



Guillermo Álvarez Ferrero

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Summary of CV

This section describes briefly a summary of your career in science, academic and research; the main scientific and technological achievements and goals in your line of research in the medium -and long- term. It also includes other important aspects or peculiarities.

I obtained my degree in Chemical Engineering at the University of Oviedo (Spain). My research career started in 2014 after joining Prof. Antonio Benito Fuertes and Dr. Marta Sevilla group at Instituto Nacional del Carbon (INCAR) in Oviedo where I earned my PhD degree. My thesis, entitled “Doped porous carbon materials for energy storage and production”, was focused on the preparation of porous carbon materials doped with heteroatoms (i.e. oxygen and nitrogen) and some metals (i.e. iron) for electrochemical applications. Specifically, I have synthesized carbon materials with different porous structures (micro-mesoporous) and with the incorporation of heteroatoms into the carbon framework. In particular, I have been focused on Supercapacitors. Furthermore, I investigated the use of carbon materials derived from biomass as electrode materials by employing hydrothermal carbonization (HTC) followed by the chemical activation. In addition, I was hosted by the Sustainable Materials Group at the Queen Mary University of London under the supervision of Professor Maria-Magdalena Titirici during a period of four months. During this stay, I carried out the development of metal-free carbon catalysts and non-precious metal catalysts for the oxygen reduction reaction and I was able to publish 3 articles. Additionally, I have carried out the design of graphene materials for use as flexible and free-standing supercapacitors.

After my PhD thesis, I focused on the synthesis of iron and nitrogen co-doped porous carbon materials and its application as electrocatalyst for the oxygen reduction reaction. In parallel, I continue working on the synthesis of carbon materials derived from biomass as electrodes for supercapacitors by using different activating agents (potassium hydroxide, potassium carbonate, potassium bicarbonate or sodium thiosulfate) and I began to work on carbon materials for Li/S batteries.

Nowadays, I am working as a postdoctoral research in the Max Planck Institute for Chemical Energy Conversion in Mülheim an der Ruhr with Prof. Dr. Robert Schlögl and Dr. Saskia Heumann. My research is focused on the design and synthesis of porous binderless carbon pellets as electrocatalysts for the oxygen evolution reaction. I am also participating in the Maxnet Energy Project, a collaboration between different institutes and external partners including Fritz Haber Institute in Berlin, University of Virginia and Colorado School of Mines. Among the characterization techniques that I have used are: X-ray diffraction; N₂ physisorption, Scanning Electron Microscopy, Transmission Electron Microscopy, Raman spectroscopy, Infrared spectroscopy and Thermogravimetric Analysis; among the multiple electrochemical techniques for the different applications.



General quality indicators of scientific research

This section describes briefly the main quality indicators of scientific production (periods of research activity, experience in supervising doctoral theses, total citations, articles in journals of the first quartile, H index...). It also includes other important aspects or peculiarities.

Índice h: 14

Citas: 969



Guillermo Álvarez Ferrero

Surname(s): **Álvarez Ferrero**
 Name: **Guillermo**
 ORCID: **0000-0001-8606-781X**
 ScopusID: **56328465400**

Current professional situation

Employing entity: Max Planck Institute for Chemical Energy Conversion

Professional category: Investigador Post-doctoral

Start date: 15/09/2018

Dedication regime: Full time

Primary (UNESCO code): 230000 - Chemistry; 330300 - Chemical technology and engineering

Performed tasks: Carbonización hidrotermal, activación, nanomoldeo Materiales de carbono nanoporoso

Identify key words: Chemical industry

Previous positions and activities

	Employing entity	Professional category	Start date
1	Instituto Nacional del Carbón	Titulado Superior de Actividades Técnicas y Profesionales	21/06/2017
2	Instituto Nacional del Carbón	Estudiante de doctorado	15/01/2014

1 **Employing entity:** Instituto Nacional del Carbón
Professional category: Titulado Superior de Actividades Técnicas y Profesionales
Start-End date: 21/06/2017 - 11/09/2018

2 **Employing entity:** Instituto Nacional del Carbón **Type of entity:** State agency
Professional category: Estudiante de doctorado
Start-End date: 15/01/2014 - 20/06/2017



Education

University education

1st and 2nd cycle studies and pre-Bologna degrees

- 1 **University degree:** Máster
Name of qualification: Máster de prevención de riesgos laborales
Degree awarding entity: UNIR **Type of entity:** University
Date of qualification: 30/09/2011
- 2 **University degree:** Higher degree
Name of qualification: Graduado o Graduada en Ingeniería Química
Degree awarding entity: Universidad de Oviedo **Type of entity:** University
Date of qualification: 30/06/2010

Doctorates

Doctorate programme: Programa Oficial de Doctorado en Ciencia y Tecnología de los Materiales
Degree awarding entity: Instituto Nacional del Carbón **Type of entity:** State agency
Date of degree: 20/06/2017

Attended advanced, improvement and innovative teacher training and new technology courses and seminars focused on improving teaching

- 1 **Title of course/seminar:** Ciencia de materiales de carbono
Organising entity: Instituto Nacional del Carbón **Type of entity:** State agency
Duration in hours: 20 hours
- 2 **Title of course/seminar:** Materiales de carbono. Nuevos retos tecnológicos.
Organising entity: Instituto Nacional del Carbón **Type of entity:** State agency
Duration in hours: 20 hours

Language skills

Language	Listening skills	Reading skills	Spoken interaction	Speaking skills	Writing skills
German	A2	A2	A2	A2	A2
English	B2	B2	B2	B2	B2



Scientific and technological experience

Scientific or technological activities

R&D projects funded through competitive calls of public or private entities

- 1** **Name of the project:** Materiales avanzados porosos de carbono y grafeno para el almacenamiento de energía en supercondensadores
Entity where project took place: Instituto Nacional del Carbón **Type of entity:** State agency
City of entity: Oviedo, Principality of Asturias, Spain
End date: 31/12/2018
- 2** **Name of the project:** Ayuda para apoyar la actividad de grupos de investigación consolidados del Principado de Asturias
Entity where project took place: Instituto Nacional del Carbón **Type of entity:** State agency
City of entity: Oviedo, Principality of Asturias, Spain
Start-End date: 01/10/2014 - 31/12/2017
Total amount: 105.000 €
- 3** **Name of the project:** Síntesis de materiales de carbono mediante carbonización hidrotermal de biomasa y su empleo en el almacenamiento de hidrógeno, captura de CO₂ y adsorción de contaminantes
Entity where project took place: Instituto Nacional del Carbón **Type of entity:** State agency
City of entity: Oviedo, Principality of Asturias, Spain
Nº of researchers: 1
Start-End date: 01/01/2013 - 31/12/2013
Total amount: 64.350 €



Scientific and technological activities

Scientific production

Publications, scientific and technical documents

- 1 Noel Díez; Guillermo A. Ferrero; Marta Sevilla; Antonio B. Fuertes. A simple and general approach for in situ synthesis of sulfur–porous carbon composites for lithium–sulfur batteries. *Sustainable Energy Fuels*. 3, pp. 3498 - 3509. The Royal Society of Chemistry, 2019. Available on-line at: <<http://dx.doi.org/10.1039/C9SE00722A>>.
Type of production: Scientific paper **Format:** Journal
- 2 Noel Díez; Guillermo A. Ferrero; Marta Sevilla; Antonio B. Fuertes. A sustainable approach to hierarchically porous carbons from tannic acid and their utilization in supercapacitive energy storage systems. *Journal of Materials Chemistry A*. 7, pp. 14280 - 14290. The Royal Society of Chemistry, 2019. Available on-line at: <<http://dx.doi.org/10.1039/C9TA01712G>>.
Type of production: Scientific paper **Format:** Journal
- 3 Mo Qiao; Guillermo A. Ferrero; Leticia Fernández Velasco; Wei Vern Hor; Yan Yang; Hui Luo; Peter Lodewyckx; Antonio B. Fuertes; Marta Sevilla; Maria-Magdalena Titirici. Boosting the Oxygen Reduction Electrocatalytic Performance of Nonprecious Metal Nanocarbons via Triple Boundary Engineering Using Protic Ionic Liquids. *ACS Applied Materials & Interfaces*. 11 - 12, pp. 11298 - 11305. 2019. Available on-line at: <<https://doi.org/10.1021/acsmi.8b18375>>.
Type of production: Scientific paper **Format:** Journal
- 4 Guillermo A. Ferrero; Noel Díez; Marta Sevilla; Antonio B. Fuertes. Iron/Nitrogen co-doped mesoporous carbon synthesized by an endo-templating approach as an efficient electrocatalyst for the oxygen reduction reaction. *Microporous and Mesoporous Materials*. 278, pp. 280 - 288. 2019. Available on-line at: <<http://www.sciencedirect.com/science/article/pii/S1387181118306279>>. ISSN 1387-1811
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes
- 5 Noel Díez; Guillermo A. Ferrero; Antonio B. Fuertes; Marta Sevilla. Sustainable Salt Template-Assisted Chemical Activation for the Production of Porous Carbons with Enhanced Power Handling Ability in Supercapacitors. *Batteries & Supercaps*. 2 - 8, pp. 701 - 711. 2019. Available on-line at: <<https://onlinelibrary.wiley.com/doi/abs/10.1002/batt.201900037>>.
Type of production: Scientific paper **Format:** Journal
- 6 Marta Sevilla; Noel Díez; Guillermo A. Ferrero; Antonio B. Fuertes. Sustainable supercapacitor electrodes produced by the activation of biomass with sodium thiosulfate. *Energy Storage Materials*. 18, pp. 356 - 365. 2019. Available on-line at: <<http://www.sciencedirect.com/science/article/pii/S2405829718314788>>. ISSN 2405-8297
Type of production: Scientific paper **Format:** Journal
- 7 Antonio B. Fuertes; Guillermo A. Ferrero; Noel Díez; Marta Sevilla. A Green Route to High-Surface Area Carbons by Chemical Activation of Biomass-Based Products with Sodium Thiosulfate. *ACS Sustainable Chemistry & Engineering*. 6 - 12, pp. 16323 - 16331. 2018. Available on-line at: <<https://doi.org/10.1021/acssuschemeng.8b03264>>.
Type of production: Scientific paper **Format:** Journal

- 8** Guillermo A. Ferrero; Noel Diez; Marta Sevilla; Antonio B. Fuertes. Iron–Nitrogen-Doped Dendritic Carbon Nanostructures for an Efficient Oxygen Reduction Reaction. *ACS Applied Energy Materials*. 1 - 11, pp. 6560 - 6568. 2018. Available on-line at: <<https://doi.org/10.1021/acsaem.8b01457>>.
Type of production: Scientific paper **Format:** Journal
Corresponding author: Yes
- 9** Mo Qiao; Seyyed Shayan Meysami; Guillermo Alvarez Ferrero; Fei Xie; Han Meng; Nicole Grobert; Maria? Magdalena Titirici. Low Cost Chitosan Derived N Doped Carbons Boost Electrocatalytic Activity of Multiwall Carbon Nanotubes. *Advanced Functional Materials*. 28 - 16, pp. 1707284 - 1707284. 2018. Available on-line at: <<https://onlinelibrary.wiley.com/doi/abs/10.1002/adfm.201707284>>.
Type of production: Scientific paper **Format:** Journal
- 10** Marta Sevilla; Guillermo A. Ferrero; Noel Diez; Antonio B. Fuertes. One-step synthesis of ultra-high surface area nanoporous carbons and their application for electrochemical energy storage. *Carbon*. 131, pp. 193 - 200. 2018. Available on-line at: <<http://www.sciencedirect.com/science/article/pii/S0008622318301428>>. ISSN 0008-6223
Type of production: Scientific paper **Format:** Journal
- 11** Marta Sevilla; Guillermo A Ferrero; Antonio B Fuertes. Beyond KOH activation for the synthesis of superactivated carbons from hydrochar. *Carbon*. 114, pp. 50 - 58. 2017.
Type of production: Scientific paper **Format:** Journal
- 12** Guillermo A. Ferrero; Marta Sevilla; Antonio B. Fuertes. Free-standing hybrid films based on graphene and porous carbon particles for flexible supercapacitors. *Sustainable Energy Fuels*. 1, pp. 127 - 137. The Royal Society of Chemistry, 2017. Available on-line at: <<http://dx.doi.org/10.1039/C6SE00047A>>.
Type of production: Scientific paper **Format:** Journal
- 13** Marta Sevilla; Guillermo A. Ferrero; Antonio B. Fuertes. One-Pot Synthesis of Biomass-Based Hierarchical Porous Carbons with a Large Porosity Development. *Chemistry of Materials*. 29 - 16, pp. 6900 - 6907. 2017. Available on-line at: <<http://dx.doi.org/10.1021/acs.chemmater.7b02218>>.
Type of production: Scientific paper **Format:** Journal
- 14** Marta Sevilla; Guillermo A Ferrero; Tan T Vu; Antonio B Fuertes. A Simple Approach towards Highly Dense Solvated Graphene Films for Supercapacitors. *ChemNanoMat*. 2 - 1, pp. 33 - 36. 2016.
Type of production: Scientific paper **Format:** Journal
- 15** Marta Sevilla; Guillermo A Ferrero; Antonio B Fuertes. Aqueous Dispersions of Graphene from Electrochemically Exfoliated Graphite. *Chemistry-A European Journal*. 22 - 48, pp. 17351 - 17358. 2016.
Type of production: Scientific paper **Format:** Journal
- 16** Antonio B Fuertes; Guillermo A Ferrero; Marta Sevilla. Commentary: Methods of calculating the volumetric performance of a supercapacitor. *Energy Storage Materials*. 4, pp. 154 - 155. Elsevier, 2016.
Type of production: Scientific paper **Format:** Journal
- 17** Guillermo A Ferrero; Antonio B Fuertes; Marta Sevilla; Maria-Magdalena Titirici. Efficient metal-free N-doped mesoporous carbon catalysts for ORR by a template-free approach. *Carbon*. 106, pp. 179 - 187. 2016.
Type of production: Scientific paper **Format:** Journal
- 18** Guillermo A Ferrero; Kathrin Preuss; Adam Marinovic; Ana Belen Jorge; Noramalina Mansor; Dan JL Brett; Antonio B Fuertes; Marta Sevilla; Maria-Magdalena Titirici. Fe--N-doped carbon capsules with outstanding electrochemical performance and stability for the oxygen reduction reaction in both acid and alkaline conditions. *ACS nano*. 10 - 6, pp. 5922 - 5932. American Chemical Society, 2016.
Type of production: Scientific paper **Format:** Journal



- 19** Guillermo A Ferrero; Marta Sevilla; Antonio B Fuertes. Flexible, Free-Standing and Holey Graphene Paper for High-Power Supercapacitors. ChemNanoMat. 2 - 11, pp. 1055 - 1063. 2016.
Type of production: Scientific paper **Format:** Journal
- 20** Marta Sevilla; Guillermo A Ferrero; Antonio B Fuertes. Graphene-cellulose tissue composites for high power supercapacitors. Energy Storage Materials. 5, pp. 33 - 42. Elsevier, 2016.
Type of production: Scientific paper **Format:** Journal
- 21** Guillermo A Ferrero; Kathrin Preuss; Antonio B Fuertes; Marta Sevilla; Maria-Magdalena Titirici. The influence of pore size distribution on the oxygen reduction reaction performance in nitrogen doped carbon microspheres. Journal of Materials Chemistry A. 4 - 7, pp. 2581 - 2589. Royal Society of Chemistry, 2016.
Type of production: Scientific paper **Format:** Journal
- 22** Guillermo A Ferrero; Antonio B Fuertes; Marta Sevilla. From Soybean residue to advanced supercapacitors. Scientific reports. 5, pp. 16618 - 16618. Nature Publishing Group, 2015.
Type of production: Scientific paper **Format:** Journal
- 23** Guillermo A Ferrero; Marta Sevilla; Antonio B Fuertes. Mesoporous carbons synthesized by direct carbonization of citrate salts for use as high-performance capacitors. Carbon. 88, pp. 239 - 251. Elsevier, 2015.
Type of production: Scientific paper **Format:** Journal
- 24** Guillermo A Ferrero; Antonio B Fuertes; Marta Sevilla. N-doped microporous carbon microspheres for high volumetric performance supercapacitors. Electrochimica Acta. 168, pp. 320 - 329. Elsevier, 2015.
Type of production: Scientific paper **Format:** Journal
- 25** Guillermo A Ferrero; Antonio B Fuertes; Marta Sevilla. N-doped porous carbon capsules with tunable porosity for high-performance supercapacitors. Journal of Materials Chemistry A. 3 - 6, pp. 2914 - 2923. Royal Society of Chemistry, 2015.
Type of production: Scientific paper **Format:** Journal
- 26** Antonio B Fuertes; Guillermo A Ferrero; Marta Sevilla. One-pot synthesis of microporous carbons highly enriched in nitrogen and their electrochemical performance. Journal of Materials Chemistry A. 2 - 35, pp. 14439 - 14448. Royal Society of Chemistry, 2014.
Type of production: Scientific paper **Format:** Journal
- 27** Marta Sevilla; Guillermo Ferrero; Antonio B. Fuertes. CO₂ Storage on Nanoporous Carbons. Nanoporous Materials for Gas Storage. pp. 287 - 330. Springer Singapore, 2019. Available on-line at: <https://doi.org/10.1007/978-981-13-3504-4_11>. ISBN 978-981-13-3504-4
Type of production: Book chapter **Format:** Book
Corresponding author: No

Works submitted to national or international conferences

- 1** **Title of the work:** Porous Binderless Pellets for Electrochemical Oxygen Evolution Reaction
Name of the conference: CESEP 2019
Type of event: Conference
Type of participation: Participatory - oral communication
City of event: Alicante, Valencian Community, Spain
Date of event: 21/10/2019
End date: 24/10/2019



- 2** **Title of the work:** Porous Activated Binderless Pellets for Electrochemical Oxygen Reduction and Evolution Reactions
Name of the conference: Carbon 2019
Type of event: Conference
Type of participation: Participatory - oral communication
Corresponding author: Yes
City of event: Lexington, United States of America
Date of event: 15/07/2019
End date: 19/07/2019
- 3** **Title of the work:** Efficient Fe-N-Mesoporous carbons for the oxygen reduction reaction by a template-free approach
Name of the conference: MRS 2018 Spring Meeting
Type of event: Conference
Type of participation: Participatory - oral communication
City of event: Phoenix, United States of America
Date of event: 02/04/2018
End date: 06/04/2018
- 4** **Title of the work:** N-doped porous carbon capsules with tunable porosity for high-performance supercapacitors
Name of the conference: Fourth International Conference on Multifunctional, Hybrid and Nanomaterials (Hybrid Materials 2015)
Type of event: Conference
Type of participation: Participatory - oral communication
Corresponding author: Yes
City of event: Sitges, Catalonia, Spain
Date of event: 09/03/2015
End date: 13/03/2015
Organising entity: Elsevier
- 5** **Title of the work:** One-pot synthesis of microporous carbons highly enriched in nitrogen and their electrochemical performance
Name of the conference: Fourth International Conference on Multifunctional, Hybrid and Nanomaterials (Hybrid Materials 2015)
Type of event: Conference
Type of participation: 'Participatory - poster
City of event: Sitges, Catalonia, Spain
Date of event: 09/03/2015
End date: 13/03/2015
Organising entity: Elsevier
- 6** **Title of the work:** Aqueous dispersions of graphene from electrochemically exfoliated graphite
Name of the conference: E-MRS Fall Meeting 2017
Type of event: Conference
Type of participation: 'Participatory - poster
City of event: Varsovia,
- 7** **Title of the work:** Flexible, free-standing and holey graphene paper for high power supercapacitors
Name of the conference: CESEP 2017
Type of event: Conference



Type of participation: 'Participatory - poster
City of event: Lyon,

8 Title of the work: Free-standing hybrid films based on graphene and porous carbon particles for supercapacitors

Name of the conference: CESEP 2017

Type of event: Conference

Type of participation: Participatory - oral communication

Corresponding author: Yes

City organizing entity: Lyon,

9 Title of the work: Mesoporous carbons synthesized by direct carbonization of citrate salts for use as high-performance supercapacitors and as metal-free electrocatalysts for the oxygen reduction reaction

Name of the conference: E-MRS Fall Meeting 2017

Type of event: Conference

Type of participation: 'Participatory - poster

10 Title of the work: Nitrogen doped porous carbon capsules with tunable porosity for electrochemical applications

Name of the conference: Energy Materials Network London 1-st Young Researchers Symposium

Type of event: Conference

Type of participation: Participatory - oral communication

City organizing entity: Queen Mary University, United Kingdom

Other achievements

Stays in public or private R&D centres

Entity: Queen Mary University of London

Type of entity: University

Faculty, institute or centre: School of Engineering and Materials Science

City of entity: Londres, Inner London, United Kingdom

Start-End date: 02/02/2015 - 29/05/2015

Duration: 4 months

Goals of the stay: Doctorate