

**CURRICULUM VITAE ABREVIADO (CVA)**

**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	URL Web	
Open Researcher and Contributor ID (ORCID) (*)	0000-0001-9814-0834		

(\*) *Mandatory*

**A.1. Current position**

Position	Tenured Professor		
Initial date	01/2000		
Institution	UNIVERSITY OF ZARAGOZA		
Department/Center	CONDENSED MATTER PHYSICS	FACULTY OF SCIENCES	
Country	SPAIN	Ph. N <sup>er</sup>	+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/Interruption cause
2000 to date	Profesora Titular / Universidad de Zaragoza (UNIZAR) / SPAIN
1996-2000	Profesora Asociada (Tiempo completo) / UNIZAR / SPAIN
1994-1996	Profesora Ayudante (Tiempo completo) / UNIZAR / SPAIN
1994	<i>Becaria Postdoctoral (programa FPU en el extranjero) Centre National d'Études des Telecommunications, Bagneux/ FRANCE</i>
1990-1993	Becaria predoctoral, programa FPU/ 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 (max. 5000 characters, including spaces)**

My research training began in the framework of a project on inorganic materials for laser applications. During my PhD, I was trained in spectroscopic techniques, in particular time-resolved photoluminescence and electronic paramagnetic resonance. After obtained my PhD degree, I was granted a FPU postdoc fellowship to join the Prof. Zyss group, at the "Centre National d'Études des Télécommun." (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 a tenured 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 encloses 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  $\pi$ -Materials group* consolidating the close collaboration maintained up to that moment. Along with the research on NLO molecular materials, my interest extended to photovoltaic (PV) devices, in particular Dye Sensitized Solar Cells. 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 a project **PID2019**.

I have co authored 104 articles; 58 on NLO topics, a third of which are in collaboration with foreign researchers. An example of recent collaboration (3 art.) is Prof. S. Ludwigs, U. Stuttgart; her group hosted me for three weeks, in Oct-2022. On the other hand, of the 16 articles on PV, 6 are co authored with researchers from other national or foreign groups. I currently lead the collaboration with the Univ. La Serena (ULS, Chile) on cost-effective and environmentally friendly solar cells. Mobility actions (ULS-UZ) have taken place within the framework of a KA107-EU project (2022) promoted by me. Since March-23, the collaboration has been strengthened thanks to the funding of the Chilean Research Agency ANID (see C.3). As one of the actions of the Ibero-American network, Dr. C. Rodríguez (ULS) visited us on July-23 and in Nov/Dec 2023, ULS welcomed me as a guest professor and researcher, for working on the optical and photovoltaic properties of sustainable DSSCs. We have a joint publication, and we are working on two more (1 submitted).

I have supervised 3 PhD Theses on optical and NLO properties of organic materials (+1 in progress, on PV, to be defended in 2024) and, since 2020, 2 Master Projects and 2 Final Bachelor Projects on topics of PVs, as well as 3 on NLO polymers. I have been involved in a number of These committees mainly on NLO materials.

My activity in the academic management of doctoral training has been very intense: firstly, as Academic Secretary of the UZ Doctoral School, from 06/2012 to 02/2017; since 10/2017 I have been the Campus Iberus PhD Coordinator, in charge of organizing the training and science outreach activities of PhD students and coordinating the start- and follow-up actions of joint PhD Programs.

I have participated in evaluation panels (Materials Area) of the National Agency for Evaluation and Prospective (pre-doctoral and Juan de la Cierva contracts), in 2010-13. I have been a member of the evaluation panel of research projects (Retos, 2016) and RyC contracts, 2020 call.

From 05/21, I am a board member of the Specialized Group of Nanoscience and Molecular Materials (GENAM). I organized the GENAM Symposium in the 38<sup>th</sup> Biennial Meeting of the RSEF (July-22, Murcia).

Peer review activities: Dyes&Pigments, Macromolecules, Nanomaterials, etc (aprox. 8/year).

As for science outreach, I supervised (6 years) the activities of Condensed Matter during the *Semana de Inmersión*, annual event of the Science Faculty-UZ for high school students. I participate (team member, 2019 to date) in the Project *HiScore-Science* (INMA) funded by FECYT. I was the organizer of the exhibition *Miguel Catalán (1894-1957). Investigador y Maestro*, UZ 2019-21. Recently, I have lectured on spectroscopy and its beginnings in Spain (Inst. 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).

## **Part C. RELEVANT MERITS** (sorted by tematic scope)

### **C.1. Publications** (selection of publications relevant to the objectives of the project)and

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

**1a)**A. Ansón-Casaos; J.C. Ciria; C. Martínez-Barón; **B. Villacampa**; A.M. Benito; W.K. Maser  
*Modeling TiO<sub>2</sub> photoanodes for PEC water splitting: Decoupling the influence of intrinsic material properties and film thickness. International Journal of Hydrogen Energy, 2024, 52, 1146-1158. (illustrates, with 1c), my collaboration with nearby research groups in topics relevant to the proposal)*

**1b)**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. (Selected, besides 1d), 1e) and 1f) as examples of my work on solar cells, with responsibility in optical studies, dye adsorption mechanism and photovoltaic characterization techniques)*



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

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

**1e)** 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.

**1f)** 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. (1<sup>st</sup> article about DSSCs collecting results obtained entirely in our laboratory)

## **2. NLO properties of organic and Liquid Crystal materials**

**2a)** V. Tejada-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, almost 40 contributions; responsible of the design, realization and analysis of EFISH experiments, contributing to establish structure-properties relationships)

**2b)** González-Lainez 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 Pig.*, **2015**, 119, 30-40. (Corresponding author)

**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. (Corresponding author)

**C.2. Congress**, indicating the modality of the participation (invited conference, oral commun., poster)

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**4<sup>th</sup> 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\*

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

TITLE: *Photoactive  $\pi$ -functional systems: From molecular design to device development*

TYPE OF PARTICIPATION: Invited Seminar

AUTHORS: B. Villacampa\*

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**5<sup>th</sup> 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

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**3<sup>rd</sup> 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.

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**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.

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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

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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)

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TIT: **Design and evaluation of  $\pi$ -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**

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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**

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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**

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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**

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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**

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TITLE: **Photoaddressable Polymers for Optical Applications. Photoinduced Properties.**  
FUNDING BODY: DGICYT (Spain) **MAT2008-06522-CO2-02** AMOUNT: **205700 €**  
FROM: **01/01/2009** TO: **31/12/2011** (extended until 30/06/2012)  
TYPE OF PARTICIPATION: **Project leader**

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TITLE: **Photoaddressable polymers for optical information storage and other optical applications.**  
FUNDING BODY: DGICYT (Spain) **MAT2005-06373-CO2-02** AMOUNT: **154700 €**  
FROM: **01/01/2005** TO: **31/12/2008**  
TYPE OF PARTICIPATION: **Project leader**

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