MINISTERIO DE CIENCIA E INNOVACIÓN

Cofinanciado por la Unión Europea

AGENCIA ESTATAL DE INVESTIGACIÓN

Part A. PERSONAL INFORMATION

CV date	08/01/25

First name	Pedro Enrique		
Family name	Sánchez Jiménez		
Gender (*)	Male	Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail		URL Web	
Open Researcher and Contributor ID (ORCID) (*)		0000-0001-6982-1411	

(*) Mandatory

A.1. Current position

Position	Científico Titular CSIC		
Initial date	10/07/2020		
Institution	CSIC		
Department/Center	Instituto de Ciencia de Materiales de Sevilla		
Country	Spain	Teleph. number	954446119
Key words	Kinetics, Thermochemical energy storage, thermal analysis, mechanochemistry, flash sintering		

A.2. Previous positions (research activity interruptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
Institute of Materials Science of Seville-CSIC	From September 2015
University of Cambridge	October 2014 to August 2015
Institute of Materials Science of Seville-CSIC	October 2010 to September 2014
University of Colorado at Boulder	June 2008 to January 2010

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Chemistry	Universidad de Sevilla	2003-08
Bsc in Biochemistry	Universidad de Sevilla	2000-01
Bsc in Chemistry	Universidad de Sevilla	1994-99

Part B. CV SUMMARY *(max. 5000 characters, including spaces)*

I received my PhD at the University of Seville (2008), with a thesis on kinetic studies of solid-state reactions. After 2 years as a postdoctoral researcher at the University of Colorado at Boulder (USA), I returned in 2011 to the Institute of Materials Science of Seville (ICMS) with JAE-Doc and Juan de la Cierva (JdC) grants. In 2014, I obtained a Talentia PostDoc grant in a very competitive call (8 in Andalusia for all research fields), to develop a research project at Cambridge University focused on nanogenerators. In 2016 I obtained a Ramón y Cajal grant, and in 2019 the position of Senior Scientist at CSIC, although during the period 2021-2023 I worked at the University of Seville with a Talentia Senior grant.

Throughout my career I have gained experience in various fields related to solid state reactions. I have worked in solid state kinetics, developing several kinetic analysis methods with great impact in the field. Some of them are recommended by the ICTAC (International

Confederation for Thermal Analysis and Calorimetry) in their published good practices guides. Due to this experience, I have participated in several contracts with industrial partners. For the Eurokin Consortium I elaborated a monograph on kinetic analysis. With Abengoa I participated in several industrial projects, for more than 500,000 euros, aimed at increasing the operating temperature range of their heat transfer fluids. This work led to the construction of a pilot plant at the Solucar Platform. I am member of the ICTAC and Secretary of GECAT (Grupo Especializado de Calorimetría y Análisis Térmico), part of the RSEQ. I have an important international network of collaborators in this area, having given several invited talks at international meetings.

I have a relevant production in the field of environment and energy. Specifically, I have extensively studied the Calcium-Looping (CaL) process for CO2 capture, with the aim of reducing emissions in power plants. Also as a thermochemical energy storage system (TCES) in concentrating solar power plants. This line of research, closely aligned with current EU priorities, has been very successful (over 35 papers) and we are currently one of the leading groups worldwide. The impact of this research is demonstrated by the H2020 EU Socratces project (2018-2023), with a budget of €5 million. The seminal idea of this project was developed in our lab. Within the project, I collaborated in the construction of the first prototype of a TCES plant based on CaL. Our proposal to exploit the facility obtained funding in 2021 in the National Call “Proof of Concept”, in which I am co-PI. This proposal explores the commercial viability of the concept. I have been PI in 2 National projects in this thematic, one within the Retos Programme, and another one in the Ecological and Digital Transition call. I have directed a thesis on this topic, and I am currently directing another one. I have made a great effort to disseminate this line of research among the general public, participating in several activities organized by both ICMS and the University of Seville. We have also prepared specific presentations for industrialists, visited several companies and organized special visits to our plant for different industrial visitors.

Another of my research interest lies on the preparation of ceramic materials by means of the innovative Flash Sintering (FS) technique. This line, strongly international, counts on the collaboration with prestigious researchers; Prof. Raj (U. of Boulder), pioneer of the technique, Prof. Tsakalakos (Rutgers U.), where I made a 4-month stay in 2019-20 in the framework of the José de Castillejo program. In FS we have contributed with two disruptive works; the first-time proposal of one-step synthesis and densification of nanostructured ceramics at low temperatures by FS, and in the extension of the technique to 3D ceramics of complex shapes. I have 20 papers on this topic, and I am currently directing a PhD thesis. I have been PI in a project funded by the Junta de Andalucía.

I am co-author on 147 articles, totaling 6818 citations (Scopus). My h-index is 47 (Scopus). I have been included in the last update (Oct 2023) of the “World's Top 2% Scientists List” in the field of Materials. According to the Impact metrics in Scopus, 81% of my published papers are within the top 25% most cited documents worldwide I have been PI in 6 projects and 1 contract. I have directed 3 PhD theses and am currently directing 2 more. One of my former PhD students is currently Full Professor at the University of Seville and an active part of our research group, another one works at the Andalusian Historical Heritage Institute and another one at a company in the field of renewable energies.

Part C. RELEVANT MERITS *(sorted by typology)*

C.1. Publications. (Selected among the **55 papers** published in the 2019-2024 period)

1. **Unlocking synergistic benefits of the calcium looping-calcium hydroxide integration for energy storage: A perspective on sorbent performance.** J.Arcenegui, A. Carro,(…) and P.E. Sánchez-Jiménez, CHEM.ENG. J. 504, 158775. **2025.**
2. **On the athermal origin of flash sintering: Separating field-induced effects from Joule heating using a current ramp approach.** S. Molina, A. Perejon, L.A. Pérez-Maqueda and P.E. Sánchez-Jiménez. SCR. MATER. 247, 116086. **2024.**
3. **Metal- based eggshell particles prepared via successive incipient wetness impregnation method as a promoted sorbent for CO2 capturing in the calcium looping**

process. M. Imani, M. Tahmasebpoor, P.E. Sánchez-Jiménez, J. ENVIRON. CHEM. ENG. 11(5), 110584. **2023.**

4. **ICTAC Kinetics Committee recommendations for analysis of thermal decomposition kinetics.** N. Koga, S. Vyazovkin, (…), P. E. Sánchez-Jiménez. THERMOCHIMICA ACTA. 719, 179384. **2023.**

5. **A novel, green, cost-effective and fluidizable SiO2-decorated calcium-based adsorbent recovered from eggshell waste for the CO2 capture process.** M. Imani, M. Tahmasebpoor, Pedro E. Sánchez-Jiménez, J.M. Valverde, V. Moreno; SEP. PURIF. TECHNOL. 305, 122523. **2023.**

6. **Albero: An alternative natural material for solar energy storage by the calcium-looping process.** V. Moreno, J. Arcenegui, P.E. Sánchez-Jiménez, A. Perejón, R. Chacartegui, J.M. Valverde, L.A.Pérez-Maqueda; CHEM.ENG. J. 440, 135707. **2022.**

7. **Steam-enhanced calcium-looping performance of limestone for thermochemical energy storage: The role of particle size.** J. Arcenegui, P.E. Sanchez Jimenez, A. Perejón, Valverde J.M.; Luis A Perez Maqueda; J. ENERGY STORAGE 51, 104305**, 2022.**

8. **Kinetics and cyclability of limestone ($CaCO_3$) in presence of steam during calcination in the CaL scheme for thermochemical energy storage**. J. Arcenegui, P.E Sánchez Jiménez, A. Perejon, J.M. Valverde, L.A Perez Maqueda; CHEM. ENG. J. 417, article 129194. **2021**.

9**. Role of particle size on the multicycle calcium looping activity of limestone for thermochemical energy storage.** J**.** Durán, P.E Sanchez-Jimenez, (…); L.A.Pérez Maqueda. J. ADV. RES. 22, pp. 67 - 76. **2020.**

10. **High-Performance and Low-Cost Macroporous Calcium Oxide Based Materials for Thermochemical Energy Storage in Concentrated Solar Power Plants.** P.E Sánchez Jiménez; C. Ortiz; J.M. Valverde; A. Perejon; L. A Perez Maqueda. APPLIED ENERGY. 235, pp. 543 - 552. **2019.**

C.2. Participation in Conferences (activities implemented during the 2019-2024 period)

4 Invited talks in various international conferences related to Thermal analysis and Materials Science

C.3 Research projects (activities implemented during the 2019-2024 period)

1. **Materials for High performace thermal energy storage system based on hybrid molten salts and carbonates.** Ministerio de Ciencia e Innovación (PID2022-140815OB-C22)**.** 09**-**2023 a 09-2026. 181.250 €.

2. **Materiales termoquímicos para almacenamiento de energía mejorados mediante control microestructural.** Ayudas a PROYECTOS ESTRATÉGICOS ORIENTADOS A LA TRANSICIÓN ECOLÓGICA Y A LA TRANSICIÓN DIGITAL (TED2021-131839B-C22) **IP: Pedro E. Sánchez Jiménez.** 2022-2024. 161.000 €.

3. 202435E01. Fabricación de materiales con aplicación en energía mediante técnicas de fabricación aditiva. Intramural CSIC. **Pedro E. Sánchez Jiménez**. 01/01/2025-31/12/2026. 120.000 €.

4. **Demostración en entorno relevante del uso de reacciones de Calcinación Solar y Carbonatacion para Almacenamiento de Energía Térmica.** Ayudas a proyectos de I+D+i para la realización de prueba de concepto (PDC2021-121552-C21) **IP: Pedro E. Sánchez Jiménez.** 2021-2022. 68.770 €.

5. **Cerámicas en un flash: la nueva ruta para un procesado energética y medioambientalmente eficiente** Proyecto de Excelencia Junta de Andalucía (P18-FR-1087) **IP: Pedro E. Sánchez Jiménez.** 2021-2022. 99.700 €.

6. **Adquisición de Equipo de Análisis térmico de altas prestaciones.** Infraestructuras y Equipamiento Científico-Técnico (2019). EQC2019-005791-P. **IP: Pedro E. Sánchez Jiménez**. Overall budget 89.903 €

7. **Integration of the Calcium Looping process in Concentrated Solar Power Plants for Thermochemical Energy Storage** *Plan Estatal Retos Investigación 2017*. CTQ2017-83602-C2-1-R. Coordinated project. **IP: Pedro E. Sánchez Jiménez**. 2018-2021. Overall budget: 317.029 € (Subtask 1: 145.200 €)

8. **SOlar Calcium-looping integRAtion for Thermo-Chemical Energy Storage** (SOCRATCES) *H2020-LCE-2016-2017 (COMPETITIVE LOW-CARBON ENERGY)*. IP: Luis A. Pérez-Maqueda. 2018-2020. 258.000 €

C.4. Contracts, technological or transfer merits (activities implemented during the 2019-2024 period)

1. **Build to Zero (2024-2025)**. Contrato de Apoyo Tecnológico. Characterization of molten salts for thermal energy storage. 10.940 €
2. **Fresenius AG**. Contrato de Apoyo Tecnológico. Characterization of Freeze-dried Monoliths for biomedic applications (2024). 12.500 €
3. **Thermogravimetric Analysis. Kinetics.** Contract with VDI Technologiezentum GMBH (Eurokin Consortium). IP: Luis A. Pérez Maqueda. 2017-2018. 12.500 €
4. Contracts with Abengoa Research (**New Concept of Central Tower operating fluids at very high temperatures with higher performance, High Temperature and High Pressure Ceramic Receptor for Hybrid Solar Systems with Gas Turbine and Combined Cycle** and **Degradation studies and Development of new HTF.** 3 contracts amounting 600.000€ implemented during 2013-2016.

C.5. Teaching (activities implemented during the 2019-2024 period)

1. Teacher at Departamento Química Inorgánica (University of Seville). 45 ECTS credits within the 2021-2023 period.
2. Invited Professor at Material's Engineering, Processing and Characterization Master Degree. Universidad Politécnica de Valencia. From 2016/17 to 2020/2021.
3. Member of the Doctoral Program *Ciencia y Tecnología de Nuevos Materiales*, (Universidad de Sevilla). During the 2018-2024 period I have directed 4 TFMs
4. Two ongoing PhD thesis and one thesis finished in the period mentioned, all of them in the energy storage field. Another PhD thesis finished before the mentioned period.

C.6. Grants (activities implemented during the 2019-2024 period)

Talentia Senior Grant. Junta de Andalucía. 2021-2023.

C.7. Internationalization

1. Fulbright. 4-month stay at Rutgers University. **2019-2020**
2. Other Short and long stays at **University of Colorado at Boulder, Cambridge University, Institut Europeen des membranes de Montpellier**.
3. Host of 10 international collaborators from **University of Colorado at Boulder, University of Oregon, University of Sheffield, Rutgers University, Universidad de Atacama, University of Pardubice, Czech Academy of Sciences, Universidad Autónoma Metropolitana de México.**
4. 32.0% of papers co-authored with researchers in other countries (Scopus)

C.8. Other merits (correspondientes a actividades ejecutadas durante el periodo 2018-2023)

- Thermal analysis responsable in Instituto de Ciencia de Materiales de Sevilla
- Member of ICTAC (International Confederation for Thermal Analysis and Calorimetry)
- Secretary of GECAT (Grupo Especializado de Calorimetría y Análisis Térmico),