

# Curriculum Vitae

## Personal information

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Name	Paulo Nuno Barradas Pereira Martinho
Address	Faculdade de Ciências, Universidade de Lisboa Centro de Química e Bioquímica Campo Grande 1749-016 Lisboa, Portugal
Telephone	(+351) 217 500 978
E-mail	pnmartinho@fc.ul.pt
Date of birth	03 November 1974
Gender	Male

## Publications

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11. E. J. Devid, **P. N. Martinho**, M. V. Kamalakar, Ú. Prendergast, C. Kübel, T. Lemma, J.-F. Dayen, T. E. Keyes, B. Doudin, M. Ruben, S. J. van der Molen, "The influence of molecular mobility on the properties of gold nanoparticle organic ligand networks", *Beilstein J. Nanotechnol.*, **2014**, in print.
10. J. Kitchen, **P. N. Martinho**, G. G. Morgan, T. Gunnlaugsson, "Synthesis, crystal structure and EPR spectroscopic analysis of novel copper complexes formed from N-pyridyl-4-nitro-1,8-naphthalimide ligands", *Dalton Trans*, **2014**, *43*, 6468-6479.
9. **P. N. Martinho\***, A. I. Vicente, S. Realista, M. S. Saraiva, A. I. Melato, L. P. Ferreira, M. D. Carvalho, "Solution and solid state properties of Fe(III) complexes bearing N-ethyl-N-(2-aminoethyl)salicylaldiminate ligands", *J. Organomet. Chem.*, **2014**, *760*, 48-54.
8. **P. N. Martinho**, B. Gildea, M. M. Harris, T. Lemma, A. D. Naik, H. Müller-Bunz, T. E. Keyes, Y. Garcia, G. G. Morgan, "Cooperative spin transition in a mononuclear Mn(III) complex", *Angew. Chem. Int. Ed.*, **2012**, *51*, 11995-11999.
7. **P. N. Martinho**, T. Lemma, G. Picardi, B. Gildea, R. J. Forster, T. E. Keyes, G. Redmond, G. G. Morgan, "Template assembly of spin crossover 1D nanowires", *Angew. Chem. Int. Ed.*, **2012**, *51*, 12597-12601.
6. **P. N. Martinho**, Y. Ortin, B. Gildea, C. Gandolfi, G. McKerr, B. O'Hagan, M. Albrecht, G. G. Morgan, "Inducing hysteretic spin crossover in solution", *Dalton Trans*, **2012**, *41*, 7461-7463 (hot communication).
5. C. Gandolfi, T. Cotting, **P. N. Martinho**, V. K. Malik, C. Bernhard, O. Sereda, A. Neels, G. G. Morgan, M. Albrecht, "Synthesis and self-assembly of spin-labile and redox-active manganese(III) complexes", *Dalton Trans*, **2011**, *40*, 1855-1865.
4. C. Gandolfi, N. Miyashita, D. Kurth, **P. N. Martinho**, G. G. Morgan, M. Albrecht, "Organization of potentially spin- and redox-labile metal centers into Langmuir and Langmuir-Blodgett films", *Dalton Trans.*, **2010**, *39*, 4508-4516 (Cover).
3. **P. N. Martinho**, C. J. Harding, H. Müller-Bunz, M. Albrecht, G. G. Morgan "Inducing spin crossover in Fe(III) amphiphiles", *Eur. J. Inorg. Chem.*, **2010**, 675-679.
2. **P. N. Martinho**, S. Quintal, P. J. Costa, S. Losi, V. Félix, C. Gimeno, M. G. B. Drew, P. Zanello, M. J. Calhorda, "New polynuclear Mo-Fe complexes with benzimidazole ligands", *Eur. J. Inorg. Chem.*, **2006**, *20*, 4096-4103.

1. M. J. Calhorda, P. J. Costa, **P. N. Martinho**, M. C. Gimeno, A. Laguna, S. Quintal, M. D. Villacampa, "Synthesis and ligand properties towards gold and silver of the ferrocenylamidobenzimidazole ligand", *J. Organomet. Chem.*, **2006**, 691, 20, 4181-4188.

### Book Chapters

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1. **P. N. Martinho**, C. Rajnak, and M. Ruben, (2013) Nanoparticles, Thin Films and Surface Patterns from Spin-Crossover Materials and Electrical Spin State Control, in Spin-Crossover Materials: Properties and Applications (ed M. A. HALCROW), John Wiley & Sons Ltd, Oxford, UK.

### Oral Communications

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1. P. N. Martinho, *Self-assembly of Fe(III) Molecular Magnetic Switches*, RSC Workshop on Multifunctional Materials, April 2011, Dublin, Ireland (Invited speaker).
2. P. N. Martinho, *Structural and surface organization of Fe(III) magnetic switches*, 239th ACS National Meeting, March 21-25, 2010, San Francisco, California.
3. P. N. Martinho, *Organisation of Molecular Magnetic Switches using Self-Assembly Techniques*, Postgraduate Joint Seminar Series 2009, April 24th, Trinity College Dublin, Dublin, Ireland.
4. P. N. Martinho, *Organisation of Molecular Magnetic Switches using Self-Assembly Techniques*, 237th ACS National Meeting, March 22-26, 2009, Salt Lake City, Utah.

### Posters

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1. *The Anion Role on Promoting Room Temperature Thermal Spin Crossover in Fe(III) Complexes*, A. I. Vicente, S. Realista, L. P. Ferreira, M. D. Carvalho, A. I. Melato, P. Brandão, M. J. Calhorda, P. N. Martinho, 10th Inorganic Chemistry Conference, April 10-12 2014, Costa da Caparica, Portugal.
2. *Binuclear Zinc Complexes for Green CO<sub>2</sub> Capture and Reduction*, S. Realista, P. N. Martinho, A. Melato, M. J. Calhorda, 10th Inorganic Chemistry Conference of Sociedade Portuguesa de Química, April 10-12 2014, Costa da Caparica, Portugal
3. *Modified Electrodes for Electrocatalysis: Electropolymerisation Based on Binuclear Metal Complexes*, S. Realista, P. N. Martinho, A. Melato, M. J. Calhorda, III Jornadas da eletroquímica e inovação, September 2013, Vila Real, Portugal.
4. *Modified Electrodes Based on Binuclear Complexes for Electrocatalysis*, S. Realista, P. N. Martinho, A. Melato, M. J. Calhorda, 46th Heyrovský Discussion on Molecular Electrochemistry in Organometallic Science, June 2013, Prague, Czech Republic.
5. *New Materials for Spintronics: Template Assembly of Spin Crossover 1D Nanowires*, P. N. Martinho, T. Lemma, G. Picardi, B. Gildea, R. J. Forster, T. E. Keyes, G. Redmond, G. G. Morgan, ElecMol12 6th International Meeting on Molecular Electronics, MINATEC, December 3-7 2012, Grenoble, France.
6. *Surface-ordered Iron(III) Molecular Magnetic Switches*, P. N. Martinho, G. G. Morgan, H. Müller-Bunz, C. J. Harding, C. Gandolfi, M. Albrecht, Coordination Chemistry approaches to New Multifunctional Materials-International Summer School, October 16-18 2009, Karlsruhe, Germany.
7. *The Impact of Chain Length on Thermal Spin Transitions in Spin Crossover Amphiphiles*, G. G. Morgan, H. Müller-Bunz, C. J. Harding, P. N. Martinho, 10th Annual Symposium on Supramolecular Chemistry in Ireland, School of Chemistry, Trinity College Dublin, 09 July 2009, Dublin, Ireland.
8. *The Impact of Chain Length on Thermal Spin Transitions in Spin Crossover Amphiphiles*, G. G. Morgan, H. Müller-Bunz, C. J. Harding, P. N. Martinho, Royal Society of Chemistry Coordination Chemistry Discussion Group, University of Leeds, 29-30 June 2009, Leeds, UK.

9. *Surface-ordered Iron(III) Molecular Magnetic Switches*, P. N. Martinho, G. G. Morgan, H. Müller-Bunz, C. J. Harding, C. Gandolfi, M. Albrecht, ElecMol08 4th International Meeting on Molecular Electronics, MINATEC, December 8-12 2008, Grenoble, France.
10. *New Material for Spintronics: Structural Organisation of Molecular Magnetic Switches*, P. N. Martinho, G. G. Morgan, H. Müller-Bunz, C. J. Harding, C. Gandolfi, M. Albrecht, ISSS-5 International Symposium on Surface Science and Nanotechnology, November 9-13 2008, International Conference Center, Waseda University, Tokyo, Japan.
11. *The Impact of Ligand Derivatisation on Thermal Spin Transitions*, P. N. Martinho, G. G. Morgan, H. Müller-Bunz, C. J. Harding, C. Gandolfi, M. Albrecht, 2008 Symposium on Inorganic Chemistry in Ireland, Trinity College Dublin, September 26<sup>th</sup> 2008, Dublin, Ireland.
12. *Surface-ordered Molecular Magnetic Switches: New Materials for Spintronics*, P. N. Martinho, G. G. Morgan, H. Müller-Bunz, E. Carey, C. Stubenrauch, C. J. Harding, C. Gandolfi, M. Albrecht, ICSFS-14 14th International Conference on Solid Films and Surfaces, Trinity College Dublin, 29th June - 4th July 2008, Dublin, Ireland.
13. *Surface-ordered Molecular Magnetic Switches: New Materials for Spintronics*, P. N. Martinho, G. G. Morgan, H. Müller-Bunz, E. Carey, C. Stubenrauch, C. J. Harding, C. Gandolfi, M. Albrecht, SICC-5 Singapore International Chemistry Conference 5, Suntec Singapore, 16 - 19 December 2007, Singapore (poster shortlisted for conference prize).

#### **Awards and achievements**

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2010

36 months grant for postdoctoral studies awarded by the Portuguese Foundation for Science and Technology in a highly competitive funding round.  
Fundação para a Ciência e Tecnologia, Rua D. Carlos I, 124-J, 1249-074 Lisboa (Portugal)

2009

12 months grant for doctoral studies awarded by the Portuguese Foundation for Science and Technology in a highly competitive funding round.  
Fundação para a Ciência e Tecnologia, Rua D. Carlos I, 124-J, 1249-074 Lisboa (Portugal)

2008

Seed funding awarded for oral presentation at the 237<sup>th</sup> ACS Meeting in Salt Lake City.  
University College Dublin, Belfield, D4 Dublin (Ireland)

2008

Seed funding awarded for 6 weeks research placement at University of Otago, New Zealand under supervision of Prof. Alan Blackman.  
University College Dublin, Belfield, D4 Dublin (Ireland)

2007

Seed funding awarded for poster presentation at the Singapore International Chemistry Conference with poster shortlisted for conference prize.  
University College Dublin, Belfield, D4 Dublin (Ireland)

2006

36 months grant for doctoral studies awarded by the Irish Research Council for Science, Engineering and Technology under the ERA-chemistry scheme.  
IRCSET, Shelbourne road, D4 Dublin (Ireland)

2003

Grant for a 2 months research placement at the Inorganic Chemistry Department at Masaryk University under supervision of Prof. Josef Novosad.  
Masaryk University Kotlarska 2, CZ-61137 Brno (Czech Republic)

2002

Prize awarded by the Portuguese office for the Ministry of Education under the programme PRODEP III for excellence in completion of undergraduate studies.

Ministério da Educação, Av. 5 de Outubro, 107, 1069-018 Lisboa (Portugal)

2002

Grant awarded under the programme SOCRATES/ERASMUS. Research placement for completion of undergraduate studies at the Department of Inorganic Chemistry at University of Zaragoza under supervision of Prof. Antonio Laguna and Dr. M. Concepción Gimeno.

Ministério da Ciência e da Tecnologia, Estrada das Laranjeiras, 197-205 Lisboa (Portugal)

## Research Projects

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Sponsor: Fundação Calouste Gulbenkian

Title: Smart polymer switches for green CO<sub>2</sub> capture.

Start Date / End Date: 01-Jan-2014 / 31-Dec-2014

CMST COST Action CM1305 (Management Committee)

Title: Explicit Control Over Spin-states in Technology and Biochemistry (ECOSTBio)

Start Date / End Date: 28-Jan-2014 / 14-Nov-2017

## Education

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Dec/2010

PhD in Synthetic Inorganic Chemistry. Transnational programme between Dr. Grace Morgan (Dublin) and Prof. Martin Albrecht (Fribourg) with funding from ERA-chemistry call.

University College Dublin, Belfield, D4 Dublin (Ireland)

Jun/2006

Bachelors Degree in Chemistry and Physics High School teaching accomplishing a 75% grade (5 years degree condensed to 2 years as Honours Degree in chemistry already awarded in 2002).

Universidade de Lisboa, Campo Grande, 1700 Lisboa (Portugal)

Jul/2002

Honours Degree in Chemistry accomplishing a 70% grade, equivalent to BSc+MSc in UK/USA system (3+2 in Bologna model).

Universidade de Lisboa, Campo Grande, 1700 Lisboa (Portugal)

## Training

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### In PhD programme:

Oct/2009

Master Class in Chemical Conversion and Storage of Chemical Energy (with Prof. Thomas Meyer, Prof. Anders Hagfeldt, Prof. R. Thampi, Prof. J. M. Kelly, Dr. G. Morgan, Prof. H. Vos, Prof. D. McCormack).

Lectures and workshops in chemical conversion and storage of chemical energy.

University College Dublin, Belfield, D4 Dublin (Ireland)

Apr/2009

Master Class in Interfacial Techniques (with Prof. Robert Foster, Dr. Tia Keyes).

Lectures and workshops on preparation, functionalisation, manipulation and characterization of chemical systems at a surface interface.

Dublin City University, D9 Dublin (Ireland)

Mar/2009

Course in Integrated Pharmacology (with Prof. A. Baird, Prof. D. Brayden).

Lectures and workshops in drug delivery and *in vivo* effects of drugs in the context of Pharma drug development programmes.

University College Dublin, Belfield, D4 Dublin (Ireland)

Dec/2008

Master class in Magnetism and Photomagnetism (with Prof. R. Clérac, Prof. M. Coey, Dr. C. Mathonière, Dr. G. Morgan).

Fundamentals of magnetism, synthesis of functional materials and approaches to analyse the magnetic behaviour of simple complexes, single molecule magnets or spin-chains. Spin-crossover systems and photomagnetic properties.

Trinity College Dublin, College Green, D2 Dublin (Ireland)

Sep/2008

4th EPR Summer School (with Prof. G. Denninger, Prof. K Dinse, Prof. D. Collison, Prof. S. van Doorslaer, Prof. D. Goldfarb, Prof. E. Goovaerts, Prof. P. Hore, Prof. G. Smith).

Training in advanced paramagnetic resonance techniques.

European Federation of EPR Groups, North Haugh, KY16 9SS St Andrews (Scotland)

### **Prior to PhD:**

Sep/2005 - Jun/2006

Professional training in Physics and Chemistry Education accomplishing a 95% grade.

Escola E.B. 2,3 El-Rei D. Manuel I, Avenida da Restauração, 2890-012 Alcochete (Portugal)

Feb/2001 - Dec/2001

Professional training in Environmental Chemistry via work placement in Water Quality and Residual Water Management in the Serviços Municipalizados de Água e Saneamento de Montijo, Portugal (attaining maximum Grade A).

Serviços Municipalizados de Água e Saneamento de Montijo, Av. dos Pescadores, 2870-114 Montijo (Portugal)

### **Research experience**

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Sep/2002 - Jan/2004

16 month postgraduate research post in synthetic organometallic chemistry with Prof Maria José Calhorda.

Instituto de Tecnologia Química e Biológica, Av. da República, 2780-157 Oeiras (Portugal)

Feb/2011 – Jan/2012

Guest Scientist with Prof Mario Ruben.

Karlsruhe Institute of Technology, Karlsruhe (Germany)

Mar/2012 – to date

Postdoctoral Fellow with Prof Maria José Calhorda

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

### **Supervision experience**

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2014 – to date

Sara Realista, Sequestration and reduction of CO<sub>2</sub> using multifunctional metal-organic materials. PhD thesis supervision.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2014 – to date

Priscila Ramgi, Synthesis, electropolymerisation and electrocatalytic activity of *salen* derived complexes. Final undergraduate research project co-supervision.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2013 – 2014

Ana Vicente, Spin crossover Fe(III) complexes: anion and solvate effects. Research fellow (voluntary) supervision.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2013

Sara Realista, Synthesis, electropolymerisation and electrocatalytic activity of *salen* complexes. MSc thesis co-supervision.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2013

Margarida Quaresma, Cu(I) complexes and their biological activity. Final undergraduate research project co-supervision.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2013

Xinwei Wu, New amphiphilic spin crossover Fe(III) complexes. Final undergraduate research project co-supervision.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2012

Dilan Polat, Towards molecular electronics: new transition metal complexes. Scientific initiation.

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

2011

Cyril Rajnak, Spin transition in neutral Fe(II) compounds. PhD thesis co-supervision.

Karlsruhe Institute of Technology, Karlsruhe (Germany)

2007

Kevin Fennell, Molecular switches: synthesis and assembly. Final undergraduate research project. University College Dublin, Dublin (Ireland)

## Teaching experience

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Oct/2004 - Aug/2005

Physics and Chemistry teacher, teaching Foundation Physics to a class of 20 adults and Foundation Chemistry to a separate group, of 15 mature students.

Escola Secundária Rainha D. Amélia, Rua Jau, Alto de Santo Amaro, 1349-002 Lisboa (Portugal)

Jan/2007 - May/2007

Demonstrator CHEM10060, Physical and Inorganic Chemistry (year 1 class, demonstrated 4 groups of 12 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Sep/2007 - Dec/2007

Demonstrator CHEM10060, Analytical and Inorganic Chemistry (year 2 class, demonstrated 4 groups of 12 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Jan/2008 - May/2008

Tutor CHEM10060, Physical and Inorganic Chemistry (year 1 class, tutored 5 groups of 16 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Sep/2008 – Dec/2008

Demonstrator CHEM00010, Introductory Chemistry (year 1 class, demonstrated 4 groups of 12 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Jan/2009 - May/2009

Tutor CHEM10060, Physical and Inorganic Chemistry (year 1 class, tutored 4 groups of 16 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Sep/2009 – Dec/2009

Tutor CHEM00010, Introductory Chemistry (year 1 class, tutored 5 groups of 16 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Jan/2010 – May/2010

Tutor CHEM10060, Physical and Inorganic Chemistry (year 1 class, tutored 4 groups of 14 students).

University College Dublin, Belfield, D4 Dublin (Ireland)

Feb/2014 – Jun/2014

Inorganic Chemistry (year 2 class, laboratory)

Faculdade de Ciências, Universidade de Lisboa, Lisboa (Portugal)

### Personal skills and competences

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Mother tongue Portuguese

Other languages

Self-assessment

*European level*

**English**

**Spanish / Castilian**

**French**

		<b>Understanding</b>		<b>Speaking</b>				<b>Writing</b>		
		Listening		Reading		Spoken interaction		Spoken production		
	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user	C2	Proficient user
	B1	Independent user	C1	Proficient user	B1	Independent user	B1	Independent user	A2	Basic User

Social skills and competences

- Team spirit;
- Good ability to adapt to multicultural environments, gained through my research experience in different countries;
- Good communication skills gained through my experience as a teacher.

Organisational skills and competences

- Good organisation and time management;
- Good experience in project and team management.

Technical skills and competences

I acquired expertise in using different techniques of synthesis and methods of characterisation. Organic synthesis based on both wet and solvent free chemistry mainly condensation reactions, substitution reactions, Gabriel synthesis, protection reactions, deprotection reactions, complexation reactions. Purification methods: recrystallisation, column chromatography using silica, alumina and ion exchange resins. Hydrothermal and solvothermal synthesis, mass spectrometry, temperature dependent UV-vis spectroscopy, IR

spectroscopy, ESR spectroscopy, LB film formation, cyclic voltammetry, TEM, SEM and NMR.

Computer skills and competences - Good command of Microsoft Office™ tools;  
- Good command of database searching, Scifinder, Mercury, Chemdraw and Symyxdraw.