

# M. Rosa Palacín Peiró

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## ACADEMIC APPOINTMENTS AND EDUCATION

Research Professor	ICMAB-CSIC (2018 -
Research Scientist	ICMAB-CSIC (2009-2017)
Tenured Scientist	ICMAB-CSIC (1999-2009)
Post-doctoral Fellow	ICMAB-CSIC (1998-1999)
Post-doctoral Fellow	Université de Picardie Jules Verne – CNRS (1996-97)
Ph.D. in Materials Science (with honors)	Universitat Autònoma de Barcelona, June 1995
Master in Materials Science	Universitat Autònoma de Barcelona, June 1993
B.S in Chemistry (with honors)	Universitat Autònoma de Barcelona, June 1991

## RESEARCH INTERESTS AND ACHIEVEMENTS

Research involving solid state chemistry and electrochemistry applied to battery technology covering already commercial technologies (e.g. Ni or Li-ion) or pre-commercial (Na-ion) technologies as well as new battery chemistries and emerging concepts (Mg or Ca based). Emphasis is set in developing new materials tailoring structure and microstructure to maximise electrochemical performance and understanding redox mechanisms through investigation of electrode and electrolyte reactivity. Focus on developing fertile cooperation scenarios between basic oriented research and industry. Main scientific achievements include:

- Understanding the structural transformations taking place in the positive electrode of *nickel based batteries* through operando neutron diffraction and correlation between defects present in the crystal structure and electrochemical performance.
- Research in new alternative materials for *lithium ion batteries*, achievement of high temperature operation for LiFePO<sub>4</sub>, and investigation of electrodes reacting via a new non intercalation based mechanism.
- Pioneering recent technological development for *Na-ion batteries* through optimizing electrolyte formulation and negative electrode performance.
- Demonstration of the viability of calcium metal as anode material, first step towards proof-of-concept of a new high-energy *battery technology based on calcium*.

## AWARDS

- *VI Premi Sant Albert per a Llicenciats en Ciències Químiques* (1991) and *IX Premi Sant Albert a la Investigació Química* (1994) awards by the Col.legi Oficial de Químics de Catalunya.
- *Premio Joven Investigador en Materiales* by the Sociedad Española de Materiales (1999).
- International Battery Association Research Award. October 2021
- Electrochemical Society (ECS) Fellow. July 2021
- Miguel Catalán – Paul Sabatier Award by the Société Chimique de France 2022.

## SCIENTIFIC ACTIVITY

### Research production and impact

Published > 150 manuscripts in peer reviewer journals, referenced over 11000 times, h-index of 44 (Web of Science). Advisor of 10 PhD, co-author of 4 book chapters and co-inventor in 10 patents (6 of them jointly owned by CSIC and Toyota Motor Europe).

### Grants and projects

PI of diverse National grants involving battery materials research activity, joint bilateral international projects with RSC (UK) and CNRS (France) and H2020 research projects: NAIADES (Na-ion batteries, coordinated by CEA (France) 2015-2018), e-Magic (FET-PROACTIVE, Mg batteries, coordinated by Cidetec (Spain) 2019-2022), BIG-MAP (2020-2023, coordinated by DTU (Denmark) and coordinator of H2020 FET-OPEN CARBAT (Ca batteries, 2017-2020) PI of industrially funded projects: Repsol (2012-2019), Toyota Motor Europe (2013-2017), Ficosa and Premo (2009-2011) and Air Products (2006-2008).

### Governing and advisory boards

- Scientific co-director of the ALISTORE-ERI European virtual research institute devoted to battery research enlisting 23 academic institutions and 12 industrial club members (2008-2017).
- Deputy Director at ICMAB-CSIC since 2014.
- President of the International Battery Association since November 2021. Member of Governing Board since 2012.
- Member of the Executive Committee for the International Meeting on Lithium Batteries (IMLB) LLC since 2014.
- Member of CEA International Scientific Advisory Board (France), 2015.
- Member of CAM-IES International Scientific Assessment Panel (Cambridge, UK), since 2017.
- Member of the Karlsruhe Institut of Technology (KIT) Advisory Board on "Electrochemical Energy Storage" since 2019.

### Editorial Boards

- Matter (Cell Press, since 2019).
- Associate editor for Chemistry of Materials (ACS, since 2016).
- Scientific Reports (Nature Publishing Group 2012-2016).
- Materials for Renewable and Sustainable Energy (Springer, 2012-2016).
- Journal of Power Sources (Elsevier, 2009-2016).

## PUBLICATION HIGHLIGHTS

- *Elucidation of the redox activity of  $\text{Ca}_2\text{MnO}_{3.5}$  and  $\text{CaV}_2\text{O}_4$  using operando XRD: charge compensation mechanism and reversibility*; A.P. Black, C. Frontera, A. Torres, M. Recio-Poo, P. Rozier, J.D. Forero-Saboya, F. Fauth, E. Urones-Garrote, M.E Arroyo-de Dompablo. M. R. Palacín. Energy Storage Materials 2022, 47, 354-364.
- *Achievements, challenges and prospects of calcium batteries*; M.E Arroyo-de Dompablo. A. Ponrouch, P. Johansson, M. R. Palacín. Chem. Rev. 2020, 120, 6331-6357.
- *Understanding ageing in Li-ion batteries: a chemical issue*; M.R. Palacín. Chem. Soc. Rev. 2018, 47, 4924-33.
- *Why do batteries fail?* A. de Guibert, M.R. Palacín. Science, 2016, 351(6273) 1253292.
- *Towards a calcium-based rechargeable battery*; A. Ponrouch, C. Frontera, F. Barde, M.R. Palacín. Nat. Mater. 2016, 15, 169-173.
- *Recent achievements on inorganic electrode materials for lithium ion batteries*. L. Croguennec, M.R. Palacín. J. Am. Chem. Soc. 2015, 237, 3140-3156
- *Towards high energy density sodium ion batteries through electrolyte optimization*. A.Ponrouch, R. Dedryvere, D. Monti, A.E. Demet, J.M. Ateba Mba, L. Croguennec, C. Masquelier, P. Johansson, M R. Palacín. Energy & Environmental Science 2013, 6, 2361-9.
- *Deciphering the structural transformation during nickel oxyhydroxide electrode operation*. M. Casas- Cabanas, J. Canales-Vázquez, J. Rodríguez-Carvajal, M.R. Palacín. J. Am. Chem. Soc. 2007, 129, 5840-2.

## RECENT KEYNOTE AND INVITED TALKS

- PRIME 2020 Symposium A01 - Intercalation Chemistry for Electrochemical Energy Storage Technologies: In Honor of M. Stanley Whittingham, Nobel Prize in Chemistry 2019: "*Lessons Learnt and Challenges Ahead the Development of Ca-Based Batteries*".
- 2019 International Battery Seminar & Exhibit, US, March 2019 "*Li-ion battery aging: lessons learnt on the way to the future*"
- 2019 ACS Spring Meeting ACS Spring Meeting, US, April 2019 "*Developing calcium batteries: The good, the bad, and the ugly*"
- IMLB 2018, 19th International Meeting on Lithium Batteries, Japan, June 2018 "*On the quest for Ca battery cathodes: the beauty and the beast*"

## SCIENCE AND PUBLIC OUTREACH

- **Public Entities & Scientific events**: Co-author of Basic Research Needs for Electrical Energy Storage, US DoE (2007) and the Roadmapping Exercise on Materials for the European Strategic Energy Technology Plan in Energy Storage, EC (2011). Participation in the LIVE project for Electric Vehicle implementation in Barcelona (2009). Co-organizer of National meetings (QIES, STN) and diverse International battery related symposia held both in Europe and US (ECS, MRS IUCr, IMLB, IBA etc).
- **Teaching and Education**: Teaching battery technology within the Postgraduate in Electric Vehicles and Other Propulsion Technologies. Polytechnic University of Catalonia (UPC) since 2011. Participation Summer Schools and Workshops such as UCM El Escorial, UIMP, Barcelona Summer Tech, or Chalmers Battery Initiative.
- **Social Outreach Activities**: round tables and conferences (STA, ETSE, Automobile Barcelona, Foro Innovación, Fòrum Àgora, Expominer, Barcelona Smartmoto Challenge, RSC-COP26 amongst others) and press, radio or TV media events and interviews (TVE2, Canal 33, RAC1, Onda Cero, El País). Participation in ICMAB-CSIC activities for high school students aiming at raising awareness on achievements of women scientists through history.