7*, 729-734.