MINISTERIO DE CIENCIA E INNOVACIÓN

Cofinanciado por la Unión Europea

AGENCIA ESTATAL DE INVESTIGACIÓN

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

CV date	15/01/2023

First name	MARÍA DOLORES		
Family name	MERCHÁN MORENO		
Gender (*)	MUJER	Birth date (dd/mm/yyyy)	29/10/1965
Social Security, Passport, ID number	07858922Y		
e-mail	mdm@usal.es	https://lbt.usal.es/staff-member/ma-dolores-merchan-moreno/	
Open Researcher and Contributor ID (ORCID) (*)		0000-0003-3573-3805	

(*) Mandatory

A.1. Current position

Position	Professor of University			
Initial date	23/12/1999			
Institution	University of Salamanca			
Department/Center	Physical Chemistry	Faculty of Chemitry Sciences		
Country	Spain		Teleph. number	+34 699912315
Key words	Physical Chemistry, Adsorption, Interface Chemistry, Materials Chemistry			

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

Period	Position/Institution/Country/Interruption cause
11/01/1991-10/01/1996	Assistant teacher/USAL/Spain/end of agreement
11/01/1996-22/12/1999	Associated professor/ USAL/Spain/Promotion

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Chemistry Degree	Salamanca	1988
PhD in Chemistry	Salamanca	1992

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

My research activity begins with **my doctoral thesis**, advised by Prof. F. Salvador, focused on the development of the Thermoprogrammed Desorption in Solution (TPD-S) technique. The technique was only applicable to the gas phase, and the work carried out during my thesis managed to adapt it to the liquid phase. In addition to the design and construction of the equipment, several mathematical models were proposed for the characterization of surfaces and others aimed at obtaining adsorption and desorption kinetic parameters. The thesis won the doctorate award in 1992. The research continued towards the search for different technical applications of the technique developed in my doctorate: retention of pollutants, regeneration of adsorbents, improvement of the adsorption capacity of solids, destruction of pollutants, etc. One of the most cited articles in my CV refers to the regeneration of activated carbons used for the removal of phenols with water at high pressure and temperature(doi.org/10.1016/S0043-1354(02)00552-3). An interesting application of the TPD-S equipment is as reactor for catalytic reactions at high pressure and temperature. Looking for that applications I had **two postdoctoral stays,** first at the Institute of Catalysis and Petrochemistry, CSIC with Prof. J.L.G. Fierro for one year, and six months at the University of New Hampshire with Prof. P.T. Vasudevan. This line led to **11 publications** and **3 patents of utility of the TPD-S technique**. It allowed

me to get the first six-years of research period **(6YR)**, and stabilize my professional status in 1999 as professor of university. During these years I have participated in 2 National integrated actions and in 7 research projects, 3 Regional, 3 National and a Coordinated European (CECA) with the National Carbon Institute, University of Alicante, University of New Castle Upon Tyne (UK) and Sviluppo Materiali Center (I).

I joined in 2002 to the group of Prof. M. Velázquez. I extended my study to the field of interfaces LV. I gained experience in handling techniques, to study the adsorption kinetics in the Liquid-Vapor interface as the drop volume, and maximum bubble pressure tensiometers. Langmuir balance, surface potential, dynamic light scattering, and Brewster angle microscopy techniques allowed me to characterize Langmuir and Gibbs monolayers of surfactants and polymers. The results obtained in this field provided me a valuable experience in the self-assembly process and structures. These studies gave rise to **6 publications**, a degree Work and **one PhD**, second **(6YR)**. The lost years are due to my two maternities in 2000 and in 2003. I have participated in **7 research projects**: (1 UE, 4 N, 2 R).

Once I learned to control the structure of the monolayers formed at the L-V interface, the Langmuir-Blodgett technique allowed us to transfer these films to solids. The characterization of the films was developed by different techniques AFM, ellipsometry, TEM, SEM, QCM-D. This experience facilitated the preparation of semiconductor crystal films, using surfactants and polyelectrolytes as adsorption standards. The lifetime fluorescence imaging microscope determined the photochemical properties of films. This line of research gave rise to **5 publications**, two Degree Works, 3 TFM in Supramolecular Chemistry and **I have advised one PhD**. That line was supported by **7 research projects**: (1 N, 3 R, 2 from the University of Salamanca).

The experience on the preparation of self-assembled materials leads to use self-assembled polymers and surfactants to modulate the properties of graphene derivatives and actually a consolidated line is the synthesis and characterization of chemical graphene. Joined with my experience in retention of contaminants, we have **two important works** on the preparation of nanocomposites based in graphene with very good results in carbon dioxide uptake. Since 2017 our group has joined to the Excellence Unit of Nanoelectronic and Nanomaterials at the University of Salamanca, USAL-NANOLAB. That line was supported by **1 research projects**, currently in development, I have got the third **(6YR)**.

At 2019, I started a collaboration with the group of F. Salvador in the direction of several academic projects. The objective of the new line is to design nanomaterials capable of adsorbing and transforming CO_2. The synergy of the experience of both groups in a line of environmental interest has led to first publication. It is a very satisfactory experience since it is allowing me to resume the design of Facilities that I addressed during my PhD, together with the management of synthesis, and characterization of materials, and complex systems acquired in the Colloids and Interfaces group.

I have participated at **25 Research projects**: 5 International (CECA, FEDER, European network and 2 Neutron facility proposals at (ILL), Francia), 12 National, 8 Regional, and 1 from USAL. **35 Scientific publications**: 12Q1, 11Q2, 4Q3, 2Q4, 2N/A, 4chapters of book. **3 Patents**. **2 phD. 3 (6YR)**

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

C.1. Publications

1. Authors: Yating Ye, L. Vega Martín, M. J. Sánchez Montero, D. López-Díaz, M.M. Velázquez, M.D. Merchán (corresponding author)
   Title: "Optimizing the properties of hybrids based on graphene oxide for carbon dioxide capture"
   Industrial & Engineering Chemistry Research, 61(3), 1332, **2022**.
   https://doi.org/10.1021/acs.iecr.1c02922. **Q2. I.F.: 4.326** Cited:4(WOS) 3(Google Schoolar)

2. Authors: Carolina de Passos, M. Dolores Merchán, M. Mercedes Velázquez (2/3)
   Title: "Correlations Between Structure and Photoluminescence. Properties in N-Doped Carbon Nanoparticles"
   Journal of Science: Advanced Materials and Devices, 7(1), **2022.** Cited:2(WOS) 2(Google Schoolar)
   https://doi.org/10.1016/j.jsamd.2021.100408. **Q1. Impact factor: 7.382**

3. Autor: D. López-Diaz, **MD Merchán**, MM Velázquez. (2/3). "The behavior of graphene oxide trapped at the air water interface" *Advances in Colloid and Interface Science,* 286, 102312, **2020**. doi: 10.1016/j.cis.2020.102312. **D1+Q1. Impact factor: 12.984** Cited: 16(WOS) 18(Google Schoolar)

4. Authors: D. López-Díaz, **M.D. Merchán**, MM Velázquez, A Maestro. (2/4)
   Title: "Understanding the Role of Oxidative Debris on the Structure of Graphene Oxide Films at the Air-Water Interface: A Neutron Reflectivity Study"
   ACS Applied Materials & Interfaces, 12(22), 25453-25463, **2020**. doi: 10.1021/acsami.0c05649.
   Q1. Impact Factor: 9,229. Cited 11(WOS) 17(Google Scholar)

5. Authors: D. López-Díaz, JA Delgado-Notario, V Clericò, E Diez, MD **Merchán**, MM Velázquez (5/6)
   Title: "Towards Understanding the Raman Spectrum of Graphene Oxide: The Effect of the Chemical Composition". *Coatings* 10(6), 524, **2020**. doi:10.3390/coatings10060524.
   Q2. Impact factor: 3,038. Cited 20(WOS), 27(Google Scholar)

6. Authors: D López-Díaz, A Solana, JL García-Fierro, **MD Merchán**, MM Velázquez **(2020)** (4/5)
   Title: "The role of the chemical composition on the photoluminescence properties of N-doped carbon nanoparticles". *Journal of Luminescence* 219, 116954, **2020**. Doi: 10.1016/j.jlumin.2019.116954. **Q1. Impact factor: 3,280** Cited 6(WOS), 8(Google Scholar)

7. Authors: R Muñoz-López, E Guzmán, MM Velázquez, L Fernández-Peña, **MD Merchán**, A Maestro, F Ortega, RG Rubio (5/8)
   Title: "Influence of Carbon Nanosheets on the Behavior of 1, 2-Dipalmitoyl-sn-glycerol-3-phosphocholine Langmuir Monolayers". *Processes* 8(1), 94-111, **2020**. doi: 10.3390/pr8010094.
   Q2. Impact Factor 2,824. Cited 10(WOS), 14(Google Scholar)

8. Authors: S. Rodríguez-García, R. Santiago, D. López-Díaz, **M. D. Merchán***, M. M. Velázquez,´ J. L. G. Fierro, and J. Palomar. (Corresponding Autor)
   Title: "Role of the Structure of Graphene Oxide Sheets on the CO2 Adsorption Properties of Nanocomposites Based on Graphene Oxide and Polyaniline or Fe3O4-Nanoparticles".
   ACS Sustainable Chemistry & Engineering 183 12464-12473, **2019.** doi: 10.1021/acssuschemeng.9b02035, **D1+Q1 Impact Factor: 6,97.** Cited 32(WOS), 41(Google Scholar)

9. Auhors: T Alejo, PMR Paulo, **M.D. Merchán**, E Garcia-Fernandez, SMB Costa (3/5)
   Title: "Influence of 3D aggregation on the photoluminescence dynamics of CdSe quantum dot films". *Journal of Luminescence* 7, 113-120, **2017**. doi: 10.1016/j.jlumin.2016.11.002
   Q2 Impact Factor: 3,280. Cited 11(WOS), 15(Google Scholar)

10. Authors: Alejo, T.; **Merchán**, **M. D**.; Velázquez, M. (2/3)
   Title: "Adsorption of Quantum Dots onto Polymer and Gemini Surfactant Films: A Quartz Crystal Microbalance Study". *Langmuir* 30, 9977 - 9984, **2014**. doi: 10.1021/la5024955.
   Q1. Impact Factor: 3,557. Cited 3(WOS), 4(Google Scholar)

C.3. Research projects

1. Títle: Desarrollo de nuevos sensores ópticos y de nuevas técnicas de caracterización en los espectros visible y de Terahercios (SA121P20)
   Entidad financiadora: Junta de Castilla y León
   Duración: 2021-23. Investigador responsable: Yahya Moubarak Meziani. Subvención: 264.000 €
2. Title: Tecnologías basadas en materiales híbridos avanzados: grafeno, materiales 2D y aislantes topológicos (SA256P18)
   Funding entity: Junta de Castilla y León Period: 11/07/2018 a 31/10/ 2021
   Principal Investigator: E. Diez Funding received: 120.000 €
3. Title: In situ study of the effect of graphene oxide nanoparticles on the surface properties of dipalmotoylphosphatidylcholine.
   Funding entity: Max von Laue and Paul Langevin (ILL), Grenoble, Francia
   Principal Investigator: M. M. Velázquez; researchers: 3
4. Title: In-situ study of effect of chemical composition on the morphology of graphene oxide films.
   Funding entity: Max von Laue and Paul Langevin (ILL), Grenoble Francia

Principal Investigator: M. M. Velázquez; researchers: 4

5. Title: Propiedades de nuevos sistemas nanoestructurados de importancia tecnológica. CTQ2016-78895-R.
   Funding entity: Ministerio de Economía y Competitividad
   Period: 2017-19 Principal Investigator: R. Gonzalez Rubio Funding received: 134.310 €
6. Title: Nuevas Tecnologías Basadas en Grafeno y Nanoestructuras Semiconductoras (SA045U16).
   Funding entity: Junta de Castilla y León
   Period: 2016-18. Principal Investigator: E. Diez Funding received: 119.999 €
7. Title: Espectrómetro de Micro-Raman para la Universidad de Salamanca. UNSA13-3E-2302.
   Funding entity: Ministerio de Economía y Competitividad
   Convocatoria: Infraestructuras y equipamiento Científico-Técnico
   Period: 2015. Principal Investigator: M. M. Velázquez Funding received: 228.269,01 €
8. Title: ICP para ataque seco de nanomateriales. UNSA13-3E-2691.
   Funding entity: Ministerio de Economía y Competitividad
   Convocatoria: Infraestructuras y equipamiento Científico-Técnico
   Period: 2015 Principal Investigator: Enrique Diez Fernández Funding received: 582.374,63 €
9. Title: Modulación de las propiedades de sistemas nanoestructurados, puntos cuánticos y grafeno, mediante la utilización de sistemas autoensamblados de polímeros y tensioactivos. (*MAT 2010-19727)*
   Funding entity: Ministerio de Ciencia e Innovación
   Period: 2011- 2013. Principal Investigator: M. M. Velázquez Funding received: 84.700 €
10. Title: National Teams od Bolonia Experts. (number 201897-LLP-1-2011-1-ES BOLOGNA-BAS)
    Funding entity: CEE (Redes Europeas)
    Period: 2011- 2013.
    Principal Investigator: Francisco Javier Jiménez Leube Funding received: XXX €

C.4. Contracts, technological or transfer merits

1. Título: Procedimiento y aparato de desorción térmica programada
   Inventores: María Dolores Merchán Moreno; Francisco Salvador Palacios
   Fecha de solicitud: 1992
   Número de solicitud: P92-01729
   Entidad Titular: UNIVERSIDAD DE SALAMANCA
   Países de protección válida: ESTADOS UNIDOS DE AMÉRICA
2. Título: Mejoras en la patente Nº 9201729, relativas a un procedimiento y aparato de desorción térmica programada
   Inventores: Francisco Salvador Palacios; María Dolores Merchán Moreno; María del Carmen Sánchez Jiménez
   Fecha de solicitud: 1995
   Número de solicitud: 9500669
   Entidad Titular: UNIVERSIDAD DE SALAMANCA
   Países de protección válida: ESTADOS UNIDOS DE AMÉRICA
3. Título: Procedimiento y aparato para la producción de carbón activo
   Inventores: María Dolores Merchán Moreno; Aurelio Salvador Palacios; María del Carmen Sánchez Jiménez; Francisco Salvador Palacios
   Fecha de solicitud: 1998
   Número de solicitud: P9801552
   Entidad Titular: UNIVERSIDAD DE SALAMANCA
   Países de protección válida: ESTADOS UNIDOS DE AMÉRICA