

CURRICULUM VITAE ABREVIADO (CVA)

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

Part A. PERSONAL INFORMATION

First name	Fca. Mónica		
Family name	Calero de Hocés		
Gender (*)		Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail	mcalero@ugr.es		URL Web
Open Research and Contributor ID (ORCID)(*) 0000-0001-8029-8211			

(*) Mandatory

A.1. Current position

Position	Full Professor		
Initial date	27/12/2017		
Institution	University of Granada		
Departament/Center	Chemical Engineering Department		
Country	Spain	Teleph. number	958243315
Key words	Adsorption / Thermochemical processes / Residual biomass / Plastic waste / Industrial by-products / Waste and biomass valorization / Mechanical Recycling / Chemical Recycling/ Biosorbents		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
25/10/1994-30/09/1996	Associate Professor type 2/University of Granada/Spain
30/09/1996-30/09/1998	Associate Professor type 3/University of Granada/Spain
01/10/1998-16/01/1999	Senior lecturer interim/University of Granada/Spain
17/01/1999-26/12/2017	Senior Lecturer/University of Granada/Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Chemistry - Licensed	University of Granada	1989
Chemistry-PhD	University of Granada	1994

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

I am responsible for the Research Group "Waste Recovery Technologies and Catalytic Processes (RNM-152)" since 2009. My research work begins with the research line "Use of natural resources" (1990-2004), dedicated to the separation of celestine and calcite. I worked in the line of concentration of minerals, mainly by flotation and studies of solid-liquid-gas interface, whose produce the realization of both my undergraduate thesis and my doctoral thesis on concentration of celestine with mineral from the mines of Montevives and Escúzar located in Granada (Spain).

Since 2005, the Research Group has been focused on two lines of work: the treatment of industrial effluents containing heavy metals through biosorption and the energy recovery of solid wastes, including the exhausted biosorbents. In the first of the lines, the practical application of biosorption has been raised, using real wastewater supplied by industries that have shown interest in the results. Currently, the study of different aspects that are still underdeveloped, such as the scale-up or the reuse or destination of the exhausted biosorbent has been analyzed. On the other hand, research is also being directed towards the use of biosorption for the removal of emerging pollutants. The second line of research,



energy recovery of solid waste, has undergone a great push following the recent granting of a project of the challenges call of 2016, which contemplates the use of the olive cake in a biorefinery scheme, mainly for obtaining products of interest and a gaseous fuel.

In 2017 a new line of research was initiated about the use of plastics from the mixed fraction of the municipal solid waste through mechanical recycling to obtain recycled film (the Group participates as a partner in tow European Project granted in the LIFE 2017 and 2018 call). In addition, work is currently being carried out on the pyrolysis of plastic materials to obtain a fuel oil.

Finally, the group has started again the research related to the use of geological-mining deposits. Two lines are being worked on, on the one hand the treatment of some rubble and on the other in the flotation of fluorite. Also, with two contracts with Solvay Minerales SAU, the celestine flotation has been carry on, working on the improvement and optimization of the process from an environmental point of view.

With regard to training activities, I have directed a large number of final degree and master's projects, as well as other initial research project and PhD Thesis.

I have participated in 32 research projects (15 as main researcher) and in 21 research contracts (18 as main researcher). Thesis supervised: 11; Thesis in process: 3; JCR articles: 83 (Q1); Cites: 5423 (12/01/2023); h Index*: 40; i10 Index*: 85.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

1. Paucar-Sánchez, M.F.; **Calero, M.**; Blázquez, G.; Solís, R.R.; Muñoz-Batista, M.J.; Martín-Lara, M.A. Thermal and catalytic pyrolysis of a real mixture of post-consumer plastic waste: An analysis of the gasoline-range product. *Process Safety and Environmental Protection* 168, 1201-1211 (2022).
2. Martín-Lara, M.A.; Moreno, J.A.; Garcia-Garcia, G.; Arjandas, S.; **Calero, M.** Life cycle assessment of mechanical recycling of post-consumer polyethylene flexible films based on a real case in Spain. *Journal of Cleaner Production* 365, 132625 (2022).
3. Martín-Lara, M.A., Godoy, V., Quesada, L., Lozano, E.J., **Calero, M.** Environmental status of marine plastic pollution in Spain. *Marine Pollution Bulletin* 170,112677 (2021).
4. Iáñez-Rodríguez, I., Martín-Lara, M.A., Blázquez, G., **Calero, M.** 2021. Effect of different pre-treatments and addition of plastic on the properties of bio-oil obtained by pyrolysis of greenhouse crop residue. *Journal of Analytical and Applied Pyrolysis* 153, 104977.
5. Martín-Lara, M.A., Piñar, A., Ligeró, A., Blázquez, G., **Calero, M.** 2021. Characterization and use of char produced from pyrolysis of post-consumer mixed plastic waste. *Water* 13, 1188.
6. Fernández-González, R., Martín-Lara, M.A., Blázquez, G., Tenorio, G., **Calero, M.** 2020. Hydrolyzed olive cake as novel adsorbent for copper removal from fertilizer industry wastewater. *Journal of Cleaner Production* 268, 121935.
7. Soto, J.M., Martín-Lara, M.A., Blázquez, G., Godoy, V., Quesada, L., **Calero, M.** 2020. Novel pre-treatment of dirty post-consumer polyethylene film for its mechanical recycling. *Process Safety and Environmental Protection* 139, 315-324.
8. Godoy, V., Martín-Lara, M.A., **Calero, M.**, Blázquez, G. 2020. The relevance of interaction of chemicals/pollutants and microplastic samples as route for transporting contaminants. *Process Safety and Environmental Protection* 138, 312-323.
9. Quesada-Lozano, L., **Calero, M.**, Martín-Lara, M.A., Pérez, A., Blázquez, G. 2019. Characterization of fuel produced by pyrolysis of plastic film obtained of municipal solid waste. *Energy* 186, 115874.

C.2. Congress

1. **Calero, M.**, Martín-Lara, M.A., Blázquez, G., Arjandas, S., Pérez, M. Characterization of landfill gas composition for the production of biomethane. International Scientific Conference on Earth&Planetary Science. Oral. International. 6-9/12/2022, Viena (Austria).
2. **Calero, M.**, Ligeró, A., Blázquez, G., Pérez, A., Muñoz-Batista, M.J., Martín-Lara, M.A. Aprovechamiento del char obtenido en la pirólisis de residuos plásticos como adsorbente de CO₂. *Recuwaste 2021. Resources and Life*. Oral. International. 26/10/2021 - 27/10/2021. Mataró (Barcelona).
3. Martín-Lara, M.A., Blázquez, G., Piñar, A., Paucar, M.F., **Calero, M.** Turning non-recyclable mixed plastic from municipal solid waste into valuable chemicals and carbon



- materials (VALORPLASTIC). International Congress of Chemical and Process Engineering. Poster. International. 15/03/2021 - 18/03/2021. República Checa.
4. **Calero, M.**, Martín-Lara, M.A., Pérez, A., Blázquez, G., Muñoz-Batista, M.J., Arjandas, S., Lozano, E.J. Plastic mix recycling from municipal solid waste: characterization of raw material. 5TH SYMPOSIUM ON URBAN MINING AND CIRCULAR ECONOMY. Oral. International. 18/11/2020 - 20/11/2020. Bolonia (Italia).
 5. Blázquez, G., **Calero, M.**, Lozano, E.J., Martín-Lara, M.A., Muñoz-Batista, M.J., Pérez, A., Arjandas, S. New products from non-recyclable plastics from municipal solid waste. Life4Film and LifePlasMix projects. Symposium on Marine Pollution. Poster. International. 18/06/2020 - 19/06/2020. Lugar: Granada.
 6. Martín-Lara, M.A., Quesada, L.M., **Calero, M.**, Godoy, V., Peula, F.J., Pérez, A., Blázquez, G. Effect of operating conditions on the liquid fraction obtained in the pyrolysis process of plastic film waste. 3rd ANQUE-ICCE International Congress of Chemical Engineering. Poster. International. 19/06/2019 - 21/06/2019. Santander.
 7. **Calero, M.**, Martín-Lara, M.A., Godoy, V., Quesada, L.M., Martínez, D., Peula, F.J., Soto, J.M. Characterization of plastic materials presented in mixed municipal solid waste. Preliminary study for their mechanical recycling. Fourth Symposium on Urban Mining. Oral. International. 21/05/2018 - 23/05/2018. Bergamo (Italia).

C.3. Research projects

1. Project Title: ADSORBENTES DE BAJO COSTE PREPARADOS A PARTIR DE RESIDUOS PLÁSTICOS ORIENTADOS A LA SEPARACIÓN DE CO₂ DE BIOGÁS (ADSORCHAR).
Financing entity: Ministerio de Ciencia e Innovación – Proyectos I+D+i Pruebas de Concepto 2022 (Plan de Recuperación, Transformación y Resiliencia)
Participant entity: Departamento de Ingeniería Química UGR. Grupo RNM 152
Duration, from: 01-12-2022 to: 31-12-2024. Amount 115.000 €
Principal researcher: **F^a Mónica Calero de Hoces/M^a Ángeles Martín Lara**
2. Project Title: DESARROLLO DE UN MATERIAL CARBONOSO DE BAJO COSTE A PARTIR DEL CHAR DE PIRÓLISIS DE RESIDUOS PLÁSTICOS POST-CONSUMO Y SU APLICACIÓN A LA DEPURACIÓN DE EFLUENTES (CARBOPLASTIC)
Financing entity: Ministerio de Ciencia e Innovación – Proyectos orientados a la Transición Ecológica y a la Transición Digital (Plan de Recuperación, Transformación y Resiliencia)
Participant entity: Departamento de Ingeniería Química UGR. Grupo RNM 152
Duration, from: 01-12-2022 to: 30-12-2024. Amount 129.950 €
Principal researcher: **F^a Mónica Calero de Hoces/M^a Ángeles Martín Lara**
3. Project Title: DESARROLLO DE MATERIALES DE CARBONO DE BAJO COSTO PARA APLICACIONES AGROAMBIENTALES EN EL MARCO DE ECONOMÍA CIRCULAR Y MITIGACIÓN DEL CAMBIO CLIMÁTICO (AGROMICAT)
Financing entity: Ministerio de Ciencia e Innovación – Proyectos de colaboración público-privada (Plan de Recuperación, Transformación y Resiliencia)
Participant entity: Grupo Layna, UGR, Ecocuadrado, Neoliquide, UAH
Duration, from: 01-07-2022 to: 30-12-2024. Amount 1.255.474 €
Principal researcher UGR: **F^a Mónica Calero de Hoces/M^a Ángeles Martín Lara**
4. Project title: VALORIZACIÓN DE RESIDUOS PLÁSTICOS PROCEDENTES DE LA FRACCIÓN RECHAZO DE LAS PLANTAS DE TRATAMIENTO DE RESIDUOS SÓLIDOS URBANOS MEDIANTE PIRÓLISIS (PYROMIX). P20_00167
Financing entity: Consejería de Transformación Económica, Industria, Conocimiento y Universidades. Junta de Andalucía.
Participant entity: Departamento de Ingeniería Química UGR. Grupo RNM 152
Duration, from: 04-10-2021 until: 30-06-2023. Amount 67.200 €
Principal researcher: **F^a Mónica Calero de Hoces**
5. Project title: INTEGRAL MANAGEMENT OF THE BIOGAS FROM LANDFILLS FOR USE AS VEHICLE FUEL. LIFE18 ENV/ES/000256
Financing entity: EUROPEAN COMMISSION
Participant entity: FCC MA, IVECO, SEAT, GASNAM, CARTIF, SYSADVANCE, UGR
Duration, from: 01-07-2019 until: 30-06-2023. Amount 2.466.777 €
Principal researcher UGR: **F^a Mónica Calero de Hoces**



6. Project title: PLASTIC MIX RECOVERY AND PP AND PS RECYCLING FROM MUNICIPAL SOLID WASTE. LIFE18 ENV/ES/000045
Financing entity: EUROPEAN COMMISSION
Participant entity: FCC MA, ANAIP, ANDALTEC, LINDNER, STADLER, PELLENC, UGR
Duration, from: 01-07-2019 until: 31-12-2022. Amount 1.888.608 €
Principal researcher UGR: **Fca Mónica Calero de Hoces**
7. Project title: CONVIRTIENDO EL PLÁSTICO MEZCLA NO RECICLABLE DE RESIDUOS SÓLIDOS MUNICIPALES EN PRODUCTOS QUÍMICOS Y MATERIALES CARBONOSOS DE ALTO VALOR
Financing entity: MINISTERIO DE CIENCIA E INNOVACIÓN
Participant entity: DEPARTAMENTO DE INGENIERÍA QUÍMICA DE LA UNIVERSIDAD DE GRANADA (GRUPO RMM-152)
Duration, from: 30-07-2020 until: 30-07-2023. Amount 108.900 €
Principal researcher UGR: **Fca Mónica Calero de Hoces**

C.4. Contracts, technological or transfer merits

1. **Contract title:** Ejecución de tareas en el marco del Proyecto Europeo CIRCULAR ECOLOGICAL ESSENTIAL & CRITICAL RAW MATERIALS (ROTATE).
Company/Administration: CANTERAS INDUSTRIALES SL.
Participant entity: University of Granada. Research groups "Concentración de Sólidos y Biorrecuperación (RNM-152)" and "Mineralogía y Geoquímica de los Ambientes Sedimentario y Metamórfico (RNM179)".
Duration, from: 24-10-2022 to 14-10-2026 Total contract budget: 81.021,6 €
Principal researcher: **Fª Mónica Calero de Hoces/Mario J. Muñoz Batista**
2. **Contract title:** Estudio de investigación para la mejora en los procesos de utilización de biomasa como combustible.
Company/Administration: Centro de Investigación y Análisis Watt S.L.
Participant entity: University of Granada. Research groups "Tecnologías de Valorización de Residuos y Procesos Catalíticos (RNM-152)".
Duration, from: 15-03-2022 to 15-03-2023 Total contract budget: 6.991,11 €
Principal researcher: **Fª Mónica Calero de Hoces/Antonio Pérez Muñoz**
3. **Contract title:** OPTIMIZACIÓN DE MEDIO DENSO MEDIANTE HYDROCICLÓN A ESCALA LABORATORIO PARA LA CONCENTRACIÓN DE MINERAL DE CELESTINA
Company/Administration: Canteras Industriales, S.L.
Participant entity: University of Granada. Research groups "Concentración de Sólidos y Biorrecuperación (RNM-152)" and "Mineralogía y Geoquímica de los Ambientes Sedimentario y Metamórfico (RNM179)"
Duration, from: 11-11-2021 until 10-08-2022 Total contract budget: 14.775,44 €
Principal researcher: **Fª Mónica Calero de Hoces/Alejandro Rodríguez Navarro**
4. **Contract title:** ESTUDIO DE ASESORAMIENTO Y APOYO PARA LA VALORIZACIÓN Y RECICLADO DE RESIDUOS
Company/Administration: FCC Medio Ambiente S.A.
Participant entity: University of Granada. Chemical Engineering Department. Research group "Concentración de sólidos y biorrecuperación"
Duration, from: 16-04-2021 until 15-07-2022 Total contract budget: 33.409,17 €
Principal researcher: **Fª Mónica Calero de Hoces**
5. **Contract title:** ASESORAMIENTO EN EL ÁMBITO DE LA GESTIÓN DE RESIDUOS
Company/Administration: Soluciones Ambientales Granada S.L.
Participant entity: University of Granada. Chemical Engineering Department. Research group "Concentración de sólidos y biorrecuperación"
Duration, from: 13-02-2021 until 12-02-2023 Total contract budget: Open contract
Principal researcher: **Fª Mónica Calero de Hoces/Mª Ángeles Martín Lara**

Patents

Authors: Pérez Muñoz, Antonio. Blázquez García, Gabriel. Calero de Hoces, Francisca Mónica. Martín Lara, Mª Ángeles.
Title: PROCEDIMIENTO PARA LA OBTENCIÓN DE POLIOLES Y OTROS COMPUESTOS DE INTERÉS A PARTIR DE RESIDUOS PROCEDENTES DE ALMAZARAS.
Application number: P201830627 Priority country: Spain
Application date: 21/06/2018 Titular entity: University of Granada