CURRICULUM VITAE ABREVIADO (CVA)

Part A. PERSONAL INFORMATION

First name	Monica		
Family name	Carril Garcia		
Gender (*)	Female	Birth date (dd/mm/yyyy)	03/08/1979
ID number	78898115L		
e-mail	monica.carrilg@ehu.eus	URL Web	https://www.biofisika.org/
Open Researcher and Contributor ID (ORCID) (*)		0000-0002-1232-8658	

(*) Mandatory

A.1. Current position

Position	Head of FluoroNanoTools Lab. Ikerbasque Research Associate		
Initial date	10/05/2018		
Institution	Universidad del País Vasco (UPV/EHU)		
Department/Center	Bioquímica y Biología Molecular		
Country	Spain	Teleph. number	946018165
Key words	Nanoparticle functionalization, fluorine, nanomedicine, surface chemistry, protein corona, targeting, ^{19}F MRI		

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

Period	Position/Institution/Country/Interruption cause
05/2021-02/2022	Hospitalization and medical leave due to high risk pregnancy + baby hospitalization due to premature birth + maternity leave (9 months).
05/2019-10/2019	Maternity leave (5 months)
05/2013-05/2018	Ikerbasque Research Fellow/CIC biomaGUNE/Spain
05/2010-05/2013	Juan de la Cierva Fellow/CIC biomaGUNE/Spain
02/2009-04/2010	Postdoctoral Fellow/TUM Munich & DSM Natural products/Germany & Switzerland (Industrial project)
10/2007-12/2008	Postdoctoral Fellow/RWTH Aachen/Germany
01/2007-10/2007	Postdoctoral Fellow/UPV-EHU/Spain
01/2003-12/2006	PhD Fellow (FPU)/UPV-EHU/Spain
07/2001-09/2001	Industrial internship/FAES FARMA S.A./ Spain

A.3. Education

PhD	University/Country	Year
Chemistry (Organic Chemistry)	University of the Basque Country (UPV/EHU)	2006

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

M. Carril has a PhD in Chemistry, which she obtained in 2006 from the University of the Basque Country (UPV/EHU), under the supervision of Prof. E. Domínguez and Dr. R. SanMartin. Her initial experience and field of research was in synthetic chemistry, both during her doctoral studies and her postdoctoral stays in Germany at RWTH Aachen with Prof. C. Bolm and TUM Munich with Prof. F. E. Kühn, where she worked mainly in cross-coupling and oxidation reactions catalyzed by various metals. During her stay in Munich she was involved in an industrial project funded by DSM Natural Products (Kaiseraugst, Switzerland) to improve the synthesis of vitamin E. In 2010, she joined CIC biomaGUNE (Donostia) as a Juan de la Cierva researcher in Prof. S. Penadés' group and since then she has focused her research on the field of nanomedicine and nanoparticle surface modification taking advantage of her organic chemistry knowledge. In that time, she developed iron oxide nanoparticles coated with gold and vectorized them for targeted imaging of macrophages in atherosclerosis using antibodies grafted on the surface of those nanoparticles. She prepared the nanomaterials, modified and vectorized the surface of them and was directly involved in the MRI experiments in mice and their quantification to prove their targeting ability. The same system was later used to target macrophages in acute kidney failure in mice. In 2013, she obtained a position as an Ikerbasque Research Fellow that she developed at CIC biomaGUNE. In 2015, she joined the

group of Prof. W. J. Parak (currently at Univ. Hamburg), to run his former laboratory at CIC biomaGUNE on his behalf. During that time, she became aware of the protein corona and the interactions of nanomaterials with plasma proteins and cells. She developed a novel method to study protein corona and nanoparticle integrity in plasma based on ^{19}F diffusion NMR, which could be potentially translated to *in vivo* studies. That work was a major breakthrough because it allowed to study protein corona formation in equilibrium with the surrounding proteins and for the first time a translational technique was used. At the same time, she developed a novel research line based on the design of fluorinated nanoprobes for ^{19}F MRI, which implied deep knowledge on NP surface chemistry to obtain fluorinated NPs that were colloidably stable in water. In Spain, M. Carril's group pioneers the research that deals with these types of nanoprobes. In May 2018, after a positive evaluation by an external scientific committee, she was promoted to a permanent position as Ikerbasque Research Associate and joined the UPV/EHU, more precisely the Instituto Biofisika (CSIC, UPV / EHU, Leioa), as Head of the FluoroNanoTools laboratory. Today, the focus of her research is at the interface between organic chemistry, nanotechnology and bio(nano)medicine. Since joining the Instituto Biofisika and the UPV/EHU, her main goal is to expand the uses of customized nanoparticles, not only as imaging probes, but also as vehicles for targeted drug delivery, and to develop methods to learn about the fate and integrity of nanomedicines *in vivo*, taking advantage of the expertise of the group in nanoparticle surface functionalization and characterization for biomedical applications. In summary, she has experience in the design of contrast agents, vectorization of magnetic NPs for molecular imaging and has developed a new method to visualize the integrity of NPs through the use of magnetic resonance and other types of imaging and analysis techniques. Currently the laboratory is composed of 8 people (the PI, 2 postdoc, 3 PhD students and 2 Master students). The multidisciplinarity of the research is supported by several external and in-house collaborations many of which are in the field of neuroscience and molecular imaging. Such collaborations frequently take place in the frame of funded projects in the form of consortiums (NanoNeuro or IMatrix, e.g.). Additionally, M. Carril belongs to the RICORS-ICTUS network and her laboratory belongs to the B3N network (Basque NanoNeuro Network) which develops novel methods based on nanoparticles and bioorthogonal chemistry to induce neuromodulation. She recently joined the EUROSTOP COST action European Network for diagnosis and treatment of antibiotic-resistant bacterial infections.

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

C.1. Publications *(AC: Author of correspondence)*

1. Arango, JM.; Padro, D.; Blanco, J.; Lopez-Fernandez, S.; Castellnou, P.; Villa-Valverde, P.; Ruiz-Cabello, J.; Martin, A.; Carril, M. *(AC)* "Fluorine Labeling of Nanoparticles and In Vivo 19F Magnetic Resonance Imaging" ACS Applied Materials & Interfaces, 2021, 13, 12941-12949. Selected for cover art (https://pubs.acs.org/toc/aamick/13/11).

2. Sanchez-Cano, C.; Carril, M. (*AC*) "Recent Developments in the Design of Non-Biofouling Coatings for Nanoparticles and Surfaces" International Journal of Molecular Sciences, 2020, 21, 1007.

3. Padro, D.; Cienskowski, P.; Lopez-Fernandez, S.; Chakraborty, I.; Carrillo-Carrion, C.; Feliu, N.; Parak, WJ.; Carril, M. *(AC)* "Toward Diffusion Measurements of Colloidal Nanoparticles in Biological Environments by Nuclear Magnetic Resonance" Small, 2020, 16, 2001160.

4. Argudo, PG.; Martin-Romero, MT.; Camacho, L.; Carril, M.; Carrillo-Carrion, C.; Giner-Casares, JJ. *(AC)* "Fluorinated CdSe/ZnS quantum dots: Interactions with cell membrane" Colloids and Surfaces B-Biointerfaces, 2019, 173, 148-154.

5. Carrillo-Carrion, C.; Atabakhshi-Kashi, M.; Carril, M.; Khajeh, K.; Parak, WJ. *(AC)* "Taking Advantage of Hydrophobic Fluorine Interactions for Self-Assembled Quantum Dots as a Delivery Platform for Enzymes" Angewandte Chemie International Edition, 2018, 57, 5033-5036.

6. Carril, M. *(AC)*; Padro, D.; del Pino, P.; Carrillo-Carrion, C.; Gallego, M.; Parak, WJ. *(AC)* "In situ detection of the protein corona in complex environments" Nature Communications, 2017, 8, 1542.

7. Carril, M. *(AC)* "Activatable probes for diagnosis and biomarker detection by MRI." Journal of Materials Chemistry B. 2017, 5, 4332-4347. Submitted as an invitation to the special issue of Emerging Investigators 2017.

8. Carrillo-Carrion, C., Carril, M., Parak, WJ. *(AC)* "Techniques for the experimental investigation of the protein corona." Current Opinion in Biotechnology, 2017, 46, 106-113.

9. Michelena, O., Padro, D., Carrillo-Carrión, C., del Pino, P., Blanco, J., Arnaiz, B., Parak, W.J., Carril, M. *(AC)* "Fluorinated ligands for gold nanoparticle labelling with application in 19F-MRI." Chemical Communications 2017, 53, 2447-2450.

10. Rubio-Navarro, A.*, Carril, M.*, Padro, D., (…), Moreno, JA. (2/11)"CD163-macrophages are involved in rhabdomyolysis-induced kidney injury and may be detected by MRI with targeted gold-coated iron oxide nanoparticles." Theranostics 2016, 6, 896-914. **Both authors contributed equally*.

C.2. Congress, indicating the modality of their participation.

1. Carril, M. "Water Friendly Fluorinated Nanoparticles and Applications" Christmas workshop, 20 December 2023, Donostia (Spain).

2. Carril, M. "Nanoparticle surface design for 19F MRI applications" Workshop: Nanomaterials for imaging, sensing and therapy, 23 October 2023, invited keynote presentation. Santiago de Compostela (Spain).

3. Arango, JM.; Padro, D.; Blanco, J.; Lopez-Fernandez, S.; Castellnou, P.; Villa-Valverde, P.; Ruiz-Cabello, J.; Martin, A.; Carril, M. "Synthesis of water soluble fluorinated gold nanoparticles and in vivo 19F MRS/MRI". ACS Spring National Meeting, 20-24 March 2022, presentación *ORAL*, (online), hybrid event in San Diego (USA).

4. Carril, M. "Fluorinated nanoparticles for 19F MRI and as reporters for protein corona" SBAN conference, 8-9 September 2022, Invited Keynote presentation, Madrid (Spain).

5. Carril, M. "Nanoparticles as contrast agents for magnetic resonance with a focus on 19F MRI" Ettore Majorana International School of Nanomedicine, 20-25 July 2022, Invited Keynote presentation, Erice (Italy).

6. Carril, M. "Synthesis and uses of fluorinated nanoparticles", 5th UNIGE Postdoc Day, 9 June 2022, Invited Keynote presentation, Geneva (Switzerland).

7. Carril, M. "Fluorinated gold nanoparticles as contrast agents in 19F-MRI and for protein corona evaluation" European Molecular Imaging Meeting (EMIM), 20-23 March 2018, Invited talk in the Educational session, Donostia (Spain).

8. Carril, M. "Novel fluorine probes for Au NP labelling with application in 19F MRI" ACS National Meeting, 20-24 August 2017, Invited talk, Washington DC (USA).

9. Carril, M. "Nanoparticles as contrast agents with a focus on 19F MRI" Seminar series of Instituto de Química Avanzada de Cataluña (IQAC), 14 July 2017, Invited talk, Barcelona, (Spain).

10. Carril, M.; Padro, D.; del Pino, P.; Carrillo-Carrion, C.; Gallego, M.; Parak, WJ. "In situ detection of the protein corona in complex environments" Nanospain, 13-15 March 2018, Oral Presentation, Bilbao (Spain).

C.3. Research projects, indicating your personal contribution.

1. Reference: 2022/01349. Title: NanoNeuro
Funding Agency (Call): Basque Government (IKUR strategy); Duration: 2022-2025
PI: Mónica Carril; Affiliation: FBB (Fundación Biofisica Bizkaia).
Consortium Coordinator: Aitzol García-Etxarri (DIPC)
Amount: 410,000 € (for FBB). Total amount: 4,1 M€

2. Reference: PCI2022-134987-2, IMatrix; Title: Theragnostic targeting of extracellular matrix metalloproteinases and blood brain barrier disruption in subacute ischemic stroke.
Funding Agency (Call): AEI (ERANET-NEURON); Duration: 2023-2025
PI: Mónica Carril; Affiliation: UPV/EHU
Consortium Coordinator: Abraham Martin (Achucarro)
Amount: 145,140 € (for Instituto Biofisika). Total amount: 1,3 M€

3. Reference: IT1449-22; Title: El reto de generar protección cruzada frente a coronavirus pandémicos: producción, estudio de estructura-función y optimización de anticuerpos pan-neutralizantes.
Funding Agency (Call): Basque Government (Grupos Universitarios); Duration: 2022 – 2025

PI: Jose Luis Nieva (Instituto Biofisika)
Role: Researcher; Affiliation: Instituto Biofisika (CSIC, UPV/EHU)
Amount: 188,800 €

4. Reference: 248/C/2020; Title: Blood-brain barrier dysfunction and oxidative stress modulation in brain arteriovenous malformations: a translational study of secondary injury after surgical resection.
Funding Agency (Call): Fundació La Marató de TV3; Duration: 2021 – 2024
PI: Ramón Torné (IDIBAPS)
Role: Researcher; Affiliation: Instituto Biofisika (CSIC, UPV/EHU)
Amount: 398,695.34 €

5. Reference: RTI2018-100881-B-I00; Title: Design and synthesis of fluorinated nanoparticle based tools for biomedical applications.
Funding Agency: Ministerio de Ciencia, Innovación y Universidades (Programa RETOS); Duration: 2020 - 2023
PI: Mónica Carril; Affiliation: FBB (Fundación Biofisica Bizkaia).
Amount: 72,600 €

6. Reference: bmG19; Title: Investigación Colaborativa en Biomarcadores Para el Diagnóstico Precoz y Seguimiento de Tratamiento en Hipertensión Pulmonar
Funding Agency: Gobierno Vasco (Programa Elkartek); Duration: 2019 - 2021
PI: Mónica Carril; Affiliation: FBB (Fundación Biofisica Bizkaia).
Consortium Coordinator: Jesús Ruiz-Cabello (CIC biomaGUNE)
Amount: 40,736.25 € (for FBB). Total amount: 1,7 M€

7. Reference: 201703; Title: Blood brain barrier disruption after subarachnoid hemorrhage: clinical relevance, role of hyperglycemia and effect of potentiating endogenous antioxidant mechanisms. A translational study.
Funding Agency: Fundació La Marató de TV3; Duration: 2018 - 2021.
PI: Sergio Amaro (Hospital Clínic Barcelona)
Role: Researcher; Affiliation: CIC biomaGUNE
Amount: 399,653.40 €

8. Reference: CTQ2015-68413-R; Title: Fluorinated Nanoparticles as novel contrast agents and ON/OFF probes.
Funding Agency: MINECO (RETOS); Duration: 2016 - 2018.
PI: Mónica Carril; Affiliation: CIC biomaGUNE
Amount: 48,400 €

C.4. Contracts, technological or transfer merits.

1. **CPI (Compra Pública Innovadora)**. Reference: Exp. CPP 09/2023 AB (DCCPI/OCPI).
Funding Agency: Centro para el Desarrollo Tecnológico Industrial (CDTI)
Project: NeuroModulación a través de Nanoparticulas Selectivas.
Subproject PI: Monica Carril; Affiliation: FBB. Subcontracted by the Beneficiary entity.
Beneficiary entity: Fundación TECNALIA Research & Innovation.
Phase I granted (Dec 2023) (total amount 133,602 €; 9,874.17 € for FBB)
Currently preparing phase II (total amount requested: 10 M€; 675,000 € for FBB).

2. **Contract with Hospital Quirón**. Funding Agency: Centro para el Desarrollo Tecnológico Industrial (CDTI) (CENIT program).
Project: Convergencia de tecnologías médicas para gestión integral del remodelado cardiovascular (cvREMOD).
Subproject PI: Soledad Penadés (CICI biomaGUNE). Participated as: Researcher
Leading entity: Grupo Hospitalario Quirón
Starting date and length: 10/2009, 4 years and 2 months
Amount: 308.000 Euros (for CIC biomaGUNE). Total amount: 12.3 M€