

CURRICULUM VITAE ABREVIADO (CVA)

Part A. PERSONAL INFORMATION

First name	LUIS		
Family name	GÓMEZ-HORTIGÜELA SAINZ		
Gender (*)	MALE	Birth date	06/12/1979
ID number	51076125W		
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Open Researcher and Contributor ID (ORCID) (*)	0000-0002-4960-8709		

A.1. Current position

Position	Tenured Scientist		
Initial date	21/03/2017		
Institution	CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS		
Department/Center	INSTITUTO DE CATÁLISIS Y PETROLEOQUÍMICA		
Country	SPAIN	Teleph. number	915119709
Key words	Zeolite, Molecular Sieves, Chirality, Enantioselective Catalysis		

A.2. Previous positions

Period	Position/Institution/Country/Interruption cause
2021	Interruption: paternity leave for birth of daughter (4 months)
2013-2017	Contract: Ramón y Cajal/ICP-CSIC/Spain (39 months)
2010-2013	Contract: Juan de la Cierva/ICP-CSIC/Spain (36 months)
2009-2010	Contract: postdoctoral/University College London/United Kingdom (21 months)
2007-2009	Postdoctoral Fellowship/University College London/United Kingdom (24 months)
2006-2007	Contract: Research Assistant/ICP-CSIC/Spain (14 months)
2002-2005	FPU Predoctoral Grant/ICP-CSIC/Spain (48 months)

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Chemistry	ICP-CSIC/UAM/Spain	2006
Degree in Chemistry	UAM	2001

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

My research started on the last year of my bachelor degree (2001), with a **collaboration grant** at the Physical-Chemistry Department (UAM). After graduating in **Chemistry** (2001) with **Extraordinary Award**, I got a **FPU** grant to carry out my PhD at the **Molecular Sieves Group** (GTM) at the **Institute of Catalysis and Petroleum Chemistry** (ICP) (2002-2006), where I studied the use of fluorinated structure-directing agents for the synthesis of microporous materials. During my PhD period I spent one year at the **Royal Institution of London** (2003/2004), a world-leader lab on computational chemistry. I got my PhD on 2006, with **Extraordinary Award**.

I spent almost four years as posdoc at the Chemistry Department at **University College London** (2007-2010). During this stay, I extended my knowledge on molecular simulations, whose efficient application was recognized with the concession of the **2009-2010 Publication Award**. All my research work at London was recognized with the prestigious **Barrer Award** (2014), given every three years by the **Royal Society of Chemistry**.

In 2010 I resumed my work at ICP-CSIC, through a **Juan de la Cierva** and then **Ramón y Cajal** contracts (both obtained with the **best score in the Chemistry Area**). Finally, I got my **Tenured Scientist** position at ICP in 2017. I have been **PI** of a **European Project**, under the frame of the **Marie Curie-CIG** program, for the study of new structure-directing agents in the synthesis of microporous materials, and **of two research projects of the MICINN**, related



with the design of new structure-directing agents for the synthesis of chiral zeolite materials. I am also currently **PI** of a **proof-of-concept project** (2022) to develop a chiral zeolite catalyst obtained under the frame of previous research projects. I have also been PI of 4 non-competitive projects related to the synthesis of chiral zeolites. I have **supervised** a PhD about chiral zeolites (with **Extraordinary Award**), which resulted in 13 publications, and am currently supervising my second PhD, which after 1 year has resulted in 2 patents and 2 high-impact papers (JACS and Chem. Commun.). I have participated in an **Explora** project for the use of zeolites to eliminate As from water.

I have an extensive **international profile extended also to technology transfer in cooperation** with Ethiopia, where we developed a technology for the elimination of F from drinking water. This technology has become a success case for technology transfer and internationalization in CSIC: the patented technology was the first patent of Addis Ababa University; furthermore, it was licensed to a Spanish company (TAGUA), and finally, under a research contract with the company (of which I was PI), we pushed it to scale up and it is currently under **exploitation**. Furthermore, we teamed up with an NGO to implement the technology back in Ethiopia using 2 contracts with private foundations and AECID funds to build **2 defluoridation plants**, which are currently supplying water to two rural communities (more than 2000 people).

My expertise in technology transfer is supported by the concession of **5 patents (1 under application)**, all with PCT extension, and one of them licensed, as previously mentioned. In addition, I have participated in **2 research contracts** with *Red Eléctrica de España* to develop adsorbents for SF₆ gas, which is currently in consideration for potential future implementation.

Finally, I would like to remark my profile as part of the commitment to work in science with and for society, not only with my outreach activities such as a **book** about chirality (colección 'Qué sabemos de') and my public profile in the media (radio, TV), but also as leader, I am committed in embracing diversity and gender equity in my team, allowing every voice to be heard and making sure that the discussions and decisions are taken as a team.

In summary, as a result of my research, I have been awarded with **3 'quinquenios'** (last on 2017) and **3 'sexenios'** (last on 2019). I have participated in **18 research projects** (being **PI of 7**), in **5 research contracts** (being **PI in one**) and in **3 consultancy contracts**. I have supervised **one PhD**, and am supervising the second one; I have also supervised **8 TFG**, **1 TFM**, and 15 undergraduate practicum. I am author of **94 peer-reviewed publications** in international SCI journals, of which 79 are Q1. I am author of **4 book chapters**, and of **one divulgation book** about chirality. I have been **invited editor** of a book, and I am **editor** of a scientific journal. I am also inventor of **5 patents** (one **licensed** and under **exploitation**). I have also been involved in developing two defluoridation plants with our own technology.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (see instructions)

My CV includes **94 SCI publications**, including general chemistry journals like *Journal of the American Chemical Society* (5), *Chemistry: A European Journal* (6) (one in cover), *Chemical Communications* (3), *Chemistry of Materials* (10) (one in cover), *Journal of Materials Chemistry A* (1), *Journal of Physical Chemistry* (9), *Physical Chemistry Chemical Physics* (4), *RSC Advances* (1), *ACS Photonics* (2), *Dalton Transactions* (7), *New Journal of Chemistry* (2), *Proceedings of the Royal Society A* (1), *ACS Omega* (1), *Journal of Industrial and Engineering Chemistry* (1), *Nanomaterials* (1) as well as in more specialized journals like *Microporous and Mesoporous Materials* (23), *Studies in Surface Science and Catalysis* (3), *American Mineralogist* (1) *Separation and Purification Technology* (2), *ACS Catalysis* (4) (one in cover), *Catalysis Today* (3) and *Topics in Catalysis* (1), or in monographies like *Structure and Bonding* (3). Besides, I am author of four book chapters about zeolites, and of one divulgation book about chirality. The most relevant ones are (those where I am the corresponding author are underlined):

1) R. de la Serna, I. Arnaiz, C. Márquez-Álvarez, J. Pérez-Pariente, **L. Gómez-Hortigüela**, *Inversion of chirality in GTM-4 enantio-enriched zeolite driven by a minor change of the structure-directing agent*, Chem. Commun. 58 (2022) 13083-13086, HOT Article.



- 2) B. Bernardo-Maestro, J. Li, J. Pérez-Pariente, F. López-Arbeloa, **L. Gómez-Hortigüela**, *Driving the active site incorporation in zeolitic materials via the organic structure-directing agent through development of H-bonds with hydroxyl groups*, Chem. Eur. J. 28 (2022) e202200702.
- 3) R. de la Serna, D. Nieto, R. Sainz, B. Bernardo-Maestro, Á. Mayoral, C. Márquez-Álvarez, J. Pérez-Pariente, **L. Gómez-Hortigüela**, *GTM-3, an extra-large pore enantioselective chiral zeolitic catalyst*, J. Am. Chem. Soc. 144 (2022) 8249-8256.
- 4) Z. R. Gao, S. R. G. Balestra, **L. Gómez-Hortigüela**, J. Li, C. Márquez-Álvarez, M. A. Cambor, *Dication Containing Three Aromatic Ring Structure Directs Towards a Chiral Zeolite, Spans Three Cavities and Effectively Traps Water*, Chem. Mater. 34 (2022) 3197-3205.
- 5) **L. Gómez-Hortigüela**, Á. Mayoral, H. Liu, L. Sierra, L. Vaquerizo, C. Mompeán, J. Pérez-Pariente, *Synthesis of large-pore zeolites from chiral structure-directing agents with two L-prolinol units*, Dalton Trans. 49 (2020) 9618-9631.
- 6) P. Lu, Á. Mayoral, **L. Gómez-Hortigüela**, Y. Zhang, M. A. Cambor, *Synthesis of 3D Large-Pore Germanosilicate Zeolites Using Imidazolium-Based Long Dications*, Chem. Mater. 31 (2019) 5484-5493.
- 7) P. Lu, **L. Gómez-Hortigüela**, L. Xu, M. A. Cambor, *Synthesis of STW zeolite using imidazolium-based dications of varying length*, J. Mater. Chem. A 6 (2018) 1485-1495.
- 8) **L. Gómez-Hortigüela**, B. Bernardo-Maestro, *Chiral Organic Structure-Directing Agents, Structure and Bonding, Special Issue: Insights into the Chemistry of Organic Structure-Directing Agents in the Synthesis of Zeolitic Materials (2017)*; 201-244. Springer, Cham.
- 9) A. Rojas, **L. Gómez-Hortigüela**, M. A. Cambor, *Zeolite structure-direction by simple bis(methylimidazolium) cations, The effect of the spacer lengths on structure-direction and of the imidazolium ring orientation on the ¹⁹F NMR resonances*, J. Am. Chem. Soc. 134 (2012) 3845-3856.
- 10) **L. Gómez-Hortigüela**, *La quiralidad, el mundo al otro lado del espejo*. Colección Qué sabemos de, Editorial Catarata (ISBN: 978-84-9097-939-6), Editorial CSIC (ISBN: 978-84-00-10610-2) (2020). Divulgation.

C.2. Congress

My research has been presented in **100 participations** in national (16) and international (84) conferences, both as oral (55) or poster (45) communications. I have also been invited as speaker in **3 schools** about zeolites, and as **keynote** speaker in **5** international conferences and in **3** workshops. The most relevant invited oral participations are:

1. **L. Gómez-Hortigüela**, *Application of molecular simulation methods to the study of microporous materials: structure-directing effects and reaction mechanisms*. 38th Meeting of the British Zeolites Association, Chester (UK). 26-31 July 2015. (Oral invited: Barrer Lecture).
2. **L. Gómez-Hortigüela**, F. Corà, C. R. A. Catlow, *Complementary Mechanistic Properties of Fe- and Mn-doped Aluminophosphates in the Catalytic Aerobic Oxidation of Hydrocarbons*. 15th International Conference on Theoretical Aspects of Catalysis, Londres (Reino Unido). 29 June-4 July 2014. (Oral invited).
3. **L. Gómez-Hortigüela**, *Simulaciones moleculares aplicadas al estudio de la dirección de estructura de materiales microporosos*. 2^o Ciclo de Palestras sobre Peneiras Moleculares, Natal (Brasil). 13-14 November 2014. (Oral invited).
4. **L. Gómez-Hortigüela**, *Theoretical Methods in Zeolite Chemistry*. 35th FEZA (Federation of European Zeolite Associations) International Conference 2011, Post-conference school: Zeolites and Ordered Porous Solids: Fundamentals and Applications, Valencia (Spain). 8-9 July 2011. (Oral invited).

C.3. Research projects

I have participated in **18** research projects, being **PI in 7** of them. The most relevant ones are:

1. *Síntesis, desarrollo y actividad enantioselectiva de catalizadores zeolíticos quirales basados en el material GTM-3* (PDC2022-133681-I00). IP: **Luis Gómez-Hortigüela Sainz**, Prof. Joaquín Pérez Pariente. Funding entity: MICINN (01/12/2022-30/11/2024): 126.500 €.



2. *Nuevas estrategias en la síntesis de catalizadores zeolíticos mejorados para procesos sostenibles* (PID2019-107968RB-I00). PI: **Luis Gómez-Hortigüela Sainz**, Prof. Joaquín Pérez Pariente. Funding entity: MICINN (01/06/2020-31/05/2021): 181.500 €.
3. *Nuevos agentes directores de estructura quirales auto-ensamblables para la síntesis de materiales microporosos quirales* (MAT2015-65767-P). PI: **Luis Gómez-Hortigüela**. Funding entity: Ministerio de Economía y Competitividad (01/01/2016-31/12/2017): 35.574 €.
4. *Desarrollo de materiales catalíticos nanoporosos avanzados* (MAT2016-77496-R). IP: Enrique Sastre de Andrés, Carlos Márquez Álvarez. Funding entity: Ministerio de Economía y Competitividad (30/12/2016-29/9/2020): 242.000 €. Member of the research team.
5. *Use of newly designed organic molecules as large and efficient structure directing agents for the synthesis of microporous aluminophosphates* (PCIG-GA-2011-291877). PI: **Luis Gómez-Hortigüela**. Funding entity: Research Executive Agency (REA), European Commission (01/09/2011-31/08/2013): 50.000 €.

C.4. Contracts, technological or transfer merits

As a result of my research, I am inventor of **5 patents**, one licensed to a Spanish company:

1. A. Pinar, J. Pérez-Pariente, **L. Gómez-Hortigüela**, *Procedimiento de preparación de un aluminosilicato con estructura tipo ferrierita a partir de geles que contienen tetrametilamonio y bencil-metilpirrolidinio, y sus aplicaciones*. CSIC. ES2304308 (2007). **Ampliación PCT**: PCT/ES2008/070035 (2008).
2. R. García, V. Martínez, **L. Gómez-Hortigüela**, Í. López-Arbeloa, J. Pérez-Pariente, *Materiales híbridos fotoactivos con respuesta anisotrópica: Pyronina Y-MgAPO-36 (ATS) y Pyronina Y-MgAPO-11 (AEL)*. CSIC-Universidad del País Vasco. Application number: P201231259 (2012). **Ampliación PCT**: PCT/ES2013/070571 (2013).
3. **L. Gómez-Hortigüela**, J. Pérez-Pariente, I. Díaz, Y. Chebude, *Material compuesto de estilbita-nanohidroxiapatita, procedimiento de preparación y utilización para la eliminación de fluoruro del agua*. CSIC-Addis Ababa University. Application number: P201330262 (2013). **Ampliación PCT**: PCT/ES2014/070141 (2014). **Licensed to** TAGUA S.L., 16th April 2014. Currently under commercial **exploitation**.
4. **L. Gómez-Hortigüela**, J. Pérez-Pariente, D. Nieto Hernández, B. Bernardo Maestro, R. de la Serna Valdés, R. Sainz Vaque, *Material Microporoso Quiral Enantio-Enriquecido GTM-3, Procedimiento de Preparación y Usos*. CSIC. Application number: P202030360 (2020). **Ampliación PCT**: PCT/ES2021/070285 (2021). **Fase nacional**: EEUU, Europa, India, China.
5. **L. Gómez-Hortigüela**, J. Pérez-Pariente, R. de la Serna Valdés, I. Arnaíz Canos, *Material microporoso quiral enantio-enriquecido GTM-4, procedimiento de preparación y usos*. CSIC. Application number: P202230707 (2022) (Solicitada). Fecha de presentación: 29/7/2022.

I have participated in **5 research contracts** with companies, being **PI in one** of them with TAGUA S.L., the company who licensed our patent about zeolites for defluoridation of water; this technology is currently under exploitation by this company. Moreover, 2 of these contracts led to building 2 defluoridation plants in Ethiopia that are currently supplying fluoride-free water to two rural communities. On the other hand, 2 of the contracts are related with the development of adsorbents for the removal of SF₆ in electric substations. I have also participated in **3 consultancy contracts** with TAGUA S.L. In addition, an investment fund (BeAble) has shown interest in our GTM-3 patent, and is currently considering the possibility of creating a spin-off company. The most relevant contracts are the following:

1. *Desarrollo de materiales basados en la zeolita clinoptilolita para la reducción de fluoruros presentes en agua* (20142387). IP: **Luis Gómez-Hortigüela**, Isabel Díaz. Funding company: TAGUA S. L. (23/04/2014-28/02/2016). Budget: 139.086 €.
2. *Estudio y valoración de la posible aplicabilidad industrial de métodos de adsorción/desorción de hexafluoruro de azufre en materiales para ser utilizados en subestaciones eléctricas. FASE II* (20202721). IP: Carlos Márquez Álvarez. Funding company: Red Eléctrica de España. (20/07/2020-20/10/2021). Budget: 132.203 €.