

CURRICULUM VITAE)

Part A. PERSONAL INFORMATION

First name	MARÍA BELÉN		
Family name	VILLACAMPA NAVERAC		
Gender (*)	Female	Birth date	24/10/1966
ID Number	18024568 C <i>(Spanish ID Number)</i>		
e-mail	bvillaca@unizar.es	ACT.: 20/Jan/2025	
Open Researcher and Contributor ID (ORCID) (*)		0000-0001-9814-0834	

A.1. Current position

Position	Associate Professor		
Initial date	01/2000		
Institution	UNIVERSITY OF ZARAGOZA		
Department/Center	CONDENSED MATTER PHYSICS	FACULTY OF SCIENCES	
Country	SPAIN	Ph. N ^{er}	+34 876 553759
Keywords	Optical Spectroscopy, Nonlinear Optics, Photoaddressable Polymers, Photovoltaic devices		

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

Period	Position/Institution/Country/
2000 to date	Profesora Titular / Universidad de Zaragoza (UNIZAR) / SPAIN
1996-2000 (4 years)	Profesora Asociada (Tiempo completo) / UNIZAR / SPAIN
1995-1996 (2 years)	Profesora Ayudante (Tiempo completo) / UNIZAR / SPAIN
1994	Becaria Postdoctoral (programa FPU en el extranjero) Centre National d'Études des Telecommunications, Bagneux/ FRANCE
1990-1993	Becaria predoctoral programa FPI/ UNIZAR

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD Sciences (Physics): <i>Spectroscopic Properties of Ni and Cr ions in Fluoroperovskite crystals</i>	Universidad de Zaragoza (UZ)	1990-1993
Bachelor in Physics	Universidad de Zaragoza (UZ)	1984-1989

Part B. CV SUMMARY

My research career was initially linked to projects on inorganic materials for laser applications. During my PhD, I gained experience in spectroscopic techniques, in particular time-resolved photoluminescence and electronic paramagnetic resonance. Then, I was granted a FPU postdoc fellowship to join the Prof. Zyss group, at the "Centre National d'Études des Télécommunications." (CNET-Bagneux-Paris). My work dealt with nonlinear optical (NLO) properties of organic materials. During my postdoc, I participated in setting up a spectrometer for NLO

characterization of materials, developed by the French company SOPRA. Back in UZ, I remained involved in this prototype project (Dept. Condensed Matter Physics and Institute of Materials Science of Aragón)

Then, I initiated my teaching career (firstly as assistant, and gaining an associated professor position in 01/2000), which I combined with my research activities; I was responsible for the design and development of specific experimental techniques to study the NLO properties of organic materials. This involves studies at molecular level, by using the EFISH technique (Electric Field Induced Second Harmonic) as well as macroscopic, focused on NLO polymers. From 1996 to 2014, I participated in 11 national and regional projects, being the IP of two of them (**MAT2005** and **MAT2008**, on organic ONL materials and photoaddressable Liquid Crystal polymers), coordinated with researchers of the Liquid Crystals and Polymers Group, UZ.

In 2015, I joined the *Electro and Photoactive π -Materials group* consolidating the close collaboration maintained up to that moment. Along with the research on NLO organic molecular materials, my interest extended to photovoltaic (PV) devices. In that context, I got involved in photophysical properties, including the set-up and supervision of several experimental techniques in our laboratory. In these areas, I was co-leader of the national project **PID2019: Design and evaluation of π -conjugated systems for optical and photovoltaic applications**.

I have co-authored 110 articles; 58 on nonlinear optics topics, a third of which are in collaboration with foreign researchers. An example of recent international collaboration (3 art. + 1 in progress) is Prof. S. Ludwigs, U. Stuttgart; her group hosted me for three weeks, in Oct-2022. On the other hand, of the 20 articles on photovoltaics, 8 are co-authored with researchers from other national or foreign groups. I currently lead the collaboration with Universidad de La Serena (ULS, Chile) on cost-effective and environmentally friendly solar cells. Several research and mobility actions (ULS-UZ) have been carried out, within the framework of EU project (KA107-EU) or funded by the Chilean Research Agency, ANID (see C.3). As indicators of this collaboration, our group in UNIZAR has welcomed professors/researchers from the University of La Serena (amounting to nearly 20 weeks) and PhD students (11 weeks); in November/December 2023 and June-July 2024 (9 weeks), ULS hosted me as a guest professor and researcher to work on the optical and photovoltaic properties of sustainable solar cells.

Supervision of Academic Works (last 5 years)

2 Master Thesis (in photovoltaics)

5(+1 in progress) Bachelor's Thesis (in photovoltaics and optical properties of polymer thin films)

2 (+ 1 in progress) supervision of external internships.

Supervision of Doctoral Theses: 4 (All with the distinction of *summa cum laude*)

1. *Polímeros cristalinos líquidos procesados en forma de película delgada. Propiedades ópticas y procesos fotoinducidos*

Doctor: Carlos Sánchez Somolinos, Universidad de Zaragoza, 2001.

2. *Propiedades ópticas fotoinducidas en polímeros con unidades de azobenceno*

Doctor: Francisco Javier Rodríguez Martínez, Universidad de Zaragoza, 2005.

3. *Modificaciones fotoinducidas de la respuesta no lineal de azopolímeros cristalino líquido.*

Doctora: Raquel Alicante Santiago, Universidad de Zaragoza, 2011.

Premio extraordinario de doctorado de la Universidad de Zaragoza

Editorial Springer Prize; Published in the series *Recognizing Outstanding Ph.D. Research*. (2012)

4. *Desarrollo y evaluación de celdas solares sensibilizadas por colorantes con nanopartículas de oro*

Doctor: Daniel Barrios González, Universidad de Zaragoza, 2024.

Academic management activities. Key aspects related to doctoral training include: Academic Secretary of the UZ Doctoral School (06/2012 - 02/2017). Since 10/2017, I have served as the PhD Coordinator for Campus Iberus (an alliance of four Spanish public universities), where I organize training and science outreach for PhD students and coordinate the initiation and progress of joint PhD Programs, emphasizing the internationalization of doctoral studies.

Research evaluation and management activities: I have participated in evaluation panels (Materials Research Area) of the (Spanish) National Agency for Evaluation and Prospective (pre-doctoral and Juan de la Cierva contracts). I have been a member of the evaluation panel of research projects (Call Retos-Materials Area and Call TransMisiones- Renewable Energy and Storage) and Ramón y Cajal Contracts. From 05/21, I am a board member of the Specialized Group of Nanoscience and Molecular Materials (GENAM). I was co-organizer of the GENAM Symposium in the 38th Biennial Meeting of the RSEF (July-22, Murcia).

Recent outreach activities. Currently, I lead the ARTesis project, an approach to PhD research process and results based on graphic arts, co-funded by a national project from the Spanish Foundation for Science and Technology, FECYT. I participate (as team member, 2019 to date) in the Project HiScore-Science (INMA) also funded by FECYT. I have been a co-organizer of the exhibition 'Einstein and Aragonese Science', commemorating the centenary of Einstein's visit to Zaragoza (open from March to November 2023). I have lectured on spectroscopy and its beginnings in Spain (Instituto de Estudios Altoaragoneses, Huesca, 9/11/21; San Martín del Río, Teruel, 10/06/23), as well as on the role of Spanish women pioneers in spectroscopy (RSEF

Biennial, 18/7/2019, Zaragoza; IES M. Catalán, Zaragoza, 11/2/2021. I was the organizer of the exhibition *Miguel Catalán (1894-1957). Investigador y Maestro*, UZ 2019-21.

Part C. RELEVANT MERITS IN RESEARCH

C.1. Publications (selection of publications, sorted by thematic scope)

Block 1 (PV): Research on solar cells and photoactive thin films (optical properties of dyes, optical and surface characterization of photoactive films, DSSCs PV performance)

Block 2 (NLO): Nonlinear optical properties of organic and liquid crystal materials

Block 1. (PV)

1a) V. Calvo; C. Martínez-Barón; B. Vázquez-Conejo; A. Dominguez-Alfaro; A.-J. Paleo; **B. Villacampa**; A. Ansón-Casaos; W.-K. Maser; A. M. Benito; J.M. González-Domínguez. *Carbon nanomaterials-Based Inks and Electrodes Using Chitin Nanocrystals*. ACS Sustainable Chemistry & Engineering **2024**, 12, 43, 15980-15990.

1b) A. Ansón-Casaos; J.C. Ciria; C. Martínez-Barón; **B. Villacampa**; A.M. Benito; W.K. Maser. *Modeling TiO₂ photoanodes for PEC water splitting: Decoupling the influence of intrinsic material properties and film thickness*. International Journal of Hydrogen Energy, **2024**, 52, 1146-1158.

1c) Duerto, I.; Sarasa, S.; Barrios, D.; Orduna, J.; **Villacampa, B.**; Blesa, M.J. *Enhancing the temporal stability of DSSCs with novel vinylpyrimidine anchoring and accepting group*; Dyes Pigm., **2022**, 203, 110310-17. **(1c) is selected, besides 1e), 1g), 1g) and 1h) as examples of my work on solar cells, with responsibility in optical studies, dye adsorption mechanism and photovoltaic characterization techniques)**

1d) Aina S.; **Villacampa B.**; Bernechea M. *Earth-abundant non-toxic perovskite nanocrystals for solution processed solar cells*; Mater. Adv., **2021**, 2, 4140-4151.

1e) Duerto I., García-Palacín M., Barrios D., Garín J., Orduna J., Villacampa B., Blesa, M.-J. *A novel σ -linkage to dianchor dyes for efficient dyes sensitized solar cells: 3-methyl-1,1-cyclohexane*. Dyes Pigm., **2020**, 173, 107945

1f) Andrés-Castán J.-M., Andreu R., **Villacampa B.**, Orduna J., Franco S.; *4H-pyranylidene organic dyes for dye-sensitized solar cells: Twisted structures towards enhanced power conversion efficiencies*; SOLAR ENERGY, **2019**, 193, 74-84.

1g) J.-M. Andrés-Castán, S. Franco, **B. Villacampa**, J. Orduna and R. Pérez-Tejada; *New efficient tert-butylidiphenyl-4H-pyranylidene sensitizers for DSSCs*; RSC Adv., **2015**, 5, 106706-106709.

1h) M. Castillo-Vallés, J.-M. Andrés-Castán, J. Garín, J. Orduna, **B. Villacampa**, S. Franco, M.-J. Blesa; *Dye Sensitized Solar Cells based on calixarene scaffolds*; RSC Adv., **2015**, 5, 90667-190677.

Block 2 (NLO)

2a) V. Tejeda-Orusco, R. Andreu,* J. Orduna, **B. Villacampa**, S. Franco, and A. Civera; *Twisted One-Dimensional Charge Transfer and Related Y-Shaped Chromophores with a 4H-Pyranylidene Donor: Synthesis and Optical Properties*; J. Org. Chem., **2021**, 86, 3152-3163. **(Selected as an example of my research on molecular NLO, with almost 40 contributions; I have been responsible of the design, realization and analysis of EFISH experiments, contributing to establish fundamental structure-properties relationships)**

2b) González-Láinez M, Jiménez-Ruiz MT, Martínez de Baroja N, Garín J, Orduna J, **Villacampa B.**,* Blesa MJ.; *Using functionalized nonlinear optical chromophores to prepare NLO-active polycarbonate films*. Dyes Pigm., **2015**, 119, 30-40.

2c) Martínez-Abadía, M.; Robles-Hernández, B.; **Villacampa, B.**; de la Fuente, MR.; Giménez, R.; Ros, MB.; *Cyanostilbene bent-core molecules: a route to functional materials*; J. Mater. Chem. C, **2015**, 3, 3038-3048. **(Selected, as well as 2d) among my 16 contributions on optical and NLO properties of liquid crystal materials and photoaddressable polymers, responsible of NLO experimental study)**

2d) R. Alicante, R. Cases, P. Forcén, L. Oriol, **B. Villacampa*** *Synthesis and NLO properties of Side Chain Liquid Crystalline Polymers containing Azobenzene Push-Pull Chromophores*; J. Polym. Sci. A. Polym. Chem. **2010**, 48, 232-242.

C.2. Congress and workshops

Workshop of the European Universities Project UNITA: Starting Grant 2024 on Rural Areas and Mountain Solar Energy Systems based on PhotoVoltaics - RAMSES-PV. Chambéry, France, 4&5 December 2024

TITLE: Development of materials and devices for application in photovoltaic technologies

TYPE OF PARTICIPATION: Oral

AUTHORS: B. Villacampa

32nd International Materials Research Congress - (IMRC2024) Cancún, México – 18-23 August 2024
TITLE: PHOTOVOLTAIC PERFORMANCE OF DSSCS WITH ZnS COATED TiO₂ PHOTOANODES AND ANILINE-BASED DYES

TYPE OF PARTICIPATION: Oral (C. Rodríguez)

AUTHORS: Carlos Rodríguez*, Belén Villacampa, María Jesús Blesa

Workshop of the Spanish National Network Organic electronic devices: from high-performance materials to advanced applications" (ORGAED). Madrid, Spain, 11-12 January 2024

TITLE: Photoactive π -functional systems: From molecular design to device development

TYPE OF PARTICIPATION: Oral

AUTHORS: B. Villacampa*, R. Andreu

4th EEES Energy, Efficiency, and Environmental Sustainability Conference; La Serena, Chile, 29 Nov to 1 Dec 2023.

TITLE: The revival of DSSCs, is it possible without a commitment to sustainability?

TYPE OF PARTICIPATION: Invited keynote

AUTHORS: B. Villacampa*

WS (Winter Semester) Seminar at the Polymer Chemistry Institute, U. Stuttgart, 25 October 2022.

TITLE: Photoactive π -functional systems: From molecular design to device development

TYPE OF PARTICIPATION: Invited Seminar

AUTHORS: B. Villacampa*

5th International Caparica Conference on Chromogenic and Emissive Materials; Caparica (Portugal), 03-07 July 2022

TITLE: Enhancing the temporal stability of DSSCs with novel vinylpyrimidine anchoring and accepting group.

TYPE OF PARTICIPATION: Oral presentation

AUTHORS: M.-J. Blesa, I. Duerto, S. Sarasa, D. Barrios, J. Orduna, B. Villacampa

3rd Energy, Efficiency, and Environmental Sustainability Conference; La Serena, Chile, 9&10 December 2021.

TITLE: Development of optimized photovoltaic devices: DSSCs with gold nanoparticles.

TYPE OF PARTICIPATION: Oral presentation

AUTHORS: D. Barrios, G. Maurin-Pasturela, I. Duerto, M. J. Blesa, B. Villacampa.

II Symposium on Progress in Organic Optoelectronics and Energy Conversion; Málaga, Spain, 12&13 December 2019.

TITLE: Development of optimized photovoltaic devices: dye-sensitized solar cells with Au@NPs.

TYPE OF PARTICIPATION: Poster

AUTHORS: D. Barrios, G. Maurin, I. Duerto, M. J. Blesa, S. Franco, B. Villacampa*

C.3. Research projects, indicating your personal contribution. In the case of young researchers, indicate lines of research for which they have been responsible.

TIT: Red PHOTOMAT: "Materiales Foto y Electroactivos para un Futuro más Sostenible: Energía, Catálisis y Valorización de recursos."

Grupo de Acción de Campus Iberus: con participación de Univ. Zaragoza, Univ. Pública de Navarra, Univ. de la Rioja, junto con colaboradores de la Universidad de Pau (Francia) y Univ. de La Serena (Chile) y de empresas y centros tecnológicos.

PROJECT COORDINATOR: B. Villacampa

PERIOD: Reconocido desde abril 2025

TIT: "Organic electronic devices: from high-performance materials to advanced applications"

FUNDING: AEI (Spain) Call "Redes de Investigación"

AMOUNT: 30000 €

PROJECT COORDINATOR: E. Barrena (ICMB)

PERIOD: June/2023-June/2025

TYPE OF PARTICIPATION: Researcher representative of the group of U. Zaragoza

TIT: "Organic electronic devices: from high-performance materials to advanced applications"

FUNDING: AEI (Spain) Call "Redes de Investigación"

AMOUNT: 30000 €

PROJECT COORDINATOR: E. Barrena (ICMB)

PERIOD: June/2023-June/2025

TYPE OF PARTICIPATION: Researcher representative of the group of U. Zaragoza

TIT: "Red Iberoamericana de investigación en materiales semiconductores y desarrollo de celdas solares fotovoltaicas." Ref. FOVI220128

FUNDING: **Agencia Nacional de Investigación y Desarrollo (ANID, Chile)** - Call 2022 "Fomento a la Vinculación Internacional para Instituciones de Investigación" AMOUNT: **30000 €**

PERIOD: **March/2023-March/2024**

TYPE OF PARTICIPATION: The coordinator of the network (Chile/ Spain/Argentina/ Mexico) is U. La Serena (Chile). **IP2 is the project leader** in U. Zaragoza (Spanish partner)

TIT: **Design and evaluation of π -conjugated systems for optical and photovoltaic applications.**

FUNDING: **AEI** (Spain) PID2019-104307GB-I00.

AMOUNT: **60500 €**

PERIOD: **01/06/2020-31/05/2023**

TYPE OF PARTICIPATION: **Project leader B. Villacampa**

TIT: **Research Group Liquid Crystals and Polymers. E47-20R**

FUNDING: Regional Aragón Government (DGA);

AMOUNT: **30051 €**

PERIOD: **01/01/2020-31/12/2022**

PROJECT LEADER: **J.L. Serrano**

TYPE OF PARTICIPATION: **Researcher**

TIT: **Tandem Si/DSSC photovoltaic devices for better use of solar energy**

FUNDING: Regional Aragón Government DGA;

AMOUNT: **63270 €**

PERIOD: **01/09/2018-31/08/2020**

PROJECT LEADER: **Santiago Franco Ontaneda**

TYPE OF PARTICIPATION: **Researcher**

TITLE: **Regional funding for Research Group Electro- and Photoactive Molecular Materials. (Ref. E14_17R)**

FUNDING BODY: Regional Aragón Government (DGA)

FROM **01/01/2017** TO: **31/12/2019**

AMOUNT: **38529 €**

PROJECT LEADER: **Jesús Orduna Catalán**

TYPE OF PARTICIPATION: **Researcher**

TITLE: **Organic and metallo-organic dyes for photovoltaic devices**

FUNDING BODY: MINECO (Spain) Call Retos-2014 **CTQ2014-52331-R**

AMOUNT: **90000 €**

FROM: **01/01/2015** TO: **31/12/2017** (extended until 30/03/2012)

PROJECT LEADER: **Jesús Orduna Catalán y Santiago Franco Ontaneda**

TYPE OF PARTICIPATION: **Researcher**

TITLE: **Photoaddressable Polymers for Optical Applications. Photoinduced Properties.**

FUNDING BODY: DGICYT (Spain) **MAT2008-06522-CO2-02**

AMOUNT: **205700 €**

FROM: **01/01/2009** TO: **30/06/2012**

TYPE OF PARTICIPATION: **Project leader B. Villacampa**