

**CURRICULUM VITAE ABREVIADO (CVA)**

**IMPORTANTE – En Curriculum Vitae no debe superar las 4 páginas**

**Part A. DATOS PERSONALES**

Nombre	Pilar		
Apellidos	Fernandez Hernando		
Genero (*)	Mujer	Fecha de nacimiento	
Nº Identificación			
e-mail	<a href="mailto:pfhernando@ccia.uned.es">pfhernando@ccia.uned.es</a>	URL Web	
Open Researcher and Contributor ID (ORCID) (*)		<a href="https://orcid.org/0000-0003-1474-3713">https://orcid.org/0000-0003-1474-3713</a>	

(\*) Obligatorio

**A.1. Situación profesional actual**

Posición	Catedrática de Universidad En Química Analítica		
Fecha de inicio	25- may -2010		
Institución	Universidad Nacional de Educación a Distancia (UNED)		
Departamento/Centro	Ciencias Analíticas	<a href="#">Facultad de Ciencias</a>	
Country	España	Telef. numero	609198355
Palabras clave	Cromatografía, antibióticos, contaminantes orgánicos, Plásticos y microplásticos, alimentos, tratamientos de muestra		

**A.2. Cargos anteriores (interrupciones de la actividad de investigación, indicar total de meses)**

Periodo	Posición/Institución/País/ causa de Interrupción
feb-1988 to feb-1991	Ayudante de Facultad/ Facultad de Química (UCM)/Spain/promocion
mar-1991 to -feb-1993	Ayudante de Fac. -Doctor/ Facultad de Química (UCM)/Spain/Prom
mar-1993 to oct-2000	Prof. Asociado-Doctor/ Facultad de Química (UCM)/Spain/ New Univ.
Oct-2000 to feb-2002	Prof. Asociado-Doctor/ Facultad de Ciencias (UNED)/Spain/promocion
feb-2002 to may-2010	Prof. Titular Universidad/Facultad de Ciencias (UNED)/Spain/promocion
may-2010 to now	Catedrático de Universidad/ Facultad de Ciencias (UNED)/Spain

**A.3. Educación**

Doctorado, Licenciatura, Grado	Universidad/País	Year
Licenciatura en Química	Universidad Complutense de Madrid (UCM)/Spain	1984
Doctorado	Universidad Complutense de Madrid (UCM)/Spain	1990

**Part B. CV RESUMEN (max. 5000 caracteres incluidos espacios)**

Comencé mi Carrera académica trabajando como Profesor Titular y preparando mis estudios de Doctorado compaginando la investigación con la docencia. He realizado dos **estancias de investigación**: obtuve una beca postdoctoral de un año (1990-91) para una estancia en la Universidad Tecnológica de Loughborough (Reino Unido) y una estancia sabática de 9 meses de investigación (2014-15) en la Universidad de East Anglia en Norwich (Reino Unido), obteniendo ambas becas del Ministerio. He participado como investigador en 13 proyectos nacionales y 6 internacionales, siendo responsable de 3 de estos, uno de ellos coordinado con 12 países europeos. He sido Investigador Principal de 2 proyectos del Plan Nacional y también Investigador Principal de 4 proyectos Autonómicos de la Comunidad de Madrid. Tengo **5 periodos de investigación reconocidos por la CNEAI** (último tramo concedido: 2014-2020). También he participado en diferentes contratos de investigación, 3 de ellos financiados por la FAO.

**1.** Mis contribuciones científicas se han centrado en diferentes temáticas. Preparación de diferentes Materiales de Referencia Certificados (CRM-606, BCR-129) financiados por la Oficina Comunitaria de Referencia de la Unión Europea en su Programa de Medición y Ensayos, actualmente algunos de ellos continúan comercializándose. Esta investigación supuso una alta transferencia de conocimiento a través de la formación de investigadores en el marco del Proyecto “Material de Referencia Certificado: Pesticidas Polares Modernos en Agua”, en el que participaron 9 países europeos y que estuvo firmado

por la Profesora Carmen Cámara (PR). Otro tema principal se basó en la preparación de diferentes materiales que puedan ser utilizados como sorbentes selectivos (inmunológicos, levaduras, tierras de diatomeas y polímeros de impronta molecular, MIPs) para el desarrollo de sensores químicos y sistemas de extracción en fase sólida (MISPE, MIP, MSPD, SPME), empleando estas metodologías para la determinación de fármacos, antibióticos, pesticidas, disruptores endocrinos, hormonas, etc.) mediante diferentes técnicas de determinación (CE, HPLC con detectores DAD, MS y FL). La aportación a la generación de conocimiento de estas investigaciones se centra en el desarrollo de métodos de extracción y determinación que incorporan como material adsorbente selectivo minimizando el tratamiento de la muestra, sin pasos de limpieza, además de ser sencillos, rápidos y de bajo coste y en algunos casos automatizados, lo que los hace muy ventajosos, frente a los métodos convencionales empleados para la extracción de estos compuestos en muestras complejas. Una parte importante de la investigación se ha centrado en el gran problema social de las enfermedades cardiovasculares, llevándose a cabo la colaboración entre la Universidad y el Servicio de Cirugía Experimental del Hospital Universitario Puerta de Hierro, durante más de 15 años. Contribuyendo a diferentes proyectos financiados con Fondos de Investigación Sanitaria del Ministerio de Sanidad y Consumo. Los proyectos han contribuido al avance del conocimiento científico y a la transferencia social, demostrando que el uso de diferentes tratamientos químicos aumenta la durabilidad de las bioprótesis, reduciendo su calcificación. La investigación que se lleva a cabo en estos proyectos, además de abordar un importante problema de salud, tiene un gran impacto económico y social, dado que sólo en Europa se utilizan más de 40.000 prótesis cardiacas al año y el 15% se fabrican en Europa. Además, dada mi experiencia docente-investigadora, he organizado e implementado numerosos cursos y actividades de formación específicas, con el fin de contribuir a la formación de personal y conseguir una mejor difusión del conocimiento en el ámbito alimentario y medioambiental. Algunas de estas actividades de divulgación científica están relacionadas con temas de calidad y seguridad alimentaria, por ejemplo: “Cáncer y seguridad alimentaria, alimentación saludable”, “Microplásticos, un nuevo contaminante en la cadena alimentaria”.

2. Soy IP del grupo de investigación, GTyMAQ, desde 2001, reconocido por la UNED (GI10) en 2011. He dirigido 10 Tesis Doctorales y Trabajos Fin de Máster (4 al año) y Trabajos Fin de Máster (5-7 al año) desde el año 2000, lo que ha supuesto no sólo una formación científica, sino que ha contribuido a su desarrollo profesional facilitando su integración y promoción laboral, tanto en empresas, como en otros centros de investigación o universidades. Esto se justifica atendiendo a la diversa situación laboral de algunos de los doctores egresados de los últimos años que trabajan actualmente como investigadores en el CSIC, INIA, CIEMAT, Canal de Isabel II, profesores universitarios, técnicos del Ministerio de Economía y Competitividad, etc. Así como de estudiantes de Tesis de Máster que han encontrado trabajo en diferentes instituciones públicas o privadas, empresas u obtenido ayudas para la investigación doctoral.

3. Fui Vicerrector Adjunto de Investigación, de 2006 a 2014. Revisor de proyectos de investigación (ANEP, UEX, UM, UCM, UPV, FONCYT-Arg). Miembro de Comisiones de evaluación del profesorado universitario de Profesores Titulados y Catedráticos: Comisión ANECA A3 (2016-2018) y Comisión ACSUCYL (2022-)

- **Un total de 98 Publicaciones científicas (Q1) y 10 capítulos de libro (nacionales e internacionales)**

### **Part C. MERITOS RELEVANTES (ordenados por tipología) (últimos 10 años)**

#### **C.1. Publicaciones**

- Dulce Lucy Soliz, Jorge García-González, Gema Paniagua González, Rosa Ma Garcinuño, Juan Carlos Bravo Yagüe, Pilar Fernández Hernando. “Enhancement of a Simple, Economic and Eco-Friendly Analytical Approach for the Extraction and Determination of Endocrine Disruptors from Plastics in Shrimp”. *Sustainability* 16,5978 (2024)1

- Lorena González; Sonia Morante-Zarcelero; Damián Pérez-Quintanilla; Gema Paniagua; Rosa M. Garcinuño; Pilar Fernández, Isabel Sierra. “Fibreglass membrane chemically modified with amino-functionalised SBA-15 and its application in solid-phase extraction to determine macrolide antibiotics in eggs”. *Microchemical Journal*, 205, 111232 (2024)1

- Dulce L. Soliz, Gema Paniagua, Muñoz-Arnanz, Juan Carlos Bravo, Pilar Fernández, Rosa María Garcinuño. “Identification and morphological characterization of different types of plastic microparticles”. *Helyon* 10, e30749 (2024)1-9

- Lorena González-Gómez, Sonia Morante, Damián Pérez-Quintanilla, Gema Paniagua González, Rosa M. Garcinuño, Pilar Fernández Hernando, Isabel Sierra. "Development and Characterization of SBA-15 Imprinted Polymers for Spiramycin Analysis". *Separations*, 11 (8) 247 (2024)1-14
- Begoña Fernández-Pintor, Gema Paniagua, Judith Gañán, Sonia Morante-Zarcero, Rosa María Garcinuño, Pilar Fernández, Isabel Sierra. "Determination of atropine and scopolamine in honey using a miniaturized polymer-based solid-phase extraction protocol prior to the analysis by HPLC-MS/MS". *Polymer*, 13, 126904 (2024)1-13
- E. Garrido, Rosa M<sup>a</sup> Garcinuño, Gema Paniagua González, Pilar Fernández Hernando. "Occurrence of common plastic additives and contaminants in raw, steamed and canned mussel samples from different harvesting areas using MSPD-HPLC methodology". *Food Research International* 181 (114109) (2024)1-8
- Dulce L. Soliz, -Rosa M<sup>a</sup> Garcinuño, Gema Paniagua González, Juan Carlos Bravo, Pilar Fernández Hernando. "Assessing matrix solid-phase dispersion extraction strategies for determining bisphenols and phthalates in gilthead sea bream samples". *Foods* 13, 413 (2024)1-11
- Rosa M<sup>a</sup> Garcinuño, Eduardo José Collado, Gema Paniagua, Juan Carlos Bravo, Pilar Fernández Hernando. "Assessment of molecularly imprinted polymers as selective solid-phase extraction sorbents for the detection of cloxacillin in drinking and river water". *Polymers* 15, 4314 (2023)1-13
- Beatriz Rios-Fuster \*, Carme Alomar , Gema Paniagua Gonzalez, Rosa Maria Garcinuño Martínez, Dulce Lucy Soliz Rojas, Pilar Fernandez Hernando, Salud Deudero. "Assessing microplastic ingestion and occurrence of bisphenols and phthalates in bivalves, fish and holothurians from a Mediterranean marine protected area". *Environmental Research* 214 (2022) 114034
- R. Cañadas , R.M. Garcinuño Martínez\*, G. Paniagua Gonzalez, P. Fernandez Hernando Development of a molecularly imprinted polymeric membrane for determination of macrolide antibiotics from cow milk. *Polymer* 249(2022) 128443
- Beatriz Rios-Fustera, Carme Alomar, Xavier Capó, Gema Paniagua González, Rosa Maria Garcinuño Martínez, Dulce Lucy Soliz Rojas, Monica Silva, Pilar Fernández Hernando, Montserrat Solé, Rosa Freitas, SaludDeudero. "Assessment of the impact of aquaculture facilities on transplanted mussels (*Mytilus galloprovincialis*): Integrating plasticizers and physiological analyses as a biomonitoring strategy". *Journal of Hazardous Materials*, 424 (A, 127264)( 2022) 1 -13
- R. Cañadas, E. Garrido Gamarro a, R.M. Garcinuño Martínez, G. Paniagua Gonzalez, P. Fernandez Hernando. "Occurrence of common plastic additives and contaminants in mussel samples: Validation of analytical method based on matrix solid-phase dispersión". *Food Chemistry* 349(2021)129-169.
- J.C. Bravo, A. Gallego, R. M. Garcinuño, P. Fernández-Hernando, J. S. Durand. "Methacrylic acid-Ethyleneglycol dimethacrylate polymeric sorbent for the removal of estrogens from water". *Desalination and Water Treatment Journal*. 143 (2019)366-373.
- C.A. Acosta a, C.E.Lopez Pasquali a, G. Paniagua b, R.M. Garcinuño b, \*,P.Fernandez Hernando. "Evaluation of total phenol pollution in water of San Martin Canal from Santiago del Estero, Argentina". *Environmental Pollution*, 236 (2018) 265-272.
- M.A. García-Mayor, G. Paniagua-González, R.M. Garcinuño-Martínez, J.S.Durand Alegría, P. Fernández-Hernando. "Synthesis and characterization of a molecularly imprinted polymer for the determination of spiramycin in sheep milk". *Food Chemistry*, 221 (2017) 721-728
- B. Soledad-Rodríguez, P. Fernández-Hernando, R.M. Garcinuño-Martínez, J.S.Durand Alegría. "Effective determination of ampicillin in cow milk using a molecularly imprinted polymer as sorbent for sample preconcentration". *Food Chemistry*, 224 (2017) 432-438

### **C.2. Congresos**

- **Conferencias Invitadas:** "Selective extraction of estrogens in water samples using a nano grafted membrane with molecular imprinted polymer"; \***P. Fernández Hernando**, R.M. Garcinuño Martínez, G. Paniagua González, J.C. Bravo Yagüe; DIOXIN, 2017, Vancouver (Canadá)
- **Conferencias Invitadas:** "Interference-free determination of illegal dyes in sauces and condiments by selective sample treatments"; \***P. Fernández Hernando**, R.M. Garcinuño Martínez, G. Paniagua González, J.C. Bravo Yagüe; 3rd Annual World Congress of Agriculture (WCA-2013) , Hangzhou (China)
- **Un total de 112 contribuciones a congresos (poster y orales) nacionales e internacionales.**

### **C.3. Proyectos**

- **Ref: TED2021-131948A-I00.** Título: "La amenaza de plásticos y microplásticos en el medio ambiente: aves marinas como bioindicadoras" (PlasThreat). Entidad financiadora: Ministerio de Ciencia e

Innovación Participating entities: CSIC, UNED. IP: Dr. Juan Muñoz Aranz (CSIC). Duración: 2022-2024. Cuantía de la subvención: 169.994,00 Euros. Contribución personal: Investigador

- **Ref.: P2018/BAA-4393.** “Estrategias integradas para la mejora de la calidad, la seguridad y la funcionalidad de los alimentos: hacia una alimentación saludable”, AVANSECAL II. Entidad financiadora: Plan Regional de la Comunidad de Madrid. Entidades participantes: CSIC, UAH, UCM, UNED. Duración: 2019-abril-2023, Cantidad financiada: 919.000 €, número de investigadores 37. IP-Coordinadora: Dra. M<sup>a</sup> Luisa Marina Alegre (UAH). Contribución personal Investigador principal (UNED): Dra. Pilar Fernández Hernando.
- **Ref: S2013 / ABI3028.** “Advanced strategies for the improvement and control of quality and safety of food”, AVANSECAL. Entidad financiadora: Regional Plan de la Comunidad de Madrid. Entidades participantes: CSIC, UAH, UCM, UNED. Duración: 2014-2018. Cantidad financiada: 654,258 Euros. UNED cantidad financiada: 57,779 Euros. Coordinadora: Dr. M<sup>a</sup> Luisa Marina Alegre (Universidad de Alcalá). Contribución personal: Investigador principal (UNED): Dr. Pilar Fernández Hernando
- **Ref: CTQ2006-15027/.** Título: “Desarrollo de nuevos sistemas de extracción rápidos y selectivos p Entidad financiadora: Ministerio de Educación y Ciencia. **Investigador principal:** Pilar Fernández. Duración: 2006-2009. Cantidad financiada: 45.000 Euros.
- **Ref: AGL2009-12589.** Título del proyecto: “Nuevas metodologías analíticas para la determinación de residuos de antibióticos”, Entidad financiadora: Ministerio de Educación y Ciencia, Investigador Principal: Pilar Fernández Hernando. Duración, 01/01/2010 a: 31/12/2010. Cantidad financiada: 30.250 €. Personal contribución: Investigador principal
- **Ref: P2009 / AGR-1464.** Título del proyecto: "Innovative analytical methodologies for quality control and food safety", ANALYSIC II. Entidad financiadora: Regional Plan de la Comunidad de Madrid. Entidades participantes: CSIC, UAH, UCM, UNED. Duración: 2010-2014. Cantidad financiada: € 966,248.75. UNED financiación: € 70,000. IP-Coordinador: Dra. M<sup>a</sup>José González Carlos (CSIC). **Investigador principal (UNED): Dr. Pilar Fernández Hernando**

#### **C.4. Contratos, méritos tecnológicos o de transferencia**

- **1. Título del contrato:** “IEO III. Analíticas de contaminantes derivados de los plásticos en muestras biológicas marinas”. Ref. IEO - CTO3. Entidad financiera Instituto Oceanográfico Español. Duración: del 23/11/2021 to 31/12/2022, Cantidad financiada: 4.900 €. Investigador Principal: Rosa M<sup>a</sup> Garcinuño Martínez, Número de investigadores: 3. Contribución personal: Investigador
- **2. Título del contrato:** “EOI II. Analíticas de plásticos (Bisfenoles y Ftalatos) en muestras de biota (peces e invertebrados)”. Ref. IEO-CTO2. Entidad financiera: Instituto Oceanográfico Español. Duración: desde 18/11/2020 a :31/12/2022; Cantidad financiada: 4.900 €. Investigador Principal: Rosa M<sup>a</sup> Garcinuño Martínez, Numero de investigadores: 3. Contribución personal: Investigador
- **3. Título del contrato:** “IEO I. Analíticas de plásticos (ftalatos y Bisfenol A) en muestras de biota (mejillones y peces)”. Ref. IEO – CTO1. Entidad financiera: Instituto Oceanográfico Español. Duración: desde 23/10/2020 hasta 31/12/2021; Cantidad financiada: 3.500 €. Investigador Principal: Rosa M<sup>a</sup> Garcinuño Martínez, Numero de investigadores: 3. Contribución personal: Investigador
- **4. . Título del contrato:** “Determinación de compuestos derivados de plásticos y microplásticos en muestras de cetáceos”, 2019-CTINV-0044. Entidad financiera: Universidad de Las Palmas de Gran Canaria (ULPG). Duración: del 30/09/2019 a 31/12/2021; Cantidad financiada: 4.500 €. Investigador Principal: Rosa M<sup>a</sup> Garcinuño Martínez, Número investigadores: 3. Contribución personal: Investigador
- **5. . Título del contrato:** “Provision of scientific evidence on the physical and chemical changes in the structure of microplastic present in farmed mussels after heat treatment for food processing”, 2017-CTINV-0024. Entidad financiera: Food and Agriculture Organization of the United Nations (FAO), Letter of agreement between FAO and UNED. Duración: del 08/12/2017 a 31/12/2018; Cantidad financiada: 22.295,00 €. Investigador Principal: Rosa M<sup>a</sup> Garcinuño Martínez, Número de investigadores: 5. Contribución personal: Investigador
- **6. Título del contrato:** “Support the provision of scientific evidence on the physical and chemical changes in the structure of microplastics present in farmed mussels after food processing”, 2019-CTINV-0069. Entidad financiera: Food and Agriculture Organization of the United Nations (FAO), Letter of agreement between FAO and UNED. Duración: del 20/12/2019 al 20/12/2020; Cantidad financiada: 18.000 €. Investigador Principal: Rosa M<sup>a</sup> Garcinuño Martínez, Número de investigadores: 5. Contribución personal: Investigador

## CURRICULUM VITAE (CVA)

**IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.**

CV date	20/01/2025
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### Part A. PERSONAL INFORMATION

First name	JUAN JOSE		
Family name	LUCENA MAROTTA		
Gender:	male		
Researcher ID	L-3513-2013		
Email	juanjose.lucena@uam.es	Orcid	0000-0001-9130-2909
<a href="https://portalcientifico.uam.es/es/ipublic/researcher/259966">https://portalcientifico.uam.es/es/ipublic/researcher/259966</a>		Web	www.micronutrientsinplants.com

#### A.1. Situación profesional actual

Institution	Universidad Autónoma de Madrid		
Dptment./Center	Química Agrícola y Bromatología		
Country	Spain	Telph	914973968
Position	Catedrático de Universidad	Initial date	2006-01-28
keywords	Agricultural chemistry, soil, plant, fertilizers, micronutrients		

#### A.2. Previous positions (research activity interruptions, art. 45.2.c)

Period	Position/Institution/Country/Interruption cause
01-05-16// 31-06-21	Department head
10-01-06// at present	Senior Professor Universidad Autónoma of Madrid
1-07-99// 31-10-99	MEC research grant. Beltsville Agricultural Research Center. USDA. Washington (USA)
1-07-96// 30-9-96	Intercampus Lecturer. Universidad Agraria Antonio Narro (México)
1-8-94 // 31-10-94	Senior NATO grant. University of Wisconsin-Madison (USA)
30-10-93// 9-01-06	Full Professor Autónoma of Madrid
1-10-93// 29-10-93	Lecturer Universidad Autónoma of Madrid
1-10-88// 30- 9-93	LRU Assistant professor Universidad Autónoma of Madrid
1-10-87// 30- 9-88	Fulbright Colorado State University (USA)
1- 1-87// 30- 9-87	Assistant professor Universidad Autónoma of Madrid
1- 1-83// 31-12-86	FPI Grant holder Universidad Autónoma of Madrid
1- 7-86// 1-12-86	Fundación R. Areces Grant holder Universidad Autónoma of Madrid

#### A.3. Education

Ph.D., Licensed, Graduate	University/Country	Year
Ph.D. Agricultural Chemistry	Universidad Autónoma de Madrid	1986
Licensed in Chemistry	Universidad Autónoma de Madrid	1982



## Part B. CV SUMMARY

Graduated (1982) in Chemistry at the University Autónoma of Madrid. FPI Grant (1963-1986). Ph.D (1986, UAM) on the chemistry of chelation in the soil plant-system. Fulbright postdoc in Colorado State University with WL Lindsay studying Chemical equilibria of natural and synthetic chelates (1987-88). LRU assistant (1988-1993). Other postdoc research on chelates characterization and chelate-plant interaction in U. of Wisconsin with P Barak (1994 NATO grant) and in Beltsville ARC (USDA) with R Chaney (1999 MEC Grant) respectively. Full professor 1993- 2006. Senior Professor 2006-today.

**Research Activities:** Chemistry of micronutrients in fertilizers (chelates and complexes), soils and plants. Special fertilizers (Si, algae extracts)

**Main achievements:** due to the great variability among Fe chelates quality in the market (J. Plant Nutr.1995, 18:1209), we developed an HPLC method to quantify Fe chelates in fertilizers (J Chrom A 1996,727:253 and 1997,789:453). With this basis, CEN delivered several standards that are now Official Methods in Europe. EDDHA isomers were firstly described (Plant Soil 2006,279:31; J Agric Food Chem 2006,54:4355, etc) by our group. Also, we elucidate the mechanisms of interaction of chelates with soil and plants (J Agric Food Chem 2001,49:5258; J Plant Nutr 2006,29:423, Org Biomol Chem 2012,10:2272; J Sci Food Agric 2016,96:1111). Recently we have investigated new ecofriendly chelating agents (J Chrom A, 2005,1064:67; Plant Soil 2006,279:31 and 2009,325:65, Front. Plant Sci2015, 6:752). Our group has also provided the analytical methods now required in the UE for the control natural complexes of these fertilizers (J Agric Food Chem, 2007,55:5746) and the knowledge of their behavior in the soil plant system (J Plant Nutr Soil Sci, 173:900; J Agric Food Chem, 60,3331).

We were pioneer on the use of several techniques such as **stable isotopes** to track Fe or Zn applied by fertilizers in plants (Ana. Bioanal Chem 2008,390:579; J Sc. Food Agric 2011,91:395).

The special fertilizer market is now under the focus. Our current project deals with its harmonization. It includes different product categories, which efficacy and evaluation methods need to be clarified. The understanding of the mechanisms related to Si and algae extract effects on micronutrient nutrition is needed. Also testing and determining fertilizer properties of new micronutrient product will be on our focus.

This research has needed a large number of collaborations from National and International centers and the support of private companies.

**Author** in 13 books, 132 Papers in scientific journals, 78 Papers in book chapters, 30 papers in dissemination technical journals. **Research Leader** in 62 projects. Adviser in 16 PhD. Participation in **scientific meetings**: Invited for 23 lectures and panelist in 5 roundtables. 179 voluntary communications. Organizer (one as president) of four Meetings. 6 research Sexennial (last in 2020) + 1 Transfer Sexennial

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

### C.1. Publications (last relevant ten papers in Q1)

- Arcas, A., Sadeghi, S. M., Lucena, J. J., Vindeirinho, J. M., Soares, E. V., Soares, H. M., & López-Rayó, S. (2024). Alleviation of Fe-induced chlorosis of soybean plants grown in calcareous soil by a freeze-dried iron fertilizer containing siderophores produced by *Rhizobium radiobacter*. J. Agric Food Research, 18, 101504. <https://doi.org/10.1016/j.jafr.2024.101504>
- Arcas A, López-Rayó S, Gárate A, Lucena JJ (2024). A Critical Review of Methodologies for

Evaluating Iron Fertilizers Based on Iron Reduction and Uptake by Strategy I Plants. *Plants*, 13(6), 819. <https://doi.org/10.3390/plants13060819>

- Lozano-González JM, Valverde S, Montoya M, Martín M, Rivilla, R, Lucena JJ, López-Rayó S. (2023) Evaluation of Siderophores Generated by Pseudomonas Bacteria and Their Possible Application as Fe Biofertilizers. *Plants*, 12, 4054. <https://doi.org/10.3390/plants12234054>
- López-Rayó S, Valverde S, and Lucena JJ\* (2023) [S,S]-EDDS ligand as a soil solubilizer of Fe, Mn, Zn, and Cu to improve plant nutrition in deficient soils. *J. Agric. Food Chem* 2023, 71, 25, 9728–9737 DOI: 10.1021/acs.jafc.3c02057
- Valverde S, Williams PL, Mayans B, Lucena JJ and Hernández-Apaolaza, L (2022) Comparative study of the chemical composition and antifungal activity of commercial brown seaweed extracts *Front. Plant Sci.* 13:1017925. doi: 10.3389/fpls.2022.1017925
- Valverde S, Arcas A, López-Rayó S and Lucena JJ (2022) Enantioselective Separation of a Novel Iron Chelate Prototype with Potential Use as Fertilizer by HPLC-DAD *ACS Agric. Sci. Technol.* 2022, DOI:10.1021/acsagscitech.2c00133
- Valverde S, Arcas A, López-Rayó S and Lucena JJ (2021) Fast Determination of a Novel Iron Chelate Prototype Used as a Fertilizer by Liquid Chromatography Coupled to a Diode Array Detector *J Agric Food Chem* 2021 69 (51), 15746-15754 DOI: 10.1021/acs.jafc.1c05943
- Islas-Valdez S, López-Rayó S and Lucena JJ\* 2021 Implications of the Mn:ligand ratio for Mn uptake by *Glycine max* L. plants fertilized with heptagluconate and gluconate complexes. *J. Sci. Food. Agric.* doi: 10.1002/jsfa.11110.
- Cieschi MT and Lucena JJ 2021 Leonardite iron humate and synthetic iron chelates mixtures in *Glycine max* nutrition. *J. Sci. Food. Agric.* doi: 10.1002/jsfa.11060
- Islas-Valdez S, López-Rayó S, Arcos J, Menéndez N, Lucena JJ 2020 Effect of Fe:ligand ratios on hydroponic conditions and calcareous soil in *Solanum lycopersicum* L. and *Glycine max* L. fertilized with heptagluconate and gluconate. *Journal of the Science of Food and Agriculture* 100: 1106–1117

## C2. Congress (relevant)

23 Keynotes lectures in international meetings

Disseminator speaker in scientific sessions, on more than 30 occasions for various national and international companies

### Last ten by invitation

- Lucena, J.J.\* and López-Rayó, S. Iron fertilization: Providing external sources or mining soil Fe? 19th International Symposium on Iron Nutrition and Interaction in Plants. ISINIP 2018. July 2018. Taipei (Taiwan)
- Lucena J.J. Extractos de aminoácidos como complejantes de metales y como bioestimulantes Santarem (Portugal), Octubre 27-28, 2016. 2º Sympósio Nacional de Fertilização e Ambiente.
- Lucena J.J. Quelatos de micronutrientes metálicos: Criterios de eficacia. Maceió (Brasil), Septiembre 17-21, 2012. Fertibio XXX Reunião Brasileira de Fertilidade do Solo e Nutrição de Plantas
- Lucena J.J. Tendencias actuales en la investigación sobre fertilizantes de micronutrientes metálicos. Madrid (Spain), Julio 23-26, 2012. 6th International XIV Simposio Hispano-Luso de Nutrición Mineral de las Plantas.
- Lucena J.J. Searching for new, effective, cheap and environmental friendly Fe fertilizers. Amherst, Massachusetts (USA), Junio 17-21, 2012. 16th International Symposium on Iron Nutrition and Interactions in Plants.
- Lucena J.J. Legislación y buenas prácticas agrícolas en la fertilización con micronutrientes. Almería. Noviembre 2009. III Jornadas del Grupo de Fertilización de la SECH.
- Lucena J.J. Fertilizantes de micronutrientes: Implicaciones medioambientales. Oviedo. Septiembre 2009. XXXII Bienal de la RSEQ
- Lucena J.J. What's new in micronutrient chelates and complexes in Europe? Barcelona.



Marzo 2009. VII New Ag International Conference and exhibition.

### C.3 Projects

Last ten years: IP of 21 projects (8 of competitive calls, including one of infrastructures) and one company sponsored Chair. Raised a total of 3.276.635 Euros

Three ongoing projects obtained in competitive calls

- Una valorización innovadora de ligninas Kraft en fertilizantes y bioestimulantes sostenibles basados en economía circular (lignoeficien-P) Ministerio de Ciencia e innovación CPP2021-008409 2022-2025
- Uso de una nueva molécula natural y orgánica, con capacidad de inhibir la actividad ureasa, en fertilizantes organominerales (orgamin-plus) Ministerio de Ciencia e innovación CPP2021-008323 3 años. 2022-2025
- Biofertilizantes de hierro basados en secreciones microbianas bioestimulantes. Ministerio de Ciencia e innovación PID2022-141721OB-C21 3 años. 2023-2026

### C.4 Patents

- PCT7ES-01/00243, (14,06,01) WO 02/00604 A1
- P 2001-101385
- P 2004-0407607.1; 0413698.2 EPO 70444; WO2005095305-A1; AN 2005:1103721; CAN 143:366656; AN 2005:1103721
- EP 06127041.9-2103; WO2008077897-A1 20080703; CAN 149:104017; AN 2008:796513; EP1939157-A1; IN200902067-P2; AU2007338021-A1; KR2009097889-A; EP2125671-A1; MX2009006727-A1; CN101616880
- EP 09461511.9 – 2117
- PCT/PT2019/050041

### C.5 Thesis

Supervisor of 16 PhD thesis and 4 in development. Two of them were awarded with the “Fertiberia price to the best PhD thesis in Agriculture”

### C.6. Member de International committees

Member of the Organizing committee in 7th ISINIP. Zaragoza, 1993; VII Simposio Nacional-III Ibérico sobre Nutrición Mineral de las plantas. Madrid 1998; XIV Simposio Hispano-Luso de Nutrición Mineral de las Plantas. Madrid 2012

President of the organizing committee 18th ISINIP 2016. May-Jun 2016. Madrid.

Member of the steering international committee for the organization of the ISINIP since 2012 1998-present: Member of the expert committee on fertilizers. Spanish Ministry of Agriculture; 2000-present Member AENOR Committee AEN/CTN-142 for standardization of fertilizers and liming materials.

2002-2019 Convenor of the CEN/TC 260/WG 5 “Chelated trace Elements”.

Since 2002 Unofficial Advisor for the EC, DG GROW D.2, (formerly DG Enterprise and Industry, Unit F2)

### C.7 Honors and Awards

**National Prize** “Chemistry and Environment” of the RSEQ and DuPont2008.

NATO Senior Grant 1994// Fulbright Grant 1987-1988

### C.8 Dissemination

30 papers in dissemination journals ( Phytoma, Vida rural, Agricultura, Tierras..)

Fecha del CVA	31/10/2024
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## Parte A. DATOS PERSONALES

Nombre	Lourdes		
Apellidos	Hernández Apaolaza		
Sexo	No Contesta	Fecha de Nacimiento	
DNI/NIE/Pasaporte			
URL Web			
Dirección Email	lourdes.hernandez@uam.es		
Open Researcher and Contributor ID (ORCID)			

## RESUMEN NARRATIVO DEL CURRÍCULUM

Graduate (1992) and doctorate (1997) in Chemistry (specialist in Agricultural Chemistry) at Universidad Autónoma de Madrid (UAM). Postdoc: Universidad Politécnica de Madrid (1998-2001). Assistant Professor (1999-2005), Assistant Professor (Tenure-track) (2005-2009); from 2009 to 2023 Associated Professor and currently Professor at UAM. Pre- and Post-doctoral stages at different universities (T&M Texas University, Wisconsin University, Universidad del Rosario, etc), Continuous collaborations with national and international researchers (USA, Rusia, Hungary, etc).

**Research activities:** micronutrients in plants (especially iron (Fe) and zinc (Zn)) and silicon (Si) and other biostimulants. **Main achievements:** due to the great variability among Fe chelates quality in the market (J. Plant Nutr.1995), we have developed an HPLC method (J. Chrom. A 1996) to quantify Fe chelates at commercial formulations (J. of Chromatography A 1997). It has been applied to several products (J. Plant Nutr. 2000). Now is the **European Community official method**. The fertilizers efficacy of **EDDHA isomers** has been firstly described (i.e. Plant Soil 2006; J. Agric. Food Chem. 2006, etc) by our group. Also, the iron chelates interaction with soil was investigated to elucidate the efficacy of these products when applied to field conditions (i.e. J. Agric. Food Chem. 2001). More recently, new chelating agents have been investigated in order to develop more eco-friendly products to minimize soil and other natural compartments contamination due to the addition of synthetic compounds as fertilizers (J. Chrom. A, 2005; Plant Soil 2006, 2009, etc).

Following the trend of preservation of the environment, my interest focused on natural or industrial byproducts to be applied to plants as pot substrate (i.e. Biol. Fert. Soils 2000; J. Plant Nutr. 2002) or as micronutrient fertilizer (i.e. J. Agric. Food Chem. 2010). We demonstrated that a mixture of composted sewage sludge and pine bark was a good substrate for plant growth or that a joint application of NPK fertilizers with a micronutrient fertilizer adhered on the granules prevent from metal deficiencies in several edible crops. We related the byproduct structure with its efficacy, by using multiple techniques (i.e. J. Agric. Food Chem. 2012).

Pioneer on the use of **stable isotopes** to track Fe or Zn in plants, allowing differentiation between native metal and metal applied by fertilizers (i.e. J. Sci. Food and Agric. 2011). A deconvolution method has been developed (Anal. Bioanal. Chem. 2008; J. Agric. Food Chem. 2011).

The **biostimulants** market is now under the focus. Our last project dealt with harmonization of that market that include different product categories, but which efficacy and richness need to be clarified. **Silicon** is relevant biostimulant. We have firstly reported its role in mitigating Fe and Zn deficiency (Plant Physiol. Biochem. 2013, 2016, 2018). I have written a review of this topic (Planta 2014). **Algae:** recently we studied the effect of several commercial seaweed extracts in the mitigation of iron chlorosis of tomato plants. Moreover and taking into account that science transference is an important goal, we have published several papers in divulgative journals about algae extracts.

Aim for next years: understand the mechanisms allowing Si and algae extracts beneficial effects on micronutrient deficiency, and explore new roles in plants.

## **1. ACTIVIDAD INVESTIGADORA, DE TRANSFERENCIA E INTERCAMBIO DEL CONOCIMIENTO**

### **1.1. PROYECTOS Y CONTRATOS DE INVESTIGACIÓN Y TRANSFERENCIA E INTERCAMBIO DEL CONOCIMIENTO**

#### **1.1.1. Proyectos**

- 1 Proyecto.** Valorización de las algas acumuladas en las orillas del Mar Menor como resultado de su eutrofización. Ministerio de Ciencia e Innovación. Cristina Soler Rivas. (Universidad Autónoma de Madrid e Instituto Murciano de Investigación y Desarrollo Agrario y Alimentario (IMIDA)). 2023-2025. Miembro de equipo.
- 2 Proyecto.** Nuevos Fertilizantes de Micronutrientes y Bioestimulantes: Criterios de Eficacia y Mecanismos de Acción (MICRONUTRIR) RTI2018-096268-B-I00. Ministerio de Ciencia e Innovación. Investigación. Lourdes Hernandez Apaolaza. (Universidad Autónoma de Madrid). 2019-2022. 214.170 €.
- 3 Proyecto.** P2018/BAA4330, Tecnología destinada a la Sostenibilidad de los Sistemas Agrícolas. Comunidad de Madrid. Antonio Vallejo Garcia. (Universidad Politécnica de Madrid, Universidad Autónoma de Madrid). 2019-2022. Miembro de equipo.
- 4 Proyecto.** Fortificación de cultivos a través del empleo de fertilizantes especiales y de micronutrientes. Aplicaciones foliares. Ministerio de Ciencia e Innovación. Universidades. Lourdes Hernández Apaolaza. (Universidad Autónoma de Madrid). Desde 2014. Investigador principal.

#### **Explicación narrativa de la aportación**

IP2

### **1.2. RESULTADOS Y DIFUSIÓN DE LA ACTIVIDAD INVESTIGADORA Y DE TRANSFERENCIA E INTERCAMBIO DE CONOCIMIENTO**

#### **1.2.1. Actividad investigadora**

AC: Autor de correspondencia; (nº x / nº y): posición firma solicitante / total autores. Si aplica, indique el número de citas

- 1 Artículo científico.** Mariem Idoudi; Tarek Slatni; Israa Laifa; Nassira Rhimi; Mokded Rabhi; Lourdes Hernandez-Apaolaza; Walid Zorrig; Chedly Abdelly. 2024. Silicon (Si) mitigates the negative effects of iron deficiency in common bean (*Phaseolus vulgaris* L.) by improving photosystem activities and nutritional status. *Plant Physiology and Biochemistry*. 206, pp.108236.
- 2 Artículo científico.** Silvia Valverde; Lourdes Hernandez-Apaolaza; Juan José Lucena. 2022. A simple analytical method to determine alginic acid, laminarin and mannitol in seaweed extracts fertilisers. *Journal of Chromatography & Separation Techniques*. 13-1, pp.1000470.
- 3 Artículo científico.** Silvia Valverde; Paul Williams; Begoña Mayans; Juan Jose Lucena; Lourdes Hernández-Apaolaza. 2022. Comparative study of the chemical composition and antifungal activity of commercial brown seaweed extracts. *Frontiers in Plant Science*. 13-1017925.
- 4 Artículo científico.** Mónica Mediavilla; Mónica Revenga-Parra; Cristina Gutiérrez-Sánchez; Lourdes Hernández-Apaolaza; Felix Pariente; Encarnación Lorenzo. 2022. Fluorescent enzymatic assay for direct total polyphenol determination in food-related samples. *Talanta*. 247-1, pp.123576.
- 5 Artículo científico.** Manuel M Losada; Lourdes Hernández-Apaolaza; Antonio Morata; Eugenio Revilla. 2022. Impact of the application of monosilicic acid to grapevine (*Vitis vinifera* L.) on the chemical composition of young red Mencía wines. *Food Chemistry*. 378, pp.132140.
- 6 Artículo científico.** Lourdes Hernandez-Apaolaza. 2022. Priming With Silicon: A Review of a Promising Tool to Improve Micronutrient Deficiency Symptoms. *Frontiers in Plant Science*. 13-840770.

- 7 **Artículo científico.** Esteban Ramírez; Zayneb Chaâbene; Lourdes Hernández-Apaolaza; Mariem Rekik; Amine Elleuch; Vicenta de la Fuente. 2022. Seed priming to optimize germination in *Arthrocnemum Moq.* *BMC Plant Biology.* 22-527.
- 8 **Artículo científico.** Sandra Carrasco-Gil; Raul Allende-Montalbán; Lourdes Hernández-Apaolaza; Juan José Lucena. 2021. Application of Seaweed Organic Components Increases Tolerance to Fe Deficiency in Tomato Plants. *Agronomy.* 11, pp.507.
- 9 **Artículo científico.** Jose Lozano-González; Clara Valverde; Carlos D. Hernández; Alexandra Martín-Esquinas; Lourdes Hernandez-Apaolaza. 2021. Beneficial effect of root or foliar silicon applied to cucumber plants under different zinc nutritional statuses. *Plants.* 10, pp.2602.
- 10 **Artículo científico.** Alexandra Martín-Esquinas; Lourdes Hernandez-Apaolaza. 2021. Rice responses to silicon addition at different Fe status and growth pH. Evaluation of ploidy changes. *Plant Physiology and Biochemistry.* 163, pp.296-307.
- 11 **Artículo científico.** Samira Islas Valdez; Sandra López Sandra López-Rayó; Hristiyan Hristov Emilov; Lourdes Hernández Apaolaza; Juan José Lucena Marotta. 2020. Assessing metal–lignosulfonates as fertilizers using gel filtration chromatography and high-performance size exclusion chromatography. *International Journal of Biological Macromolecules.* 142, pp.163-171.
- 12 **Artículo científico.** Lourdes Hernandez-Apaolaza; Laura Escribano; Angel M Zamarreño; Jose M García-Mina; Carlos Cano; Sandra Carrasco-Gil. 2020. Root Silicon Addition Induces Fe Deficiency in Cucumber Plants, but Facilitates Their Recovery After Fe Resupply. A Comparison With Si Foliar Sprays. *Frontiers in Plant Science.* 11, pp.580552.
- 13 **Artículo científico.** Francisco Javier Peris-Felipo; Yaiza Benavent-Gil; Lourdes Hernández-Apaolaza. 2020. Silicon beneficial effects on yield, fruit quality and shelf-life of strawberries grown in different culture substrates under different iron status. *Plant Physiology and Biochemistry.* 152, pp.23-31.
- 14 **Artículo científico.** Martins; Martin-Fernandez; Hernandez-Apaolaza; Barros; Soares; Lucena. 2018. Azotochelin and N-dihydroxy-N,N'-diisopropylhexanediamide as Fe sources to cucumber plants in hydroponic cultures. *Emirates Journal of Food and Agriculture.* 30-1, pp.65-76.
- 15 **Artículo científico.** Carrasco-Gil; Hernandez-Apaolaza; Lucena. 2018. Effect of several commercial seaweed extracts in the mitigation of iron chlorosis of tomato plants (*Solanum lycopersicum L.*). *Plant Growth Regulation.* doi.org/10.1007/s10725-018-0438-9.
- 16 **Artículo científico.** Carrasco-Gil; Rodríguez-Menéndez; Fernández; Pereiro; de la Fuente; Lourdes Hernández-Apaolaza; Hernandez-Apaolaza. 2018. Silicon induced Fe deficiency affects Fe, Mn, Cu and Zn distribution in rice (*Oryza sativa L.*) growth in calcareous conditions. *Plant Physiology and Biochemistry.* 125, pp.153-163.
- 17 **Artículo científico.** Juan Jose Lucena; Lourdes Hernandez-Apaolaza. 2017. Iron nutrition in plants: An overview. *Plant and Soil.* DOI 10.1007/s11104-0.
- 18 **Artículo científico.** Martin-Fernandez; Solti; Czech; Kovács; Fodor; Garate; Hernandez-Apaolaza; Lucena. 2017. Response of soybean plants to the application of synthetic and biodegradable Fe chelates and Fe complexes. *Plant Physiology and Biochemistry.* 118, pp.579-588.
- 19 **Artículo científico.** Martin-Fernandez; Lopez-Rayó; Hernandez-Apaolaza; Lucena. 2017. Timing for a sustainable fertilization with HBED/Fe<sup>3+</sup> and EDDHA/Fe<sup>3+</sup> chelates of *Glycine max.*". *Journal of the Science of Food and Agriculture.* 97, pp.2773-2781.
- 20 **Artículo científico.** Teresa Cieschi; Ana Benedicto; Hernandez-Apaolaza; Juan Jose Lucena. 2016. EDTA shuttle effect vs lignosulfonate direct effect providing Zn to navy bean plants (*Phaseolus vulgaris L 'Negro Polo'*) in a calcareous soil. *Frontiers in plant science.* 7, pp.1767.
- 21 **Artículo científico.** Hernandez-Apaolaza, L; Diego Martin-Ortiz; Garate, A. 2016. Response of wheat seedlings to Mn-lignosulfonate adhered to granular NPK. *Journal of Plant Nutrition Soil Science.* 179, pp.113-119.

- 22 Artículo científico.** Blanca Pascual; Virginia Echeverria; Maria José Gonzalo; Lourdes Hernández-Apaolaza Apaolaza. 2016. Silicon addition in soybean (*Glycine max* L.) alleviates zinc deficiency. *Plant Physiology and Biochemistry*. 108, pp.132-138.
- 23 Artículo científico.** Lourdes Hernández-Apaolaza. 2014. Can silicon partially alleviate micronutrient deficiency in plants? a review. *Planta*. 240, pp.447-458.
- 24 Artículo de divulgación.** Sandra Carrasco Gil; Lourdes Hernandez Apaolaza; Juan Jose Lucena. 2018. Aplicación de extractos de algas marinas sobre cultivos con deficiencias nutricionales. *Tierras Agricultura*. 262, pp.94-99.
- 25 Artículo de divulgación.** Sandra Carrasco Gil; Lourdes Hernandez Apaolaza; Juan Jose Lucena. 2017. ¿Pueden los extractos de algas mitigar los efectos de la clorosis férrica?. *Agricultura*. 1006, pp.404-409.

## 1.2.2. Transferencia e intercambio de conocimiento y actividad de carácter profesional

### Actividad de carácter profesional

**Catedrática de Universidad:** Universidad Autónoma de Madrid. 2023- actual. Tiempo completo.

Fecha	2025-02-05
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## Parte A. DATOS PERSONALES

Nombre	DEMETRIO		
Apellidos	GONZALEZ RODRIGUEZ		
Sexo	Hombre	Fecha de nacimiento	
DNI/NIE/Pasaporte			
URL Web			
Correo electrónico	demetrio.gonzalez@upm.es		
Open Researcher and Contributor ID (ORCID)	0000-0001-5759-352X		
Sexenios de Investigación: 2 (Jun 2018) Solicitado el 3º en enero de 2025 (2018-2023)	Quinquenios: 3		
h Index: 15 (Scopus)	UNESCO: 3101.99 - 2301		

### A.1. Situación profesional actual

Puesto	Miembro		
Fecha Inicio	2018-01-23		
Organismo/Institución	E.T.S.I.A.A y de Biosistemas. Universidad Politécnica de Madrid		
Departamento/Centro	Departamento de Química y Tecnología de Alimentos. C. EST. INV. GES.RIE.AGR.MEDIO \\'CEIGRAM\'		
País	España	Teléfono	910671118
Palabras clave	Edafología y Química Agrícola		

### A.2. Situación profesional anterior (incluye interrupciones en la carrera investigadora - indicar meses totales, según texto convocatoria-)

Periodo	Puesto / Institución / País
1/2007 – 9/2017	TITULAR UNIVERS. INTERINO. QUÍMICA Y ANÁLISIS AGRÍCOLA / Universidad Politécnica de Madrid / España
9/2017 - Actualidad	TITULAR UNIVERS. QUÍMICA Y ANÁLISIS AGRÍCOLA / Universidad Politécnica de Madrid / España

### A.3. Formación académica

Grado/Master/Tesis	Universidad / País	Año
Licenciado en Ciencias (Química)	Universidad de Valladolid / España	1989
Doctor	Universidad Politécnica de Madrid / España	2006

### A.4. Indicadores generales de calidad de la producción científica

#### Parte C. LISTADO DE APORTACIONES MÁS RELEVANTES

##### C.1. Publicaciones más importantes en libros y revistas con "peer review" y conferencias

1. **Artículo.** Ortiz, R; Gascó, G; Méndez, A; Obrador, A; González, D; Almendros, P (2024). Zinc biofortification of lettuce using environmentally friendly zinc sources in an acidic soil. *J Sci Med Sport*, 338(), 113620-. DOI: 10.1016/j.scienta.2024.113620
2. **Artículo.** Almendros, Patricia; Gonzalez, Demetrio; Ibanez, Miguel A; Smolders, Erik; Dolores Fernandez, Maria; Garcia-Gomez, Concepcion; Obrador, Ana (2022). Influence of ZnO Particle Size and Soil Characteristics on the Estimation of Long-Term Zn Bioavailability by Chemical Extraction Methods and Diffusive Gradients in Thin-Films (DGT). *Journal Of Soil Science And Plant Nutrition*, 22(3), 3901-3913. DOI: 10.1007/s42729-022-00938-1
3. **Artículo.** Obrador, Ana; Gonzalez, Demetrio; Almendros, Patricia; Garcia-Gomez, Concepcion; Fernandez, Maria Dolores (2022). Assessment of Phytotoxicity and Behavior of 1-Year-Aged Zn in Soil from ZnO Nanoparticles, Bulk ZnO, and Zn Sulfate in Different Soil-Plant Cropping Systems: from Biofortification to Toxicity. *Journal Of Soil Science And Plant Nutrition*, 22(1), 150-164. DOI: 10.1007/s42729-021-00640-8
4. **Artículo.** Almendros, Patricia; Gonzalez, Demetrio; Ibanez, Miguel A; Fernandez, Maria Dolores; Garcia-Gomez, Concepcion; Smolders, Erik; Obrador, Ana (2020). Can Diffusive Gradients in Thin Films (DGT) Technique and Chemical Extraction Methods Successfully Predict both Zn Bioaccumulation Patterns in Plant and Leaching to Groundwater in Soils Amended with Engineered ZnO Nanoparticles?. *Journal Of Soil Science And Plant Nutrition*, 20(4), 1714-1731. DOI: 10.1007/s42729-020-00241-x
5. **Artículo.** Garcia-Gomez, Concepcion; Garcia, Sandra; Obrador, Ana; Almendros, Patricia; Gonzalez, Demetrio; Dolores Fernandez, Maria (2020). Effect of ageing of bare and coated nanoparticles of zinc oxide applied to soil on the Zn behaviour and toxicity to fish cells due to transfer from soil to water bodies. *Science Of The Total Environment*, 706(135713), 135713-. DOI: 10.1016/j.scitotenv.2019.135713
6. **Artículo.** Gonzalez, Demetrio; Almendros, Patricia; Obrador, Ana; Alvarez, Jose M (2019). Zinc application in conjunction with urea as a fertilization strategy for improving both nitrogen use efficiency and the zinc biofortification of barley. *Journal Of The Science Of Food And Agriculture*, 99(9), 4445-4451. DOI: 10.1002/jsfa.9681
7. **Artículo.** Garcia-Gomez, Concepcion; Obrador, Ana; Gonzalez, Demetrio; Babin, Mar; Dolores Fernandez, Maria (2018). Comparative study of the phytotoxicity of ZnO nanoparticles and Zn accumulation in nine crops grown in a calcareous soil and an acidic soil. *Science Of The Total Environment*, 644(), 770-780. DOI: 10.1016/j.scitotenv.2018.06.356
8. **Artículo.** Garcia-Gomez, Concepcion; Garcia, Sandra; Francisca Obrador, Ana; Gonzalez, Demetrio; Babin, Mar; Dolores Fernandez, Maria (2018). Effects of aged ZnO NPs and soil type on Zn availability, accumulation and toxicity to pea and beet in a greenhouse experiment. *Ecotoxicology And Environmental Safety*, 160(), 222-230. DOI: 10.1016/j.ecoenv.2018.05.019
9. **Artículo.** Garcia-Gomez, Concepcion; Obrador, Ana; Gonzalez, Demetrio; Babin, Mar; Dolores Fernandez, Maria (2017). Comparative effect of ZnO NPs, ZnO bulk and ZnSO<sub>4</sub> in the antioxidant defences of two plant species growing in two agricultural soils under greenhouse conditions. *Science Of The Total Environment*, 589(), 11-24. DOI: 10.1016/j.scitotenv.2017.02.153
10. **Artículo.** Almendros, Patricia; Obrador, Ana; Gonzalez, Demetrio; Alvarez, Jose M (2015). Biofortification of zinc in onions (*Allium cepa* L.) and soil Zn status by the application of different organic Zn complexes. *J Sci Med Sport*, 186(), 254-265. DOI: 10.1016/j.scienta.2015.02.023
11. **Artículo.** Almendros, Patricia; Gonzalez, Demetrio; Alvarez, Jose M (2013). Long-term bioavailability effects of synthesized zinc chelates fertilizers on the yield and quality of a flax (*Linum usitatissimum* L.) crop. *Plant And Soil*, 368(1-2), 251-265. DOI: 10.1007/s11104-012-1502-2
12. **Artículo.** Obrador, Ana; Gonzalez, Demetrio; Alvarez, Jose M (2013). Effect of Inorganic and Organic Copper Fertilizers on Copper Nutrition in *Spinacia oleracea* and on Labile Copper in Soil. *Journal Of Agricultural And Food Chemistry*, 61(20), 4692-4701. DOI: 10.1021/jf305473f
13. **Artículo.** Alvarez, J M; Almendros, Patricia; Gonzalez, D (2009). Residual effects of natural Zn chelates on navy bean response, Zn leaching and soil Zn status. *Plant And Soil*, 317(1-2), 277-291. DOI: 10.1007/s11104-008-9808-9
14. **Artículo.** Gonzalez, D; Novillo, T; Rico, M I; Alvarez, J M (2008). Leaching and efficiency of six organic zinc fertilizers applied to navy bean crop grown in a weakly acidic soil of Spain. *Journal Of Agricultural And Food Chemistry*, 56(9), 3214-3221. DOI: 10.1021/jf073378q
15. **Artículo.** Gonzalez, D; Obrador, A; Lopez-Valdivia, L M; Alvarez, J M (2008). Effect of zinc source applied to soils on its availability to navy bean. *Soil Science Society Of America Journal*, 72(3), 641-649. DOI: 10.2136/sssaj2007.0099
16. **Artículo.** Gonzalez, D; Obrador, A; Alvarez, J M (2007). Behavior of zinc from six organic fertilizers applied to a navy bean crop grown in a calcareous soil. *Journal Of Agricultural And Food Chemistry*, 55(17), 7084-7092. DOI: 10.1021/jf071090v
17. **Artículo.** Obrador, A; Alvarez, J M; Lopez-Valdivia, L M; Gonzalez, D; Novillo, J; Rico, M I (2007). Relationships of soil properties with Mn and Zn distribution in acidic soils and their uptake by a barley crop. *Geoderma*, 137(3-4), 432-443. DOI: 10.1016/j.geoderma.2006.10.001

- 18. Artículo.** Alvarez, Jose M; Gonzalez, Demetrio (2006). Zinc transformations in neutral soil and zinc efficiency in maize fertilization. *Journal Of Agricultural And Food Chemistry*, 54(25), 9488-9495. DOI: 10.1021/jf061371n
- 19. Artículo.** Almendros, Patricia; Gonzalez, Demetrio; Garcia-Gomez, Concepcion; Obrador, Ana; Fernandez, Mara Dolores (2022). Both Zn biofortification and nutrient distribution pattern in cherry tomato plants are influenced by the application of ZnO nanofertilizer. *Heliyon*, 8(3), e09130-. DOI: 10.1016/j.heliyon.2022.e09130
- 20. Artículo.** Almendros, Patricia; Obrador, Ana; Alvarez, Jose Manuel; Gonzalez, Demetrio (2019). Zn-DTPA-HEDTA-EDTA Application: a Strategy to Improve the Yield and Plant Quality of a Barley Crop While Reducing the N Application Rate. *Journal Of Soil Science And Plant Nutrition*, 19(4), 920-934. DOI: 10.1007/s42729-019-00090-3
- 21. Artículo.** Gonzalez, Demetrio; Almendros, Patricia; Alvarez, Jose M (2015). Mobility in soil and availability to triticale plants of copper fertilisers. *Soil Research*, 53(4), 412-422. DOI: 10.1071/SR14165
- 22. Artículo.** Almendros, Patricia; Gonzalez, Demetrio; Alvarez, Jose M (2013). Residual effects of organic Zn fertilizers applied before the previous crop on Zn availability and Zn uptake by flax (*Linum usitatissimum*). *Journal Of Plant Nutrition And Soil Science*, 176(4), 603-615. DOI: 10.1002/jpln.201100333
- 23. Artículo.** Gonzalez, Demetrio; Alvarez, Jose M (2013). Effects of Copper Chelates on Lettuce Response, Leaching, and Soil Status. *Soil Science Society Of America Journal*, 77(2), 546-557. DOI: 10.2136/sssaj2012.0164
- 24. Artículo.** Gonzalez, Demetrio; Almendros, Patricia; Alvarez, Jose M (2016). Effects of synthetic Zn chelates on flax response and soil Zn status. *Spanish Journal Of Agricultural Research*, 14(3), e1104-. DOI: 10.5424/sjar/2016143-8765
- 25. Artículo.** Almendros, Patricia; Gonzalez, Demetrio; Gonzalez, Victoria; Alvarez, Jose M (2015). Influence of Moisture Conditions on Residual Zn Concentrations Applied as Synthetic Chelates. *Communications In Soil Science And Plant Analysis*, 46(5), 588-604. DOI: 10.1080/00103624.2014.1003646
- 26. Artículo.** Almendros P; Gonzalez D; Alvarez J (2013). The influence of moisture on the residual effects of natural zinc chelates applied to two different soils. *Journal Of Soil Science And Plant Nutrition*, 13(4), 797-807. DOI: 10.4067/S0718-95162013005000063
- 27. Artículo.** Almendros, Patricia; Gonzalez, D; Alvarez, J M (2013). The influence of moisture on the residual effects of natural zinc chelates applied to two different soils. *Journal Of Soil Science And Plant Nutrition*, 13(4), 797-807
- 28. Artículo.** CASTRILLEJO, Y; GONZALEZ, D; BARRADO, E; PARDO, R; BATANERO, PS (1990). STUDY OF ELECTROCHEMICAL-BEHAVIOR OF AN AZO COMPOUND - PONCEAU-4R. *Bull Soc Chim Fr*, (5), 609-615

## C.2. Congresos

- 1. Comunicación.** ORTIZ CASTILLO, RAQUEL; ALMENDROS GARCIA, PATRICIA. Influence of soil application of glycine on nutrients uptake and translocation within lettuce plants (2024)
- 2. Comunicación.** FRANCISCO HERNANDEZ, MARINA DE; ALMENDROS GARCIA, PATRICIA. Influence of soil application of high doses of a synthetic Zn chelate on Zn biofortification and plant physiology of *Lactuca sativa* L. (2024)
- 3. Ponencia.** J Soler; L Galvez; S Garcia-Marco; JM Arroyo; P Almendros; . RESEARCH BASED LEARNING AND LEARNING STYLES OF UNIVERSITY STUDENTS OF AGRICULTURE (2023)
- 4. Ponencia.** J Soler; L Galvez; S Garcia-Marco; JM Arroyo; P Almendros; . RESEARCH BASED LEARNING IN BACHELOR´S AND MASTER´S DEGREES IN AGRICULTURE (2023)
- 5. Poster.** Sandra Garcia; M<sup>a</sup> Dolores Fernández; Marta Letón; Mar Babín; Concepción García Gómez; ALMENDROS GARCIA, PATRICIA; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Effects of soil aging of coated and uncoated ZnO nanoparticles on their fate and toxicity to the aquatic organisms (*Chlorella vulgaris* and RTG-2 cell line fish). CICTA 2018 11<sup>o</sup> CONGRESO IBÉRICO Y 8<sup>o</sup> IBEROAMERICANO DE CONTAMINACIÓN Y TOXICOLOGIA AMBIENTAL (2018. MADRID)
- 6. Poster.** Sandra Garcia; Rosa Ana Pérez; M<sup>a</sup> Dolores Fernández; Marta Letón; Mar Babín; Concepción García Gómez; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Joint effects of zinc oxide nanoparticles and chlorpyrifos on reproduction and biomarkers of oxidative stress in the earthworm *Eisenia andrei*. 11<sup>o</sup> Congreso Ibérico y 8<sup>o</sup> Iberoamericano de Contaminación y Toxicología Ambiental. CICTA (2018. MADRID)
- 7. Poster.** GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Fate and effects of uncoated ZnO nanoparticles on nine crops exposed in two agricultural soils, a calcareous and an acidic soil.. 18th European Meeting on Environmental Chemistry (2017. Porto)
- 8. Poster.** GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Soil pH effects on the Toxicity of zinc oxide nanoparticles to soil bacterial communities.. EMEC 18th European Meeting on Environmental Chemistry (2017. Porto)
- 9. Poster.** ALMENDROS GARCIA, PATRICIA; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Soil chemical extraction tests to estimate zinc plant availability from engineered ZnO nanoparticles applied to agricultural soils.. EMEC 18th European Meeting on Environmental Chemistry (2017. Porto)

- 10. Poster.** GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Toxicity of ZnO nanoparticles in earthworm *Eisenia andrei* in two agricultural soils with different pH: lethal and reproduction, oxidative stress and coelomocytes assays.. SETAC Europe 27th Annual Meeting (2017. Brussels)
- 11. Poster.** M.D. FERNANDEZ; C GARCÍA-GÓMEZ; ALMENDROS GARCIA, PATRICIA; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Influence of soil pH and plant specie in the leaching of Zn in two crops developed in soils spiked with ZnO-NPs, ZnO-bulk and ZnSO<sub>4</sub> under greenhouse conditions. SETAC Europe 26rd Annual Meeting (2016. Nantes (Francia))
- 12. Poster.** M.D FERNÁNDEZ; M. Babin; C. GARCÍA-GÓMEZ; C. del Río; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Comparative effect of ZnO-NPs, Influence of soil pH in the effects of ZnONPs ZnO-bulk and ZnSO<sub>4</sub> in the antioxidative defence system of two plant species growing in two agricultural soils in a greenhouse experiment. SETAC Europe 26rd Annual Meeting (2016. Nantes (Francia))
- 13. Poster.** M. Fernández; M. Babin; C. García-Gómez; C del Río; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Influence of soil pH in the effects of ZnONPs on the antioxidant activities and Zn uptake in three plant species (*T. aestivum*, *R. sativus* and *Z. mays*). SETAC Europe 25th Annual Meeting (2015. Barcelona)
- 14. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Efecto de la adición de una turba comercial en la asimilabilidad de cobre, zinc, hierro, manganeso de un suelo en el que se ha cultivado trigo. VI Congreso Ibérico de la ciencia del suelo (2014. Santiago de Compostela)
- 15. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Evolución de la distribución del Zn en dos suelos después de la aplicación de Zn-EDTA en dos cultivos sucesivos de lino (*Linum usitatissimum* L.). CICS 2012 (2012)
- 16. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Fraccionamiento de cobre en un suelo calizo cuando se aplicaron quelatos de cobre a un cultivo de lechuga. CICS2012 (2012)
- 17. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Influencia de la aplicación de Zn-EDDS en la clorofila y en el Zn soluble en la hoja en dos cultivos sucesivos de lino (*linum usitatissimum* L.) realizados en un suelo ácido. XIV Simposio Hispano-Luso de Nutrición Mineral de las Plantas (2012. UAM)
- 18. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Changes in the distribution of Zn applied as a mixture of synthetic agents in two successive flax crop grown in a calcareous soil. EGU General Assembly 2012 (2012. Viena)
- 19. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Evolution of residual-Zn available concentrations of Zn-EDTA chelate in two different soils. EGU General Assembly 2012 (2012. Viena)
- 20. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Residual effect of synthetic Zn chelates on the availability of this metal in different soils under waterlogged conditions.. ASA-CSSA-SSA Internatual Annual Meetings. (2011. San Antonio, Texas, 2011.)
- 21. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Residual effect of natural and synthetic zinc chelates on zinc in a soil solution of a waterlogged acidic soil. Evolution of the pH and redox potential.. EGU General Assembly. Viena, 2011. (2011)
- 22. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Zinc residual effect of synthetic chelates on the availability of the metal in different soils under waterlogged conditions (2011)
- 23. Comunicación.** ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO. Concentración de zinc en semillas de lino oleaginoso (*Linum usitatissimum*) cultivado en un suelo calizo. XIII Simposio Ibérico de Nutrición Mineral de las Plantas (2010. San Sebastián)
- 24. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Efecto de la fertilización con quelatos de cobre de origen natural y sintético en el pH y el potencial redox de un suelo calizo inundado. III Congreso ibérico de las Ciencias del suelo (2008. Evora (Portugal))
- 25. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; NOVILLO CARMONA, JESUS. Fraccionamiento de zinc en un suelo débilmente ácido despues de un cultivo de maiz fertilizado con quelatos de zinc. III Congreso ibérico de las Ciencias del suelo (2008. Evora (Portugal))
- 26. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; RICO SELAS, M. ISABEL. Fertilization effect of Cu-EDTA chelate on soil pH and redox conditions in a flooded neutral soil. EGU General Assembly (2008)

**27. Comunicación.** ALMENDROS GARCIA, PATRICIA; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA. Residual zinc forms in weakly acidic and calcareous soil after and oilseed flax crop. EGU General Assembly (2008)

**28. Comunicación.** ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA; NOVILLO CARMONA, JESUS; SEBASTIÁN PEÑA, BEATRIZ. Distribution of zinc fractions in neutral soil treated with two zinc chelates after a maize crop. 5th International Congress of the European Society for Soil Conservation (2007. Palermo (Italia))

**29. Comunicación.** LOPEZ VALDIVIA, LUIS MANUEL; ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; RICO SELAS, M. ISABEL; SEBASTIÁN PEÑA, BEATRIZ. Easily leachable zinc extracted with the BaCl<sub>2</sub> reagent and correlation with more labile micronutrient fractions in an acidic soil. EUROPEAN GEOSCIENCES UNION (2007. Viena)

**30. Comunicación.** ALVAREZ ALVAREZ, JOSE MANUEL; GONZALEZ RODRIGUEZ, DEMETRIO; OBRADOR PEREZ, ANA FRANCISCA; NOVILLO CARMONA, JESUS; SEBASTIÁN PEÑA, BEATRIZ. Zinc bound to manganese oxides in soils in a greenhouse flax crop to which several zinc chelates were added. European Geosciences Union 2007 (2007. Vienna (Austria))

### C3. Proyectos o Líneas de investigación

**1. Proyecto Competitivo.** Ref.:TED2021-131199B-I00. SISTEMAS DE LIXIVIACION BASADOS EN AMINOÁCIDOS PARA EL DESARROLLO DE NUEVAS TECNOLOGIAS DE RECUPERACION DE METALES DE RESIDUOS Y SU CONTRIBUCIÓN A UNA AGRICULTURA SOSTENIBLE. ALMENDROS GARCIA, PATRICIA (Investigador principal (IP)); MENDEZ LAZARO, ANA MARIA (Investigador principal (IP)); GONZALEZ RODRIGUEZ, DEMETRIO (Participante)..... Financiadora: Ministerio de Ciencia e Innovación (MICINN) Programa: Plan Estatal 2021-2023 (2022-12-01 / 2024-11-30).

**2. Proyecto Competitivo.** ESTUDIO AGRONÓMICO Y ESTIMACIÓN DE IMPACTOS AGROAMBIENTALES DE LA UTILIZACIÓN DE NANOFERTILIZANTES DE ZN SINTÉTICOS (ECONANOZN). ALMENDROS GARCIA, PATRICIA (Investigador principal (IP)); GONZALEZ RODRIGUEZ, DEMETRIO (Participante)..... Afiliación: Universidad Politécnica de Madrid, Afiliación: Comunidad de Madrid (2022-01-01 / 2022-12-31)

**3. Proyecto Competitivo.** COAPA. Tecnología destinada a la sostenibilidad de los sistemas agrí-colas. VALLEJO GARCIA, ANTONIO (Investigador principal (IP)); GONZALEZ RODRIGUEZ, DEMETRIO (Participante)..... Financiadora: Comunidad de Madrid Programa: CM - Ayudas grupos (2019-01-01 / 2023-04-30).

**4. Proyecto Competitivo.** Ref.:P2018/BAA4330. Programa AGRISOST-CM, Tecnología destinada a la sostenibilidad de los sistemas agrícolas. VALLEJO GARCIA, ANTONIO (Investigador principal (IP)); GONZALEZ RODRIGUEZ, DEMETRIO (Participante)..... Afiliación: ETSI AGRONÓMICA, ALIMENT. Y BIOSISTEMAS. Universidad Politécnica de Madrid, Afiliación: ETSI AGRONÓMICA, ALIMENT. Y BIOSISTEMAS. Universidad Politécnica de Madrid, Afiliación: Contaminación de agroecosistemas por las prácticas agrícolas. Universidad Politécnica de Madrid, Afiliación: Contaminación de agroecosistemas por las prácticas agrícolas. Universidad Politécnica de Madrid (2018-01-01 / ).

**5. Proyecto Competitivo.** Ref.:RTA2013-00091-C02-02. Efectos sobre los ecosistemas agrícolas de la aplicación de nanopartículas de ZnO. OBRADOR PEREZ, ANA FRANCISCA (Investigador principal (IP)); GONZALEZ RODRIGUEZ, DEMETRIO (Participante)..... Financiadora: INIA - Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria Programa: Plan Nacional (2014-10-02 / 2018-03-15).

**6. Proyecto Competitivo.** COAPA. Sistemas agrarios sostenibles. Manejo de carbono, nitrógeno y agua para optimizar producción y calidad. VALLEJO GARCIA, ANTONIO (Investigador principal (IP)); GONZALEZ RODRIGUEZ, DEMETRIO (Participante)..... Financiadora: Comunidad de Madrid Programa: CM - Ayudas grupos (2014-10-01 / 2018-12-31).

**7. Proyecto Competitivo.** Ref.:AGL2009-12741. Efecto residual de fertilizantes de cobre en cultivos sucesivos realizados en invernadero. Movilidad de fuentes de cobre en suelos. Estudio de la interacción cobre-zinc según las fuentes aplicadas. GONZALEZ RODRIGUEZ, DEMETRIO (Participante); ALVAREZ ALVAREZ, JOSE MANUEL (Investigador principal (IP)). Financiadora: Ministerio de Ciencia e Innovación (MICINN) Programa: Plan Nacional (2010-01-01 / 2012-12-31).

### C.11. Actividades de gestión

**1. Otros cargos o puestos desempeñados de gestión.** (SUBDIRECTOR DE DEPARTAMENTO). SUBDIRECTOR DE DEPARTAMENTO. QUÍMICA Y ANÁLISIS AGRÍCOLA (Hasta 2014). Universidad Politécnica de Madrid . (2012-06-20 / 2014-08-31)

## CURRICULUM VITAE (CVA)

<b>Part A. PERSONAL INFORMATION</b>		<b>CV date</b>	03/02/2025
First name	Raúl		
Family name	Porcar García		
Gender	Male		
e-mail	rporcar@ccia.uned.es	URL Web	<a href="https://www.uned.es/universidad/docentes/ciencias/raul-porcar-garcia.html">https://www.uned.es/universidad/docentes/ciencias/raul-porcar-garcia.html</a>
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-3345-0804		

### A.1. Current position

Position	Associate Professor (Profesor Titular de Universidad)		
Initial date	08/04/2024		
Institution	National University of Distance Education (UNED)		
Department/Center	Organic and Bioorganic Chemistry, Faculty of Sciences		
Country	Spain	Teleph. number	+3491398-6546
Key words	Green Chemistry, Advanced Materials, Flow Chemistry, Organic Synthesis, Photochemistry, Biocatalysis		

### A.2. Previous positions

Period	Position/Institution/Country/Interruption cause
2022-2024	Contracted professor doctor, National University of Distance Education (UNED), Madrid, Spain
2020-2022	Assistant professor doctor, National University of Distance Education (UNED), Madrid, Spain
2012-2020	Research staff hired doctor, Universitat Jaume I de Castellón, Spain
2007-2011	Research staff (FPU scholarship), Universitat Jaume I de Castellón, Spain

### A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Sustainable Chemistry	University Jaume I of Castellón, Spain	2007-2011
MSc in Sustainable Chemistry	University Jaume I of Castellón, Spain	2006-2007
BSc in Chemistry	University Jaume I of Castellón, Spain	2001-2006

## Part B. CV SUMMARY

The applicant's research career focuses on the interface of various areas of materials and chemistry, specifically in Advanced Polymeric Materials, Catalytic/Biocatalytic Transformations, Flow Chemistry and Sustainable Chemistry. He has contributed to these fields that support the project proposal with 38 research articles in high-impact SCI journals reviewed (quartile Q1) and 4 book chapters, having received 698 citations, with an average of 17.45 citations/articles, and achieving an h-index of 17; and has presented > 80 contributions in national and international congresses (poster/oral communications). In addition, from 2009 to 2025, it has participated in 21 R+D projects financed through competitive calls from public or private entities, being IP in 4 of them. In addition, he has participated in 1 R+D project of a private entity (KRYPTONITE PROJECT, 2018). On the other hand, he has been awarded 3 research prizes (Banco Santander Awards for the Recognition of Teaching and Research Activities of the Teaching and Research Staff of the UJI, 2016; Award for the Best Short Oral Communication at the II Spanish Conference on Biocatalysis, 2018; UNED-Santander Research, Transfer and Dissemination, UNED, 2021), and he has organized 2 R&D activities. In addition, he has established collaborations with Dr. R. Fernández-Lafuente (CSIC, Madrid), Dr. V. Gotor (Oviedo University), Dr. J. Sánchez (Montpellier University, France), Dr. P. Lozano (Murcia University) and Dr. I. Alfonso (CSIC, Barcelona). He has been accredited as Assistant Professor, Contracted Professor and Professor at the Private University (ANECA, 2017), Professor at the University (ANECA, 2020), and he has obtained the i3 Certification (Incentive Program, Incorporation and Intensification of Research Activity, Ministry of Science, and

Innovation, 2019). In 2020, he obtained a position of Assistant Professor Doctor, Faculty of Sciences, UNED (Madrid); in 2022, he obtained a position of Contract Professor Doctor, Faculty of Sciences, UNED (Madrid); in 2024, he has obtained a position of Associate Professor (Profesor Titular de Universidad), Faculty of Sciences, UNED (Madrid).

In his teaching career he has collaborated in the Supervision and Tutoring of 6 doctoral projects, 9 Master's projects and 10 Bachelor's projects, furthermore he has directed 9 Master's project (TFM) and 9 Bachelor's project (TFG), and has carried out > 1500 h of teaching (Chemistry Degree, Agrifood Engineering Degree, Environmental Sciences Degree, Master in Sustainable Chemistry, Master in Chemical Science and Technology, Master in Agri-environmental and Agri-food Sciences, Master in Teacher Training in Education).

## Part C. RELEVANT MERITS

### C.1. Publications

1. Rocio Villa; Francisco J. Ruiz; Francisco Velasco; Susana Nieto; Raúl Porcar; Eduardo García-Verdugo; Pedro Lozano. A Green Chemo-Enzymatic Approach for CO<sub>2</sub> Capture and Transformation into Bis(cyclic carbonate) Esters in Solvent-Free Media. *ACS Sustainable Chem. Eng.*, **2024**, 12, 15033–15043. Signature position: 5/7, Q1. DOI: 10.1021/acssuschemeng.4c04102
2. Ferran Esteve; Raúl Porcar; Michael Bolte; Belén Altava; Santiago V. Luis; Eduardo García-Verdugo. A bioinspired approach toward efficient supramolecular catalysts for CO<sub>2</sub> conversion. *Chem Catalysis*, **2023**, 3, 100482. Signature position: 2/6, Q1. DOI: 10.1016/j.checat.2022.11.021
3. Raúl Porcar; Andrés Mollar-Cuni; David Ventura-Espinosa; Santiago V. Luis; Eduardo García-Verdugo\*; José A. Mata\*. A simple, safe and robust system for hydrogenation "without high-pressure gases" under batch and flow conditions using a liquid organic hydrogen carrier. *Green Chemistry*, **2022**, 24 (5), 2036-2043. Signature position: 1/6, Q1. DOI: 10.1039/D1GC03850H
4. David Valverde; Raúl Porcar; Marcileia Zanatta; Sergio Alcalde; Belén Altava; Víctor Sans\*; Eduardo García-Verdugo\*. Towards highly efficient continuous-flow catalytic carbon dioxide cycloadditions with additively manufactured reactors. *Green Chemistry*, **2022**, 24, 3300-3308. Signature position: 2/7, Q1. DOI: 10.1039/D1GC04593H
5. David Valverde; Raúl Porcar; Pedro Lozano; Eduardo García-Verdugo\*; Santiago V. Luis\*. Multifunctional Polymers Based on Ionic Liquid and Rose Bengal Fragments for the Conversion of CO<sub>2</sub> to Carbonates. *ACS Sustainable Chemistry and Engineering*, **2021**, 9-5, 2309-2318. Signature position: 2/5, Q1. DOI: 10.1021/acssuschemeng.0c08388
6. Raúl Porcar; Iván Lavandera; Pedro Lozano; Belén Altava; Santiago V. Luis; Vicente Gotor-Fernández\*; Eduardo García-Verdugo\*. Supported ionic liquid-like phases as efficient solid ionic solvents for the immobilisation of alcohol dehydrogenases towards the development of stereoselective bioreductions. *Green Chemistry*, **2021**, 23-15, 5609-5617. Signature position: 1/7, Q1. DOI: 10.1039/D1GC01767E
7. Rocío Villa; Raúl Porcar; S Nieto; Antonio Donaire; Eduardo García-Verdugo; Santiago V. Luis; Pedro Lozano\*. Sustainable chemo-enzymatic synthesis of glycerol carbonate (meth)acrylate from glycidol and carbon dioxide enabled by ionic liquid technologies. *Green Chemistry*, **2021**, 23-11, 4191-4200. Signature position: 2/6, Q1. DOI: 10.1039/D1GC01096D
8. Edgar Peris; Raúl Porcar; Joaquín García-Álvarez; María Isabel Burguete; Eduardo García-Verdugo\*; Santiago V. Luis\*. Divergent multistep continuous synthesis enabled by immobilised catalysts on IL-phases. *ChemSusChem.*, **2019**, 12 (8), 1684-1691. Signature position: 2/6, Q1. DOI: 10.1002/cssc.201900107
9. Rocio Villa; Elena Alvarez; Raúl Porcar; Eduardo Garcia-Verdugo; Santiago V. Luis; Pedro Lozano\*. Ionic liquids as an enabling tool to integrate reaction and separation processes. *Green Chemistry*, **2019**, 21, 6527-6544. Signature position: 3/6, Q1. DOI: 10.1039/C9GC02553G
10. David Valverde; Raúl Porcar; Diana Izquierdo; María Isabel Burguete; Eduardo Garcia-Verdugo\*; Santiago V. Luis\*. Rose Bengal Immobilized on Supported Ionic-Liquid-like Phases: An Efficient Photocatalyst for Batch and Flow Processes. *ChemSusChem.*, **2019**, 12 (17), 3996-4004. Signature position: 2/6, Q1. DOI: 10.1002/cssc.201901533

## C.2. Congress

1. Multifunctional Ionic liquid for the preparation of catalytic micellar systems. Sergio Alcalde, Raúl Porcar, Carla I. Nieto, Belén Altava Eduardo García-Verdugo. Póster presentation, International Workshop on Sustainable Chemistry (IWSC 2023), Cartagena (España), **2023**.
2. Ionic liquid technology as a green enabling tool for the chemo-enzymatic synthesis of cyclic glycerol carbonates from glycidol and carbon dioxide. Pedro Lozano, Rocío Villa, Raúl Porcar, Susana Nieto, Antonio Donaire, Eduardo García-Verdugo. Oral presentation, ISGC 2022, La Rochelle (Francia), **2022**.
3. Greener macrocyclizations: highly productive flow synthesis of cyclic pseudopeptides. Ferran Esteve; Belén Altava; María I. Burguete; Raúl Porcar; Eduardo García-Verdugo; Santiago V. Luis. Oral presentation, 25th Annual Green Chemistry & Engineering Conference, ACS-Virtual, **2021**.
4. Immobilized Cu(ii) into multifunctionalized supported ionic liquid-like phases as an effective heterogeneous copper catalyst. Sergio Alcalde; Raúl Porcar; Belén Altava; María I. Burguete; Santiago V. Luis; Pedro Lozano; Eduardo García-Verdugo. Oral presentation, 6th Iberoamerican Meeting on Ionic Liquids (IMIL 2021), Universidad de Santiago de Chile, Virtual, **2021**.
5. Multifunctional polymers based on ionic liquid for multicyclic processes. Eduardo García-Verdugo; Rocía Villa; Sergio Alcalde; Raúl Porcar; Antonio Donaire; Belén Altava; María I. Burguete; Santiago V. Luis; Pedro Lozano. Oral presentation, 6th Iberoamerican Meeting on Ionic Liquids (IMIL 2021), Universidad de Santiago de Chile, Virtual, **2021**.
6. Polymer as Non Innocent Vector to Develop Efficient Rose Bengal Supported Catalytic. Eduardo García-Verdugo, Raúl Porcar, David Valverde, M. Isabel Burguete, Santiago V. Luis. Oral presentation, 4th EuCheMs Conference on green and Sustainable Chemistry, Tarragona (España), **2019**.
7. Hierarchically Structured Polymeric Ionic Liquid Membranes obtained by Electrospinning. Eduardo García-Verdugo; David Valverde; Raúl Porcar; Belén Altava; M. Isabel Burguete; Santiago V. Luis. Oral presentation, Electrospinning and related techniques: From design to production of advanced polymer materials devices, EUPOC 2019, Como (Italia), **2019**.
8. Advanced materials for NOx determination. David Valverde; Raúl Porcar; Belén Altava; M. Isabel Burguete; Eduardo García-Verdugo; Santiago V. Luis. Poster presentation, 17th International Conference on Chemistry and the Environment (17th ICCE), Thessaloniki (Grecia), **2019**.
9. Immobilized Hydroxyl Hydrogen Bond Donors onto Supported Ionic Liquid-Like Phases (SILLPs) as efficient Organocatalyst for the Cycloaddition of CO<sub>2</sub> to Epoxides. David Valverde; Raúl Porcar; M. Isabel Burguete; Pedro Lozano; Santiago V. Luis; Eduardo García-Verdugo. Oral presentation, XXXVII Reunión Bienal de la Real Sociedad Española de Química, Donostia-San Sebastián (España), **2019**.
10. Singlet-Oxygen Oxidation catalysed by SILLPs-immobilised photooxygenation dyes. Raúl Porcar; M.I. Burguete; B. Altava; E. García-Verdugo; S.V. Luis. Poster presentation, 3rd EuCheMS Congress on Green and Sustainable Chemistry (EuGSC), York (UK), **2017**.

## C.3. Research projects

1. Sustainable tools for energy storage and chemical co-production (STECH). Research team member. GVA, PROMETEO, CIPROM/2023/57, 600000 €, **2024-2028**. UJI, IP: Eduardo García-Verdugo Cepeda. Personal contribution and lines of research: design and synthesis of systems derived from ionic liquids.
2. Catalizadores basados en MOFs para el almacenamiento y producción de hidrógeno mediante la hidrogenación de CO<sub>2</sub> y la deshidrogenación de ácido fórmico/formiatos. Research team member. AGENCIA ESTATAL DEL INVESTIGACIÓN, PID2022-142897OA-I00, 106250€, **2023-2026**. UJI, IP: Nuria Martín García. Personal contribution and lines of research: design and synthesis of materials and applications.
3. Advanced sustainable multifunctional materials with applications in drug synthesis. Principal investigator (IP). UNED, Early Research Grants UNED-SANTANDER 2022, 10000€, **2022-2023**. Personal contribution and lines of research: design and synthesis of surfactant ionic

liquids, micellar catalysis reactions and synthesis of drugs medites micellar catalysis; management, design and organization of the project.

**4.** Decarbonization of scalable and sustainable synthesis of chemicals and fuels by hydrogenating CO<sub>2</sub> to C1 products. Research team member. Ministry of Science and Innovation, Ecological Transition and Digital Transition Projects 2021, TED2021-130288B-I00, 204240€, **2022-2023**. UJI, IP: Eduardo García-Verdugo Cepeda and Víctor Sans (UJI, Castellón). Personal contribution and lines of research: design and synthesis of advanced 3D polymeric materials, design and synthesis of catalysts, hydrogenation reactions in continuous flow.

**5.** New tools in green chemistry for the development of sustainable (bio)catalytic processes for the valorization of CO<sub>2</sub> and the obtaining of compounds with high added value. Research team member. Ministry of Science and Innovation, Knowledge Generation Projects 2021, PID2021-124695OB-C22, 169400€, **2022-2024**. UJI, IP: Eduardo García-Verdugo Cepeda (UJI, Castellón) and Pedro Lozano (Universidad Murcia) (Coordinated project). Personal contribution and lines of research: design and synthesis of surfactant ionic liquids, design and synthesis of advanced 3D polymeric materials, design and synthesis of biocatalysts, biocatalysis reactions, polymer synthesis, micellar catalysis, CO<sub>2</sub> capture reactions in continuous flow.

**6.** Ionic Liquids and Related Materials for Pharmacological Applications. Research team member. Ministry of Innovation, Universities, Science and Digital Society, GVA., AICO/2021/139, 90000 €, **2021-2023**. UJI, IP: Eduardo García-Verdugo Cepeda. Personal contribution and lines of research: design and synthesis of antibacterial and fungicidal ionic liquids, design and synthesis of advanced materials derived from thiolactone.

**7.** Multi-catalytic Ionic Liquid based platforms for the transformation of simple raw materials into added-value chemicals. Research team member. Ministry of Science, Innovation and Universities, RTI2018-098233-B-C22, 156574 €, **2019-2021**. UJI, IP: Santiago Vicente Luis Lafuente. Personal contribution and lines of research: design and synthesis of polymer materials, CO<sub>2</sub> capture reactions in continuous flow, designs and synthesis of multicatalytic ionic liquids.

**8.** CO<sub>2</sub> Activation by Enzymatic Mimics Based on Pseudopeptidic Macrocycles. Research team member. UJI, UJI-B2019-40, 23280 €, **2020**. UJI, IP: Eduardo García-Verdugo Cepeda. Personal contribution and lines of research: CO<sub>2</sub> capture reactions in continuous flow, designs and synthesis of multicatalytic advance materials.

**9.** Development and Evaluation of Colorimetric Probes. Principal investigator (IP). Generalitat Valenciana GVA, AEST/2019/029, 40000 €, **2019-2020**. Kryptonite Project S.L. Personal contribution and lines of research: design and synthesis of colorimetric sensors, design and assembly of low cost UV measurement equipment; management, design and organization of the project.

**10.** Self-organizing and self-assembling systems for advanced applications. Research team member. Ministry of Science, Innovation and Investigation, CTQ2015-68429R, 114000 €, **2016-2018**. UJI, IP: Santiago Vicente Luis Lafuente. Personal contribution and lines of research: design and synthesis of auto-organizational systems derived from ionic liquids.

#### **C.4. Contracts, technological or transfer merits**

**1.** Allergen detection, KRYPTONITA PROJECT, 20,000 €, **2018-2020**, Spain.

**JOSÉ LUIS MARTÍNEZ GUITARTE**

	<b>Periodo</b>	<b>Institución</b>
<b>Catedrático de Universidad</b>	2019 - Actualidad	UNED
<b>Profesor Titular de Universidad</b>	2011 - 2019	UNED

**Formación**

<b>Estudios</b>	<b>Año</b>	<b>Institución</b>
<b>Doctor en Ciencias (Biología Molecular y Bioquímica)</b>	2000	Universidad Autónoma de Madrid
<b>Licenciatura en Ciencias Biológicas</b>	1994	Universidad Complutense de Madrid
<b>Licenciatura en Historia y Geografía</b>	2011	UNED

**Resumen del CV**

Licenciado en Biología en la UCM en 1994; realicé la tesis doctoral en el Centro de Investigaciones Biológicas (CIB), perteneciente al CSIC (2000) y la presente en la UAM. Tras dos estancias postdoctorales en Boston y Lleida, me incorporé a la UNED en 2004, y soy IP del Grupo de Bioinformática y Ecotoxicología Molecular de Invertebrados. Mi investigación se centra en el análisis del multiestrés, considerando principalmente la contaminación y el cambio climático con métodos moleculares y celulares en invertebrados. He estudiado el impacto de mezclas de sustancias químicas y la respuesta a diferentes temperaturas imitando el cambio climático. Como especies modelo, utilizo un insecto, *Chironomus riparius*, y un molusco, *Physella acuta*, analizando la expresión génica mediante PCR en tiempo real. Lo combino con otros métodos, como estudios de actividad enzimática, ensayo cometa, Western blot e inmunocitoquímica, para dilucidar los mecanismos implicados en la respuesta a los tóxicos. En este sentido, los resultados obtenidos han ampliado el uso de diferentes biomarcadores al incrementar los genes descritos utilizados en ambas especies (con matrices diseñadas de 48 genes que involucran diferentes procesos como regulación endocrina, estrés, mecanismos de desintoxicación, reparación del ADN, inmunidad y metabolismo energético). Además, he mejorado nuestro conocimiento de la respuesta compleja a mezclas a nivel molecular, mostrando que diversas interacciones que involucran diferentes genes también pueden ser opuestas a la misma combinación de contaminantes. Además, he demostrado que un aumento leve de tres grados puede causar diferentes respuestas a un tóxico. Finalmente, en colaboración con el Dr. Pestana (Universidad de Aveiro) y el Dr. Navarro (Universidad de Finlandia Oriental), mostré el impacto de los microplásticos a nivel molecular en invertebrados acuáticos, afectando principalmente a la inmunidad y otros procesos relevantes en la supervivencia. En general, he contribuido a una mejor comprensión a nivel molecular de los mecanismos implicados en la respuesta de los invertebrados acuáticos y la visibilidad de los métodos moleculares en la toxicología ambiental. Toda la investigación ha sido publicada en revistas internacionales y se ha presentado en congresos internacionales. La investigación ha sido financiada por tres proyectos del Plan Nacional (2015, 2018, 2022) y varios pequeños proyectos de la UNED (Santander Europa Investigación 2017-2018-2019). Todo este trabajo me ha permitido analizar transcriptomas para buscar nuevos genes de

interés. Como resultado, tengo experiencia en análisis de transcriptomas, y me permite estudiar otras especies como los quironómidos alpinos. Además, he trabajado para conseguir una mejor aproximación con PCR en tiempo real para mejorar los resultados y reducir costes. En este sentido, los resultados obtenidos han permitido estandarizar el proceso. La investigación pretende implementar los métodos moleculares en el presente ensayo de toxicidad estándar para actualizar los métodos utilizados en toxicología ambiental y llevarlos al siglo XXI. He colaborado con diferentes laboratorios del INIA, la Universidad Complutense, la Universidad de Aveiro, el Museo de Ciencias de Trento, la Universidad de Finlandia Oriental y la Universidad de Cartago durante los últimos diez años. Además, estoy colaborando con otros grupos e instituciones apoyando la metodología molecular y el análisis de expresión génica. Además, he colaborado con la FAO para evaluar la presencia de aditivos plásticos en mejillones, una industria pesquera relevante. Como divulgador, he grabado varios programas de radio explicando la investigación que hacemos en el laboratorio y la relevancia de los microplásticos en el mundo actual. También he participado en un programa de televisión centrado en la investigación del Centro de Astrobiología. He dirigido 7 Tesis Doctorales y varios Proyectos de Fin de Máster y Fin de Grado. Actualmente estoy dirigiendo 1 tesis doctoral. Las tesis se centran en métodos moleculares, y los estudiantes se forman en los fundamentos de las metodologías. Tengo una larga trayectoria como revisor de distintas revistas (<https://publons.com/researcher/1325420/jose-luis-martinez-guitarte/peer-review/>), y soy Editor Asociado de Aquatic Toxicology.

#### Congresos

- Ana-Belen Muñoz Gonzalez; Isabel Campos; Ana Re; Fernando Gonçalves; Nelson Abrantes; Jose-Luis Martinez Guitarte. Impact of wildfire ashes on the sub-individual responses of the aquatic invertebrate *Chironomus riparius*. SIBECOL AIL Meeting 2022. Sociedad Ibérica de Ecología. 2022. Portugal.
- Patricia Caballero Carretero; Victor Carrasco Navarro; Jossi Kukkonen; Jose-Luis Martínez Guitarte. Assessment of the Toxicity of Particles and Leachate From Polyethylene Terephthalate (PET) in Combination With Triasulfuron Using *Lemna minor* As Freshwater Model Organism. SETAC Europe 32nd Annual Meeting. Society of Environmental Toxicology and Chemistry. 2022. Denmark.
- Ana Belén Muñoz-González; Valeria Lencioni; José-Luis Martínez-Guitarte. Transcriptional response of *Diamesa zernyi* (Chironomidae) reveals metabolic alterations due to chlorpyrifos exposure in glacier-fed streams. XXV Reunión Científica de la Sociedad Española de Mutagénesis y Genómica Ambiental. Sociedad Española De Mutagenesis Ambiental. 2021.
- Judit Kalman; María Ángeles García; José-Luis Martínez-Guitarte. *Chironomus riparius* Molecular Response to Polystyrene Microparticles. SETAC Europe 2021. Society of Environmental Toxicology and Chemistry. 2021.
- Patricia Caballero; Marina Prieto; José-Luis Martínez-Guitarte. Analysis Of The Effects Of Fenoxycarb, A Juvenile Hormone Analog, In The Aquatic Gastropod *Physella acuta*. 10th Young Environmental Scientists (YES) meeting. Society of Environmental Toxicology and Chemistry. 2021.
- Victor Carrasco Navarro; Ana Belen Muñoz Gonzalez; Jouni Sorvari; Jose Luis Martinez Guitarte. Alterations in the gene expression of *Chironomus riparius* exposed to tire

rubber and polystyrene microplastics. SETAC Europe 30th Annual Meeting – SETAC SciCon. SETAC. 2020. Ireland.

- Ana Belén Muñiz González; Marta Novo Rodríguez; José Luis Martínez Guitarte. Persistent pesticides: effects of Endosulfan on gene expression and enzymatic activity of the aquatic invertebrate *Chironomus riparius*. Society of Environmental Toxicology and Chemistry North America 40th Annual Meeting. SETAC America. 2019. Canada.

### **Proyectos**

- PID2022-136669OB-I00. Ecotoxicología molecular y respuesta al multiestrés en un contexto de cambio climático en invertebrados acuáticos modelo y no modelo. 2023-2026. Ministerio de Ciencia e Innovación.
- RTI2018-094598-B-I00. Cambio global y contaminación: estandarización del estudio de la respuesta celular y molecular adaptativa al multiestrés en invertebrados acuáticos. 2019-2021. Ministerio De Ciencia, Innovación y Universidades.
- CTM2015-64913-R. Ecotoxicología y cambio climático: estandarización de bioensayos toxicogenómicos en invertebrados. 2016-2018. Ministerio de Economía y Competitividad.

### **Publicaciones**

#### **2025**

- Small heat shock proteins as relevant biomarkers for anthropogenic stressors in earthworms. *Comparative Biochemistry and Physiology -Part A : Molecular and Integrative Physiology*, Vol. 300

#### **2024**

- Development and Characterization of a Hand Rub Gel Produced with Artisan Alcohol (Puntas), Silver Nanoparticles, and Saponins from Quinoa. *Gels*, Vol. 10, Núm. 4
- Environmentally Relevant Concentrations of the Insecticide Fipronil Modulated Molecular Response in *Chironomus riparius*. *Environmental Toxicology and Chemistry*, Vol. 43, Núm. 2, pp. 405-417
- Gene expression analysis of *Chironomus riparius* in response to acute exposure to tire rubber microparticles and leachates. *Environmental Pollution*, Vol. 342
- History of exposure to copper influences transgenerational gene expression responses in *Daphnia magna*. *Epigenetics*, Vol. 19, Núm. 1
- New insights about the toxicity of 2,4-D: Gene expression analysis reveals modulation on several subcellular responses in *Chironomus riparius*. *Pesticide Biochemistry and Physiology*, Vol. 204
- Surviving in a multistressor world: Gene expression changes in earthworms exposed to heat, desiccation, and chemicals. *Environmental Toxicology and Pharmacology*, Vol. 108

#### **2023**

- *Chironomus riparius* molecular response to polystyrene primary microplastics. *Science of the Total Environment*, Vol. 868

- Effects of Wildfire Ashes on Aquatic Invertebrates: First Molecular Approach on *Chironomus Riparius* Larvae. *Science of the Total Environment*, Vol. 858
- Gene expression response of the non-target gastropod *Physella acuta* to Fenoxycarb, a juvenile hormone analog pesticide. *Scientific Reports*, Vol. 13, Núm. 1
- Impact of Global Warming on Krial Fauna: Thermal Tolerance Response of *Diamesa steinboeckii* (Goetghebuer, 1933; Chironomidae). *Diversity*, Vol. 15, Núm. 6

## 2022

- Effect of environmental stressors on the mRNA expression of ecdysone cascade genes in *Chironomus riparius*. *Environmental Science and Pollution Research*, Vol. 29, Núm. 7, pp. 10210-10221
- Effect of silver nanoparticles on gene transcription of land snail *Helix aspersa*. *Scientific Reports*, Vol. 12, Núm. 1

## 2021

- Altered gene expression in *Chironomus riparius* (insecta) in response to tire rubber and polystyrene microplastics. *Environmental Pollution*, Vol. 285
- Analysis of the impact of three phthalates on the freshwater gastropod *Physella acuta* at the transcriptional level. *Scientific Reports*, Vol. 11, Núm. 1
- Criter-a: A novel temperature-dependent noncoding rna switch in the telomeric transcriptome of *chironomus riparius*. *International Journal of Molecular Sciences*, Vol. 22, Núm. 19
- Effect assessment of reclaimed waters and carbamazepine exposure on the thyroid axis of *Xenopus laevis*: Gene expression modifications. *Environmental Pollution*, Vol. 291
- Effects of bisphenol S on the life cycle of earthworms and its assessment in the context of climate change. *Science of the Total Environment*, Vol. 781
- Molecular biomarkers as tool for early warning by chlorpyrifos exposure on Alpine chironomids. *Environmental Pollution*, Vol. 290
- Persistent pesticides: effects of endosulfan at the molecular level on the aquatic invertebrate *Chironomus riparius*. *Environmental Science and Pollution Research*, Vol. 28, Núm. 24, pp. 31431-31446



### CURRICULUM VITAE (CVA)

**IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.**

#### Part A. PERSONAL INFORMATION

<b>CV date</b>	9/1/2025
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First name	Ana Francisca		
Family name	Obrador Pérez		
Gender (*)	Female	Birth date	
Social Security, Passport, ID number			
e-mail	http://www.upm.es/observatorio		
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-5658-7651		

(\*) Mandatory

#### A.1. Current position

Position	Associate professor		
Initial date	01/06/1992		
Institution	Universidad Politécnica de Madrid (UPM)		
Department/Center	Chemistry and Food Technology	ETSI AGRONÓMICA, ALIMENTARIA Y DE BIOSISTEMAS	
Country	Spain	Teleph. number	+349106771129
Key words	Metals, nutrients, bioavailability, fertilizers, organic wastes, nanoparticles, soils		

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

Period	Position/Institution/Country/Interruption cause
from June 1989 to June 1992	Pre-doctoral research/INIA/Spain
from June 1995 to June 1996	Post-doctoral research/IMIDRA/Spain

#### A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Agricultural Engineer	Polytechnic University of Madrid (UPM)	1989
PhD in Agricultural Engineering	Polytechnic University of Madrid (UPM)	1993

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

PhD in Agricultural Engineering from the Polytechnic University of Madrid (UPM). Associate Professor at the University School of Agricultural, Food and Biosystems Engineering (ETSIAAB) of the UPM (from 2003), teaching in Degree and Master Courses in the area of agricultural chemistry, as well as in specialization subjects of the Excellent Official Doctorate Program *Environmental Technology for a Sustainable Agriculture* (TAPAS) (such as Diffuse Agricultural Pollution and Use of Organic Wastes in Agriculture). In this program, students receive training in different topics, all related to agro-ecosystems (yield production, environmental and economic issues). In relation to research training, I have directed 10 master's thesis (three of them were awarded by the Fertiberia Chair in Agro-Environmental Studies). Several of these students are currently working in research positions in both public centers and private companies. I have been recognized by the UPM with six teaching five-year



periods (quinquenios) and with “Docentia” accreditation. I have an extensive experience as a researcher in agro-environmental chemistry in different public research centers: *National Institute for Agricultural and Food Research and Technology (INIA)*, *Madrid Institute for Rural, Agrarian and Food Research and Development (IMIDRA)* and *University School of Agricultural Engineering (ETSIAAB) of UPM*. I was member of the research group “*Metals in the Agricultural Environment*” (from 2006 to 2014) and I am currently a member of the COAPA (*Pollution of Agro-systems by Agricultural Practices*) research group, which is a consortium of university researchers from the *Research Centre for the Management of Agricultural and Environmental Risks (CEIGRAM-UPM)*. I have been involved in research lines related mainly to the contamination of agro-systems due to agricultural practices (chemical extraction methods to assess the environmental risk of metals in agricultural environments; use of organic wastes in agriculture; efficacy and negative impacts derived from the application of commercial inorganic fertilizers, with macro- and mainly with micro-nutrients, as well as the interaction between them; possibility of using Zn oxide nanoparticles as micro-fertilizer). I have participated as a member of the researcher team in 15 competitive public projects funded at Regional, National and European level, being PI of the last National Plan project in which I have been involved. I have also carried out research work for industry through projects funded by private companies. As a result of all this research work I have published various book chapters and numerous articles, 43 included in journals indexed in the SCI (a major proportion in Q1 journals). My H-Index is 21. The total number of cites at present is 1502 (750 from 2018). I have regularly participated in major national/international conferences, with more than 40 contributions presented. I am a reviewer for high impact international journals of WOS such as *Geoderma*, *Chemosphere*, *Plant and Soil* and *Journal of Environmental Management*, and I am currently guest editor of special issue in *Agronomy* journal. I was also associate editor of the Environmental Series of the journal “*Monografías INIA. Serie Medioambiental.*” I am an evaluator (technical expert) of research project proposals requested by Spanish research groups. All this has allowed me to contribute to society by supporting the Spanish Ministry of Agriculture as an expert advisor in Agricultural Chemistry through the Committee of Experts in Fertilization (from 2018 to actually) for the preparation of legislation issues (such as Ministerial Orders amending RD 506/2013 on fertilizer products and the RD 1051/2022 on Sustainable Nutrition) and trying to find solutions to different technical problems. Other scientific merits are the recognition of 5 “six-year targets” (sexenios) on my research activity by the National Commission for Research Evaluation (CNEAI) (last in 2022).

## **Part C. RELEVANT MERITS (a selection of the latest)**

### **C.1. Publications**

Ortiz, R.; Gascó G.; Méndez, A.; Obrador, A.; González, D.; and Almendros, P. Zinc biofortification of lettuce using environmentally friendly zinc sources in an acidic soil. *Scientia Horticulturae* 338, 113620 (2024). DOI: 10.1016/j.scienta.2024.113620.

García-Gómez, C.; Pérez, R.A., Albero, B.; Obrador, A.; Almendros, P.; and Fernández, M.D. Interaction of ZnO nanoparticles with metribuzin in a soil-plant system: ecotoxicological effects and changes in the distribution pattern of Zn and metribuzin. *Agronomy* 13, 2004 (2023). DOI:10.3390/agronomy13082004.

Ortíz, R.; Gascó, G.; Méndez, A.; Sánchez-Martín, L.; Obrador, A.; and Almendros, P. Comparative study of traditional and environmentally friendly zinc sources applied in alkaline fluvisol soil: lettuce biofortification and soil Zn status. *Agronomy* 13, 3014 (2023). DOI:10.3390/agronomy13123014.

Almendros, P.; González, D.; Ibáñez, M.A.; Smolders E.; Fernández, M.D.; García-Gómez, C.; and Obrador, A. Influence of ZnO particle size and soil characteristics on the estimation of long-term Zn bioavailability by chemical extraction methods and diffusive gradients in thin-films



(DGT). *Journal of Soil Science and Plant Nutrition*. 22: 3901-3913 (2022). DOI: 10.1007/s42729-022-00938-1.

Obrador, A.; González, D.; Almendros, P.; García-Gómez, C.; and Fernández, M.D. Assessment of phytotoxicity and behavior of 1-year-aged Zn in soil from ZnO NPs, bulk ZnO, and Zn sulfate in different soil-plant cropping systems: from biofortification to toxicity. *Journal of Soil Science and Plant Nutrition*. 22: 150-164 (2022). DOI: 10.1007/s42729-021-00640-8.

Almendros, P.; González, D.; Fernández, M.D.; García Gómez, C.; and Obrador, A. Both Zn biofortification and nutrient distribution pattern in cherry tomato plants are influenced by the application of ZnO nanofertilizer. *Heliyon*. Article number e09130 (2022). DOI: 10.1016/j.heliyon.2022.e09130.

Fernández, M.D.; Obrador, A.; and García-Gómez, C. Zn concentration decline and apical endpoints recovery of earthworm (*E. Andrei*) after removal from an acidic soil spiked with coated ZnO nanoparticles. *Ecotoxicology and Environmental Safety*. 211:111916 (2021). DOI: 10.1016/j.ecoenv.2021.111916.

Almendros, A.; González, D.; Ibáñez, M.A.; Fernández, M.D.; Smolders, E.; and Obrador, A. Can diffusive gradients in thin films (DGT) technique and chemical extraction methods successfully predict both Zn bioaccumulation patterns in plant and leaching to groundwater in soils amended with engineered ZnO nanoparticles? *Journal of Soil Science and Plant Nutrition*. 20: 1714-1731 (2020). DOI: 10.1007/s42729-020-00241-x.

Almendros, A.; Obrador, A.; Alvarez, J.M.; and González, D. Zn-DTPA-HEDTA-EDTA application: a strategy to improve the yield and plant quality of a barley crop while reducing the N application rate. *Journal of Soil Science and Plant Nutrition*. 19: 920-934 (2019). DOI: 10.1007/s42729-019-00090-3.

García-Gomez, C.; Obrador, A.; Gonzalez, D.; et al. Comparative effect of ZnO NPs, ZnO bulk and ZnSO<sub>4</sub> in the antioxidant defenses of two plant species growing in two agricultural soils under greenhouse conditions. *Science of the Total Environment*. 589: 11-24. (2017). DOI: 10.1016/j.scitotenv.2017.02.153

Almendros, P.; Obrador, A.; Gonzalez, D.; et al. Biofortification of zinc in onions (*Allium cepa* L.) and soil Zn status by the application of different organic Zn complexes. *Scientia Horticulturae*. 186, 254-265. (2015). DOI: 10.1016/j.scienta.2015.02.023

Obrador, A.; Gonzalez, D.; and Álvarez, J.M. Effect of inorganic and organic copper fertilizers on copper nutrition in *Spinacia oleracea* and on labile copper in soil. *Journal of Agricultural and Food Chemistry*. 61 (20), 4692-4701 (2013). DOI: 10.1021/jf305473f

## C.2. Congress

Almendros, P.; González, D.; Fernández, M.D.; García-Gómez, C.; and Obrador, A. Comparison of different methods for predicting long-term Zn bioavailability from nano and bulk Zn oxide sources (Poster). Congreso Ibérico. Suelo y desarrollo sostenible: desafíos y soluciones. Abstract Book (2021). Oporto (Portugal).

García-Gómez, C.; Fernández, M.D.; García, S.; Obrador, A.; Letón, M.; Pérez R.A.; González, D.; and Babín, M. Joint effects of ZnO nanoparticles and chlorpyrifos (CPF) on reproduction and biomarkers of oxidative stress in the earthworm *Eisenia Andrei* (Poster). CICTA 2018 11º Congreso Ibérico y 8º Iberoamericano de Contaminación y Toxicología Ambiental. Abstract Book, NMP06, p. 275 (2018). Madrid (España).

Gutiérrez, S.G.; Fernández, M.D.; Babín, M.; Obrador, A.; González, D.; del Río, C.; and García-Gómez, C. Toxicity of ZnO nanoparticles in earthworm *Eisenia andrei* in two agricultural soils with different pH: lethal and reproduction, oxidative stress and coelomocytes assays (Poster). SETAC Europe 27th Annual Meeting. Abstract Book, TU 117, pag. 200 (2017). Bruselas (Bélgica).

Obrador, A.; Almendros, P.; Fernández, M.D.; García-Gómez; Babín, M.; and González, D. Soil chemical extraction tests to estimate zinc plant availability from engineered ZnO



nanoparticles applied to agricultural soils (Poster). EMEC 18th European Meeting on Environmental Chemistry. Abstract Book, PPAgroFood-14 p. 346 (2017). Oporto (Portugal).

Babín M.; Fernández, M.D.; García, S.; Obrador, A.; del Río C.; and García-Gómez, C. Joint toxicity of chlorpyrifos and zinc oxide nanoparticles at sub-lethal concentrations to the earthworm *Eisenia foetida* (Poster). Fifth NANOSAFE INTERNATIONAL CONFERENCE. Abstract Book, S5.2-P7, p. 287 (2016). Grenoble (Francia).

González, D.; Obrador, A.; Almendros, P.; Fernández, M.D.; and García-Gómez, C. Influence of soil pH and plant species in the leaching of Zn in two crops developed in soils spiked with ZnO-NPs, ZnO-bulk and ZnSO<sub>4</sub> under greenhouse conditions (Poster). SETAC Europe 2016th Annual Meeting. Abstract Book. TH046, p. 318 (2016). Nantes (Francia).

García-Gómez, C.; Obrador, A.; Álvarez, J.M.; González, D.; del Río, C.; Babín, M.; and Fernández, M.D. Influence of soil pH in the effects of ZnO NPs on the antioxidant activities and Zn uptake in three plant species (*T. aestivum*, *R. sativus* and *Z. mays*) (Poster). SETAC Europe 25rd Annual Meeting. Abstract Book, TH103, pag. 441(2015). Barcelona (España).

### C.3. Research projects

*Metodologías para la evaluación y tratamiento de suelos afectados por contaminación mixta en ambientes extremos* (PID2023-149788OB-C21). Ministerio de Ciencia, Innovación y Universidades. Proyectos de Generación de Conocimiento 2023. From 2024 to 2027. PI: M<sup>a</sup> Carmen Lobo/A. Obrador. Funding amount: 212,500 €.

*Sistemas de lixiviación basados en aminoácidos para el desarrollo de nuevas tecnologías de recuperación de metales de residuos y su contribución a una agricultura sostenible* (TED2021-131199B-I00). Ministerio de Ciencia e Innovación. Proyectos de Transición Ecológica y Digital 2021. Participating entities: UPM. From 2022 to 2025. PI: A. Méndez/P. Almendros. Funding amount: 138,000 €.

*Sistemas agroalimentarios futuros para una transición social y medioambientalmente sostenible: Co-Diseño de estrategias para la mitigación de riesgos medioambientales en agua y atmósfera en espacios naturales del territorio Sudoe* (SOE4/P5/E1059). European Commission Programme Interreg Sudoe, Funds 2014-2020 (FEDER). From 2021 to 2023. PI: A. Sanz-Cobena, Funding amount COAPA-UPM: 504,081 €.

*Tecnología destinada a la sostenibilidad de los Sistemas Agrícolas* (AGRISOST-CM) (P2018/BAA-4330). CAM and Structural Funds 2014-2020 (ERDF and ESF). Participating entities: UPM, INIA, IMIDRA, CIEMAT, Lab212-UPM, Lab235-IMIDRA. From 2019 to 2022. Project coordinator: A. Vallejo. PI group COAPA-UPM: A. Vallejo. Responsible for Activity "Biofortification of crops by means of nanofertilizers with Zn": A. Obrador. Funding amount COAPA-UPM Group: 343,680 €.

*Efectos sobre los ecosistemas agrícolas de la aplicación de nanopartículas de ZnO* (RTA2013-00091-C02-02). Ministerio de Economía y Competitividad. From 2014 to 2018. PI: A. Obrador. Funding amount: 62,000 €.

### C.4. Contracts, technological or transfer merits

Advisory support to the Spanish Ministry of Agriculture through the *Committee of Experts in Fertilization* (from 2018 to actually) for preparation of legislation issues (such as Ministerial Orders amending RD 506/2013 on fertilizer products, and RD 1051/2022 on Sustainable Nutrition) and trying to find solutions to different technical problems.

Expert 4D (3101–Agrochemistry) Unesco in certification of R&D&I projects for the company Certifica Proyectos ID, S.L.

## **DATOS**

Elvira Esteban Fernández      Dra. en Ciencias Químicas

Profesora Titular de Universidad      (13/10/2011)

Departamento de Química Agrícola y Bromatología      elvira.esteban@uam.es

ORCID: 0000-0001-6693-973X

## **RESUMEN CV**

The common thread of my research activity is the study of the physiological effects of mineral elements in plants, initially working with B and Ca in legumes (Plant Physiology, 1994, 93 times cited), the subject of my Ph D. and a postdoc stay at the University of Bonn (Dr. Heiner Goldbach). Later, I obtained a Postdoctoral Grant from the Caja Madrid Foundation, beginning my work with toxic elements (mainly Cd, Hg, As and Pb). In this line, I would highlight the study of:

a) Phytotoxic effects of heavy metals and As (Plant Science and Plant Physiology & Biochemistry, 2002, with 308 and 171 total citations respectively)

b) White lupin uptake mechanisms for As (New Phytologist, 2003; postdoc stay at the University of Aberdeen, Dr. Andrew A. Meharg) and Hg (Environmental & Experimental Botany, 2008, describing for the first time the kinetic parameters of Hg uptake)

c) Recovery of contaminated soils through phytoremediation, working in real scenarios (Aznaicóllar, Almadén, abandoned mining sites in Madrid and Basque Country), and facing the challenges posed there:

- To evaluate the mobility and dispersion of pollutants and their transfer to native vegetation.
- To select plant species both able to survive in the presence of pollutants and adapted to the environment.
- To select appropriate amendments to reduce the mobility of pollutants (especially in multi-polluted sites), focusing on waste valorization.
- To analyze, using ecotoxicological tests, the impact of these contaminants on the ecosystems, providing information for the application of contaminated soils legislation.

(More than 25 articles in SCI journals, 15 funded projects, participation in two COST networks)

d) Evaluation of the potential agricultural use of Hg contaminated soils as an alternative economic activity to mining (5 SCI publications).

e) Valorization of sewage sludge after thermal treatments as potential fertilizer or soil amendment (1 SCI publication, 16 citations, 2 communications in international meetings).

In the core of this work remains the study of element bioavailability (both nutrients and contaminants), soil health and the mechanisms that govern plant-soil interchanges in the rhizosphere, together with plant metabolic responses. The collaborations with other research organizations (especially in the framework of Programs funded by the Community of Madrid, as IP (Main Researcher and Coordinator for UAM on 1 occasion) have consolidated this line.

I have **supervised 4 Ph. D.** in the Ph. D. Program of the Department of Agricultural Chemistry, with a Mention of Quality (later of Excellence), two of them with a mention of European or International Ph. D. Two of them have now reached permanent positions at UAM and CIEMAT, other as Specialist Technician (permanent position) at the School of Biosciences of the University of Nottigham (UK) and the other one has focused her on educational activities to promote the development of STEM skills (Italy). I have also acted as academic supervisor for 3 Ph.D. students, included in our Ph.D. Program but supervised by other researchers (from CIEMAT or IMIDRA, one co-directed with Hasselt University).

I have actively participated in the **theoretical and practical teaching** at the **undergraduate** level in **Biology, Environmental Sciences, Chemistry and Food Sciences** and supervised **End-of-Degree Projects** (23 + 3 of Erasmus students) and also at **postgraduate level** (Master and Doctoral programs), both in teaching and as M. Sc. Project supervisor (more than 20). I would also highlight my contribution in the **management of postgraduate studies**, as academic secretary of the Master in Agricultural Chemistry and coordinating the design and management of the Master in Agricultural Chemistry and New Foods. I am currently the UAM coordinator of the first official Master's Degree with blended teaching at UAM (Master in Agri-environmental and Agri-food Sciences), joint title with UNED. This Master provide an opportunity to improve their academic level and open new work opportunities to professionals interested in this area, so, in addition to recently graduated students, it also contributes to long-life learning skills. I have also been **coordinator of Student Exchange and Mobility Programs** from the 2000/2001 till 2020/2021 and **part of the Directive Team** of the Agricultural and Food Science Department during the last 5 years.

#### **Recent publications:**

- Suarez, E., Tobajas, M., Mohedano, A.F., Reguera, M., **Esteban, E.**, de la Rubia, A. Effect of garden and park waste hydrochar and biochar in soil application: a comparative study (2023) Biomass Conversion and Biorefinery. 10.1007/s13399-023-04015-0. (Q2)
- MT. Cieschi, M. de Francisco, P. Herrero, J. Sánchez-Marcos, J. Cuevas, **E. Esteban**, JJ Lucena, F. Yunta. Synthesis and Characterization of Nano Fe and Mn (hydr)oxides to Be Used as Natural Sorbents and Micronutrient Fertilizers. Agronomy-Basel 11(9)/nº1876/2021 doi:10.3390/agronomy11091876.(Q1)

- R. Manzano, M. Rosende, A. Leza b, **E. Esteban**, J. M. Peñalosa, M. Miró, E. Moreno-Jiménez. Complementary assessment of As, Cu and Zn environmental availability in a stabilised contaminated soil using large-bore column leaching, automatic microcolumn extraction and DGT analysis. *Science of the Total Environment* 690/ 217–225/ 2019 (Q1)
- R. Manzano, P. Jiménez Peñalver, **E. Esteban**. Synergic use of chemical and ecotoxicological tools for evaluating multi-contaminated soils amended with iron oxides-rich materials. *Ecotoxicology and Environmental Safety* 141/251-258/2017. (Q1)
- E. Moreno-Jiménez, R. Sepúlveda, **E. Esteban**, L. Beesley. Efficiency of organic and mineral based amendments to reduce metal[oid] mobility and uptake (*Lolium perenne*) from a pyritewaste contaminated soil. *Journal of Geochemical Exploration* 174/46–52/2017 (Q2)
- C. García-Gómez; B. Sánchez-Pardo, **E. Esteban**, J.M. Peñalosa, M.D. Fernández. Risk assessment of an abandoned pyrite mine in Spain based on direct toxicity assays. *Science of the Total Environment* 470-471/ 390–399/2014. (Q1, D1)
- R. Manzano, **E. Esteban**, J.M. Peñalosa, P. Alvarenga. Amendment application in a multi-contaminated mine soil: effects on soil enzymatic activities and ecotoxicological characteristics. *Environmental Science and Pollution Research* 21/4539–4550/2014 (Q1).
- R. Millán, **E. Esteban**, P. Zornoza, M.J. Sierra. Could an abandoned mercury mine area be cropped? *Environmental Research* 125/ 150-159/ 2013 (D1, Q1)
- E. Moreno Jiménez, **E. Esteban**, R.O. Carpena Ruiz, M.C. Lobo, J.M. Peñalosa. Phytostabilisation with Mediterranean shrubs and liming improved soil quality in a pot experiment with a pyrite mine soil. *Journal of Hazardous Materials* 201-202/52-59/2012 (Q1,D1).
- E. Moreno Jiménez, **E. Esteban**, J.M. Peñalosa. The fate of Arsenic in Soil-Plant Systems. *Reviews of Environmental Contamination and Toxicology* 215/1-37/2012 (Revisión, Q1, D1)
- E. Moreno Jiménez, S. Vázquez, R.O. Carpena Ruiz, **E. Esteban**, J.M. Peñalosa. Using Mediterranean shrubs for the phytoremediation of a soil impacted by pyritic wastes in Southern Spain: a field experiment. *Journal of Environmental Management* 92/1584-1590/2011 (Q1)

### **Research projects**

- Material valorization of sewage sludge hydrothermal treatment products. TED2021-130287B-I00. 2022-2024. 161.000 €. Participating as: Researcher (1 of 13).
- Modified biochars for agri-environmental applications. UAM- Banco Santander-Asian Cooperation. 2017-2018. 13.000 € Participating as Researcher (1 of 3)
- Added value of plants used in trace element immobilization in soils: bio-energy crops and food safety. CTM2013-48697-C2-2-R. 2014-2016. 163.350 €. Participating as: Researcher (1 of 4)

- Assisted phytostabilization of heavy metal contaminated mine sites: metal-soil-root exudates interaction. AGL2012-39715-C03-03. 2013-2015. Participating as Researcher (1 of 5)
- Assisted phytostabilization of trace element contaminated sites: optimization of the plant-amendment combination for each scenario. CTM 2010-21922-CO2-02. 2011-2013. 181.500 € Participating as Researcher (1 of 7)
- Technologies for the evaluation and recovery of contaminated sites (EIADES) Autonomous Community of Madrid S2009AMB-1478. 2010-2013. 97.788 € PI: Elvira Esteban Fernández. UAM Research Group formed by 9 members. (Program coordinator: M<sup>a</sup> Carmen Lobo Bedmar)

COST “TD 1407 Network on technology-critical elements — from environmental processes to human health threats”. 2015-2019.

COST “CA19116 Trace metal metabolism in plants”. 2020-2024 (Eduardo Moreno as Spanish member of the Management Committee).

Regarding transference of knowledge to the society, I have participated as speaker in training courses for professionals organized by the Department of Training in Energy, Environment and Biotechnology (CIEMAT) and the EIADES-Community of Madrid Program, course title: Soil degradation and recovery processes (5 h) and also as speaker in the Annual Meeting of the UNESCO Chair UNED- Triptolemos Foundation, in the topic: “Science and Innovation for Sustainable Development: Global Food Production and Safety” (2016)

**Teaching periods: 5                      Research periods: 4 (last in 2018)**

**Total Journals: 48 (WOS), 53 (Scopus); Q1 Journals: 26 (WOS), 37 (Scopus)**

**H index: 27 (Scopus), 24 (WOS)**

**Total Scopus cites: 2400                      Total WOS cites:2019**

<b>DATOS PERSONALES</b>	
Nombre	Jesús Manuel
Primer apellido	Peñalosa
Segundo apellido	Olivares
Correo electrónico	jesus.olivares@uam.es
Fecha de nacimiento	
DNI	
<b>DATOS ACADÉMICOS Y SITUACIÓN PROFESIONAL</b>	
Grado y titulación	Doctor en Ciencias (Sección Químicas)
Categoría profesional	Profesor Titular de Universidad
Vinculación con la entidad	Funcionario
CÓDIGO ORCID (NNNN-NNNN-NNNN-NNNA)	0000-0003-1917-7298
<p><b>Resumen CV (máximo 8000 caracteres)</b></p> <p>He trabajado en el campo de la Nutrición Mineral de los cultivos, Cultivos Hidropónicos y Fertirrigación de cultivos hortícolas. en el estudio de la dinámica de los elementos traza en el sistema suelo-planta y la fitorremediación de suelos. Soy coordinador del grupo de investigación UAM C-129 “Metales pesados en plantas superiores. Fitorremediación”. Tengo cinco sexenios de investigación. 22 de mis artículos están en el primer cuartil (Q1) y 8 en el primer decil. He dirigido cuatro tesis doctorales ya leídas. He dirigido como IP dos proyectos competitivos financiados por el Ministerio de Economía e Innovación. Soy revisor de proyectos de investigación y de varias revistas en las áreas de Ciencias Ambientales y Ciencias del suelo. He participado en las acciones COST 837 859. He sido miembro del Comité Técnico de Normalización del AEN/CTN 77 Medioambiente SC Suelos, de AENOR para la Revisión y elaboración de normas UNE (1999-2006). Fui secretario del Departamento de Química Agrícola, Geología y Geoquímica (20021-2004), y, desde 1/11/2020 hasta 31/12/2024, he sido director del Departamento de Química Agrícola y Bromatología de la Universidad Autónoma de Madrid.</p> <p><b>Indicadores generales</b></p> <p>5 sexenios de investigación (último concedido: 31 de MAYO del 2021.  4 tesis finalizadas  83 publicaciones; 67 artículos  Citas, Google Scholar: 2205; Citas, ISI-WOS: 1208  22 publicaciones en el primer cuartil (Q1), 8 en el primer decil (D1).  Índice h: 24; 18 (SI-WOS); 20 (SCOPUS)  Índice i10: 36</p> <p><b>Publicaciones relevantes últimos años</b></p> <p>-E Moreno Jiménez, N Ferrol, N Corradi, JM Peñalosa, MC Rillig  The potential of arbuscular mycorrhizal fungi to enhance metallic micronutrient uptake and mitigate food contamination in agriculture: prospects and challenges. <i>New Phytologist</i> (2023).  <a href="https://doi.org/10.1111/nph.19269">https://doi.org/10.1111/nph.19269</a></p> <p>-T Fresno, JM Peñalosa, M. Flagmeier, E Moreno-Jiménez.  Aided phytostabilisation over two years using iron sulphate and organic amendments: Effects on soil quality and rye production. <i>Chemosphere</i> (2020) doi /10.1016/j.chemosphere.2020, 240, 124827 (I.i=5,78 / Q1)</p> <p>- R. Manzano, M. Rosende, A. Leza, E. Esteban, J. M. Peñalosa, M. Miró, E. Moreno-Jiménez.  Complementary assessment of As, Cu and Zn environmental availability in a stabilised contaminated soil using large-bore column leaching, automatic microcolumn extraction and DGT analysis. <i>Science of The Total Environment</i> (2019). Vol 690, 10, 217-225 (I.i=6,55 / Q1 D1)</p> <p>-S. Aceña-Heras, J. Novak, M. L. Cayuela, J. M. Peñalosa and E. Moreno-Jiménez.  Influence of Pyrolyzed Grape-Seeds/Sewage Sludge Blends on the Availability of P, Fe, Cu, As and Cd to Maize. <i>Agronomy-Basel</i> (2019) 9, 406; doi:10.3390/agronomy9070406 (I.i=2,60 / Q2; Q1)</p>	

-T Fresno, E Moreno-Jiménez, P Zornoza, JM Peñalosa  
Aided phytostabilisation of As-and Cu-contaminated soils using white lupin and combined iron and organic amendments. *Journal of environmental management* (2018) 205, 142-150 (I.i=4,005 / Q1)

-T Fresno, JM Peñalosa, J Santner, M Puschenreiter, E Moreno-Jiménez.  
Effect of *Lupinus albus* L. root activities on As and Cu mobility after addition of iron-based soil amendments. *Chemosphere* 182 (2017) 373-381. DOI 10.1016/j.chemosphere.2017.05.034. (I.i=4,43 / Q1)

-Teresa Fresno, Eduardo Moreno-Jiménez, Jesús M Peñalosa.  
Assessing the combination of iron sulfate and organic materials as amendment for an arsenic and copper contaminated soil. A chemical and ecotoxicological approach. *Chemosphere* 165 (2016) 539-546. DOI 10.1016/j.chemosphere.2016.09.039. (I.i=4,21 / Q1)

-Teresa Fresno, Jesús M Peñalosa, Jakob Santner, Markus Puschenreiter, Thomas Prohaska, Eduardo Moreno-Jiménez.  
Iron plaque formed under aerobic conditions efficiently immobilizes arsenic in *Lupinus albus* L roots. *Environmental Pollution* 216 (2016) 215-222. DOI 10.1016/j.envpol.2016.05.071. (I.i=4,839 / Q1; D1)

-R. Manzano; Esteban, E.; Peñalosa J.M; Alvarenga, P.  
Amendment application in a multi-contaminated mine soil: Effects on soil enzymatic activities and ecotoxicological characteristics. *Environmental Science and Pollution Research* (2014) 21:4539–4550. (I.i=2,83 / Q1)

-C. García-Gómez; Sánchez-Pardo, B; Esteban, E.; Peñalosa, J.M.; Fernández, M.D.  
Risk assessment of an abandoned pyrite mine in Spain based on direct toxicity assays. *Science of the Total Environment* 470-471 (2014) 390–399. (I.i=4,10 / Q1 D1):

-E. Moreno-Jiménez; Esteban, E.; Carpena-Ruiz, R.O.; Lobo, M.C.; Peñalosa, J.M.  
Phytostabilisation with Mediterranean shrubs and liming improved soil quality in a pot experiment with a pyrite mine soil. *Journal of Hazardous Materials* 201– 202 (2012) 52– 59. (I.i=3,93 / Q1 D1)

-E. Moreno-Jiménez; Esteban, E. and. Peñalosa, J.M.  
The Fate of Arsenic in Soil-Plant Systems. *Reviews of Environmental Contamination and Toxicology* 215, (2012) 1-37 (I.i=4,13 / Q1 D1)

-E. Moreno-Jiménez García-Gómez, C; Oropesa, A.L.; Haro, A.; Esteban, E.; Carpena-Ruiz, R.; Tarazona, J.V.; Peñalosa, J.M.; Fernández, M.D.  
Screening risk assessment tools for assessing the environmental impact in an abandoned pyritic mine in Spain. *Science of the Total Environment* 409 (2011) 692–703 (I.i=3.29 / Q1)

-E Moreno-Jiménez; Vázquez, S; Carpena-Ruiz, RO; Esteban, E; Peñalosa, JM.  
Using Mediterranean shrubs for the phytoremediation of a soil impacted by pyritic wastes in Southern Spain: a field experiment. *Journal of Environmental Management* 92 (2011) 1584-1590 (I.i=3.25 / Q1)

-S Vázquez; Hevia, A; Moreno, E; Esteban, E; Peñalosa, J.M. and Carpena, R.O.  
Natural attenuation of residual heavy metal contamination in soils affected by the Aznalcóllar mine spill. *Journal of Environmental Management* 92 (2011) 2069-2075. (I.i=3.25 / Q1)

Autores: E. Moreno-Jiménez, R. Manzano, E. Esteban, J. Peñalosa.

-E. Moreno-Jiménez, E. Esteban, T. Fresno, C. López de Egea, J.M. Peñalosa.  
Hydroponics as a valid tool to assess arsenic availability in mine soils. *Chemosphere* 79 (2010) 513–517 (I.i=3.16 / Q1)

### **Proyectos I+D relevantes.**

- Valorización material de los productos del tratamiento hidrotermal de lodos de depuradora. SLUDGEVALOR. TED2021-130287B-I00. MINISTERIO DE CIENCIA E INNOVACIÓN. PROYECTOS DE TRANSICIÓN ECOLÓGICA Y TRANSICIÓN DIGITAL 2021  
Entidades: Universidad Autónoma de Madrid. 2023-2024. 146.500,00 €. IP: M de los Ángeles de la Rubia Romero

- Aplicaciones de biochars modificados para gestión agro-ambiental. 2017//ASIA/07. UAM-Banco Santander. PROYECTOS DE COOPERACIÓN INTERUNIVERSITARIA UAM-SANTANDER con Asia. Entidades: Universidad Autónoma de Madrid. 2017-2018. 13000 €. IP: Eduardo Moreno Jiménez
- Valor añadido del uso de plantas en la inmovilización de elementos traza en el suelo. Cultivos bio-energéticos y seguridad alimentaria. VALIN. CTM2013-48697-C2-2-R. MINECO. Entidades: Universidad Autónoma de Madrid. 2014 – 2016. 163.350,00 € IP: Eduardo Moreno Jiménez
- Fitoestabilización asistida de emplazamientos contaminados por elementos traza. Selección de la combinación planta-enmienda adecuadas para cada escenario. COMFITES”. CTM2010-21922-C02-02. MICINN. 2011-2013. 181500 €. IP: Jesús M. Peñalosa Olivares.
- Technologies for the evaluation and recovery of contaminated sites. 2010-2013. Autonomous Community of Madrid S2009AMB-1478. Comunidad de Madrid (CONVOCATORIA DE PROGRAMAS DE I+D EN TECNOLOGÍAS/2009). 2009-2013. 100000 €. IP: Elvira Esteban Fernández. IP Programa: M. Carmen Lobo Bedmar (IMIDRA)
- Combination of phytoextraction, phytostabilization and revegetation for mine spill contaminated soils. Actuación combinada de fitoextracción, fitoestabilización y revegetación de suelos contaminados por residuos mineros. ACOFI. CTM2007-66401-CO2-02. DGI-MCyT. 2007-2010. 223850 €. IP: Jesús M. Peñalosa Olivares.
- Evaluation of environmental impact and site recovery of contaminated environments. EIADES S-0505/AMB/0296. Entidad Financiadora: Comunidad de Madrid S-0505/AMB/0296. 2006-2009. 79754,79 €. IP: Ramón O. Carpena Ruiz. IP programa: M. Carmen Lobo Bedmar (IMIDRA).
- Phytoremediation of heavy metal contaminated soils. Selection of plant species and stress bioindicators. DGI-MCyT CTM2004-06715-CO2-01. 2005-2008. 168 000 €. IP: Ramón O. Carpena Ruiz
- Evaluation of environmental impact and site recovery of contaminated environments. EIADES S-0505/AMB/0296. Comunidad Autónoma de Madrid S-0505/AMB/0296. 2006-2009. 79754,79 €. IP: Ramón O. Carpena Ruiz. IP programa: M. Carmen Lobo Bedmar (IMIDRA)
- Phytoremediation of heavy metal contaminated soils. Selection of plant species and stress bioindicators. DGI-MCyT CTM2004-06715-CO2-01. 2005-2008. 168 000 €. IP: Ramón O. Carpena Ruiz
- Use of non-accumulator plants for the phytoremediation of contaminated soils. -DGI-MCyT REN 2001-1113-C02-01. 2001-2004.: 76581 €. IP: Ramón O. Carpena Ruiz
- Closed System for water and nutrient management in horticulture. EC (key action 5. Sustainable agriculture, fisheries and forestry, and integrated development of rural areas including mountain areas) N° REF.: QLRT 199931301. 2001-2004. 139744 €. IP: Agustín Gárate Ormaechea

Para la sección de capacidad formativa necesitamos la siguiente información:

**1.1. Tesis realizadas o en curso en el ámbito del equipo de investigación (últimos 10 años). *Thesis completed or in progress within the scope of the research team (last 10 years).***

Título: Iron and organic amendments for the remediation of arsenic- and copper-contaminated soils / Enmiendas de hierro y materiales orgánicos para la recuperación de suelos contaminados con arsénico y cobre.

Ph. D. student: **Teresa Fresno García**. Universidad: Autónoma de Madrid. Facultad de Ciencias. Año: 2017 Sobresaliente “Cum laude” Tesis con Mención de Doctor Europeo.

**1.2. Desarrollo científico o profesional de los doctores/as egresados/as. *Scientific or professional development of graduate doctors.***

M<sup>a</sup> Teresa Fresno tiene actualmente un contrato de Profesora Ayudante Doctora (UAM).

**Part A. Personal Information**

<b>DATE</b>	04/02/25
-------------	----------

Surname(s)	Pérez Torralba	
Forename	Marta	
Social Security, Passport, ID number		
Researcher codes	Researcher ID (*)	A-5789-2012
	SCOPUS Author ID(*)	6602249732
	Open Researcher and Contributor ID (ORCID)	0000-0003-0563-8153

**Part B. Free Summary of CV**

I graduated with Bachelor Degree in Chemistry in Chemistry from the University of Alcalá de Henares in 1997. I carried out my final year project at the Instituto de Química Orgánica, CSIC (Spanish National Research Council) under the supervision of Dr. Cristina Vicent where I developed the skills necessary to work in a chemistry research laboratory. Soon before I completed my final year project, I was awarded a doctoral fellowship to join the group of Prof. R.M. Claramunt in the Dept of Organic and Bio-Organic Chemistry to carry out research work under her and Prof. D. Sanz del Castillo. This research work led to the completion of my Doctoral Degree in 2002. The title of the dissertation was “Transferencias Intra- e Intermoleculares de Protón en Sistemas Conjugados”, and defended with highest honors: Apto Cum Laude (European Ph.D.).

During my doctoral research period I was a predoctoral researcher in the following research project : “Ingeniería de Cristales: Utilización de puentes de hidrógeno y otras interacciones intermoleculares para el diseño de cristales y la predicción del empaquetamiento” (Nº PB96-0001-CO3). Also, during this period, I spent three months in the laboratory of Prof. Dr. Wolfgang Holzer (Dept. of Pharmaceutical Chemistry, University of Vienna) where I worked on the project entitled “Pyrazolones as educts for the construction of condensed heterocyclic systems”. This short stay was a very fulfilling experience from the scientific and personal point of view.

Also, during this period I carried out collaborative research with Prof, H.-H. Limbach (Freie Universität Berlin) and Prof. L. Emsley (Université de Lyon).

After completing my doctoral degree, I was hired to carry out research work at the University of Alcalá de Henares in the Dept of Organic Chemi where I was involved in a joint Project between the University of Alclaá de Henares and Almirall-Prodesframa entitled “Chemochine Receptors Antagonists CCR1”, under the supervision of Prof. Dr. Julio Álvarez-Builla. This helped me to understand and acquire expertise in the methodology used in the pharmaceutical industry.

In 2003, I was appointed as postdoctoral fellow at the Dpto. de Química Orgánica y Bio-Organica, to work in the research project “Synthesis and molecular recognition studies of benzazoles with Nitric Oxide Synthetases” funded by the Spanish Government research grants BQU2000-0252 and BQU2003-00976. After this four year period, my contract was renewed for an additional year to continue my research activity, being actively involved in the project entitled “Molecular Recognition: application to bio-organic systems”. During this year I also taught a course from the Environmental Science degree course entitled Recycling and Waste Management.

At the end of 2008, I was appointed as Assistant Professor where I continued my research and teaching duties. In may 2010, I was promoted to Associate Professor and got tenure in March 2018.

I have authored more than 31 publications in top journals and results have been presented in national and international conferences. My research activity has been awarded with 3 recognized research periods (sexenio).

Publications in Web of Science: 33

Sum of times Cited: 946

Citing Articles: 760

h-index: 18

Relevant publications:

- Ortíz de Zárate, Ana; Pérez-Torralba, Marta; Bonet Isidro, Iñigo; et al.; Lavandera, José Luis. 2021. 1,5-Benzodiazepin-2(3H)-ones: In Vitro Evaluation as Antiparkinsonian Agents. Antioxidants. 10-10. ISSN 2076-3921.
- Marín-Luna, Marta; Claramunt, Rosa M.; López, Concepción; Pérez-Torralba, Marta; Sanz, Dionisia; Reviriego, Felipe; Alkorta, Ibon; Elguero, José. 2020. A GIPAW versus GIAO-ZORA-SO study of <sup>13</sup>C and <sup>15</sup>N CPMAS NMR chemical shifts of aromatic and heterocyclic bromo derivatives. Solid State Nuclear Magnetic Resonance. 108, pp.101676-101676. ISSN 0926-2040.
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- Webber, Amy L.; Yates, Jonathan R.; Zilka, Miri; Pérez-Torralba, Marta; et al; Brown, Steven P. 2020. Weak Intermolecular CH...N Hydrogen Bonding: Determination of <sup>13</sup>CH-<sup>15</sup>N Hydrogen-Bond Mediated J Couplings by Solid-State NMR Spectroscopy and First-Principles Calculations. The Journal of Physical Chemistry A. 124-3, pp.560-572.
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- Ibon Alkorta; José Elguero; Marta Pérez-Torralba; Concepción López; Rosa M. Claramunt. 2015. A theoretical and experimental study of the NMR spectra of 4,5,6,7-tetrafluorobenzazoles with special stress on PCM calculations of chemical shifts. MAGNETIC RESONANCE IN CHEMISTRY. Wiley Online Library. 53, pp.353-362. ISSN 0749-1581.
- Claramunt, Rosa M; Pérez-Torralba, Marta; García, M. Ángeles; López, Concepción; Torralba, M. Carmen; Torres, M. Rosario; Alkorta, Ibon; Elguero, José. 2014. Intermolecular Hydrogen and Halogen Bonds in Fluorinated Benzimidazoles. Acta Crystallographica Section A. 70-a1, pp.C643-C643.
- M. Pérez-Torralba; M. A. García; C. López; M. C. Torralba; M. R. Torres; R. M. Claramunt; J. Elguero. 2014. Structural Investigation of Weak Intermolecular Interactions (Hydrogen and Halogen Bonds) in Fluorine-Substituted Benzimidazoles. Crystal Growth & Design. ACS Publications. 14, pp.3499-3509.
- Rosa María Tejedor; Santiago Uriel; Sara Graus; Marta Pérez-Torralba; et al; José Elguero. 2013. A Facile Method to Determine the Absolute Structure of Achiral Molecules: Supramolecular-Tilt Structures. Chemistry A European Journal. Wiley. 19, pp.6044-6051. ISSN 0947-6539.
- Marta Pérez-Torralba; Rosa M. Claramunt; M. Ángeles García; Concepción López; M. Carmen Torralba; M. Rosario Torres; Ibon Alkorta; José Elguero. 2013. Structure of 1,5-benzodiazepinones in the solid state and in solution: Effect of the fluorination in the six-membered ring. Beilstein Journal of Organic Chemistry. 9, pp.2156-2167. ISSN 1860-5397.

The last research Projects that I participated in are:

- UNED. New PhotoActive hydrazone biobased Materials to promote Sustainable Industrial Applications. Type of participation: Researcher.
- MINECO-CTQ2014-56833-R. Identification of new chemotypes with antioxidant properties: synthesis and applications in different pathologies. Type of participation: Researcher.
- MCINN-CTQ2010-16122. The hydrogen bond and its influence on the structure of crystals and host-guest complexes. Type of participation: Researcher.

- MEC-CTQ2007-62113/BQU. Molecular recognition Applications to bio-organic systems and the development of NOS inhibitors. Type of participation: Researcher.