# CV JUAN ANDRES TORRENO-PINA

## PERSONAL DATA

**Name: Juan Andres Torreno-Pina**
**Date of birth**: 10/10/1984
**Place of birth**: Cádiz (Spain)
**Nationality**: Spanish
**Civil status**: single, 1 child
**ORCID ID:** 0000-0001-7314-3828

## CURRENT POSITION

**01/01/2025-** **Ramon y Cajal Group Leader** at National Centre for Biotechnology (CNB)-CSIC (Madrid, Spain). Project: "Direct visualization of infection processes at the single virus level with advanced single molecule sensitive imaging tools"

## EDUCATION

**01/10/2009-02/10/2015** **Ph.D. in Photonics**, *Institute of Photonic Sciences (ICFO) and Universitat Politécnica de Catalunya (UPC), Barcelona (Spain).*
**Ph.D. Thesis:** "Membrane Protein Nanoclustering as a Functional Unit of Immune Cells - From Nanoscopy to Single Molecule Dynamics"
**Supervisor:** Prof. Dr. Maria Garcia-Parajo.
*Awarded with "Excellent Cum Laude" Prize to the best ICFO thesis (2015), Prize to the best UPC thesis (2015).*

**05/11/2005-23/01/2008** **M.Sc. Chemistry**, *Ludwig-Maximilians-Universität, Munich (Germany).*
Master thesis: "Interactions between Rad26 and RNA Polymerase II Elongation Complexes studied with Single Molecule Spectroscopy"
Supervisor: Prof. Dr. Jens Michaelis.

**01/10/2002-04/11/2005** **B.Sc. Chemistry and Biochemistry**, *Ludwig-Maximilians-Universität, Munich (Germany).*
Bachelor thesis: "Synergetic Mn/Cu-Bimetallic Catalysis for the Cross-Coupling between Aryl- or Heteroaryl-Magnesium Reagents and Aryl- or Heteroaryl Bromides or Chlorides"
Supervisor: Dr. Oliver Baron.

## PREVIOUS POSITIONS

**01/01/2018-30/11/2023** **Juan de la Cierva Postdoctoral Fellow** at the Institute of Photonic Sciences (ICFO, Spain) and at the Centre of Genomic Regulation (CRG, Spain). Projects: "Role of phase separation in gene transcription in breast cancer" and "Development of novel imaging techniques applied to viral infections"

**01/03/2016-01/12/2017** **Postdoctoral Scholar,** *Preclinical Vaccinology Department, Ragon Institute of MGH, MIT, and Harvard in Boston (USA).* **Supervisor:** Prof. Dr. Facundo Batista

**05/10/2015-01/03/2016** **Postdoctoral Researcher,** *Single Molecule Biophotonics Team, The Institute of Photonic Sciences (ICFO), Barcelona, Spain.* **Supervisor:** Prof. Dr. Maria Garcia-Parajo.

## FELLOWSHIPS AND AWARDS

**2025-2030** Ramon y Cajal Group Leader Position
**2018-2020** Juan de la Cierva Incorporación Postdoctoral Fellowship
**2017** Attendance to the 68th Lindau Nobel Laureate Meeting
**2017-2018** Human Frontiers Science Program Postdoctoral Fellowship

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| **2017** | Catalan Polytechnic University PhD Thesis Award |
| **2016-2017** | EMBO Postdoctoral Fellowship |
| **2016** | ICFO PhD Thesis Award |
| **2015** | Travel Award to the XV$^{th}$ Spanish Biophysical Meeting |
| **2013** | Poster Prize Award (ICREA International Symposium) |

## LANGUAGES

Spanish (mother tongue),
English (fluent)
German (professional)

## RESEARCH GRANTS/INDEPENDENT FELLOWSHIPS

**1. Title:** Role of Phase Separation in Gene Regulation and Chromatin Architecture
**Duration:** 12 months**, From:** January 2018**, Until:** January 2019
**Principal Investigator**: **Juan Andres Torreno-Pina** and Catalina Romero
**Sponsor:** The Barcelona Institute for Science and Technology
**Working Institute:** Centre for Genomic Regulation (CRG) and the Institute of Photonic Sciences (ICFO)
**Total Amount:** 75K€

**2. Title: Ramon y Cajal:** Direct visualization of viral infections at the single molecule level
**Duration:** 60 months**, From:** January 2025 **Until:** January 2030
**Principal Investigator**: **Juan Andres Torreno-Pina**
**Sponsor:** Spanish Ministry of Science
**Working Institute:** Spanish National Centre for Biotechnology-CSIC (Madrid, Spain)
**Total Amount:** 251K€

**3. Title: Plan Nacional :** Characterizing the neutralization of individual HIV viruses with bNAbs.
**Duration:** 36 months**, From:** December 2026 **Until:** December 2029
**Principal Investigator**: **Juan Andres Torreno-Pina**
**Sponsor:** Spanish Ministry of Science
**Working Institute:** Spanish National Centre for Biotechnology-CSIC (Madrid, Spain)
**Total Amount:** 131K€

**4. Title: Synergestic Project:** A biotechnology platform for the generation of antibodies against emerging viruses (BIOPAB)
**Duration:** 48 months, **From:** May 2025 **Until:** May 2029
**Principal Investigator:** Juan Andres Torreno-Pina as part of a consortium within the Spanish National Centre for Biotechnology
**Sponsor:** Plan Excelencia Severo Ochoa (Intramural Grant from Spanish National Centre for Biotechnology-CSIC)
**Working Institute:** Spanish National Centre for Biotechnology-CSIC (Madrid, Spain)
**Total Amount:** 100K€

## SELECTED PARTICIPATION IN SCIENTIFIC CONFERENCES

**Oral Presentations:**

1. "Multicolour, High Density quantum dot-based single molecule nanoimaging of initial host-virus interactions in living cells", **King's College London, UK, 2025.**
2. **"**Multicolour high density quantum dot-based single molecule nanoimaging of initial host-virus interactions in living cells" (Flash talk), **SPAOM, Portugal, 2025.**
3. "Early steps of individual multi-receptor viral interactions dissected by high-density, multi-color quantum dot mapping in living cells", **EuroBioimaging, Spain, 2025.**
4. "*Multi-colour quantum dot mapping of individual multi-receptor viral interactions*", **CNB-CSIC, Spain, 2024.**
5. *"Early steps of individual multi-receptor viral interactions dissected at the single virus level",* **CMBO-CSIC, Spain, 2024.**

6. "*Stochastic particle unbinding modulates growth dynamics and size of transcription factor condensates in living cells*", **Spanish Biophysical Society, Spain, 2023.**
7. "*Stochastic particle unbinding modulates growth dynamics and size of transcription factor condensates in living cells*", **Physics in Biology and Medicine, Spain, 2022.**
8. "*Stochastic particle unbinding modulates growth dynamics and size of transcription factor condensates in living cells*", **Invited talk at IBYME (Instituto de Biologia y Medicina Experimental)**, **Buenos Aires, Argentina,2022**.
9. "*Machine learning and minimal particle-based interaction model of experimentally tunable transcription factor condensates*", **The Anomalous Diffusion Workshop, Barcelona, Spain, 2021.**
10. "*Phase separation of tunable biomolecular condensates predicted by an interacting particle model*", **Cell Tissue Research Catalonia, Barcelona, Spain,2021.**
11. "*Phase separation of tunable transcriptional condensates predicted by an interacting particle model*", **Flash talk in Cell Symposia Biological Assemblies: Phase Transitions and More, Online Conference, 2021.**
12. "*Phase separation of tunable transcriptional condensates predicted by an interacting particle model*", **European Biophysics Conference, Viena, Austria, 2021.**
13. "*Phase separation of the progesterone receptor: a single molecule study*", **Biomolecular Phase Transitions, Barcelona, Spain, 2019.**
14. **"***The actin cytoskeleton modulates the activation of invariant NKT cells by segregating CD1d nanoclusters on antigen presenting cells*", **The Francis Crick Institute, London,U.K., 2015.**
15. "*The actin cytoskeleton modulates the activation of invariant NKT cells by segregating CD1d nanoclusters on antigen presenting cells*", **XV Spanish Biophysical Society Meeting, Granada, Spain, 2015.**
16. *"Addressing the role of the actin cytoskeleton on the nanoscale temporal organization of CD1d molecules and impact on iNKT cell activation*", **Barcelona Membrane Biology Club, Spain, 2015.**
17. "*The actin cytoskeleton controls the activation of invariant Natural Killer T cells by fine-tuning CD1d nanoscale aggregation on antigen presenting cells*", ***58th Annual Meeting of the Biophysical Society*, San Francisco, U.S.A., 2014.**
18. "*The neck region of DC-SIGN regulates its surface spatiotemporal organization and virus-binding capacity on antigen presenting cells", **XII Spanish Biophysical Society Meeting*, Barcelona, Spain, 2012.**
19. **"***DC-SIGN nanodomain formation revealed by single molecule fluorescence microscopy*", **XI Spanish Biophysical Society Meeting, Murcia, Spain, 2011.**

## SUPERVISION OF MASTER AND PH.D. STUDENTS

**2018-2023:** Ph.D. Student Nicolas Mateos at the Institute of Photonic Sciences (ICFO, Spain). Excellent cum laude. "**Advanced single molecule fluorescent tools to reveal spatiotemporal multi-molecular interactions in living cells**" (co-supervised with Prof. Maria Garcia-Parajo).

**2020:** Master Student Aiturgan Zheenbekova at the ICFO, Spain.**"**Assessing Chromatin Compaction by STORM super-resolution imaging of H2B histones on intact wing imaginal discs of *D. melanogaster."*

**2020:** Master Student Guillem Guigo Corominas at ICFO, Spain. **"**Adressing the phase separation capability of the progesterone receptor by means of Single Particle Tracking*."*

**2021:** Master Student Maria Quintana Verdaguer at ICFO, Spain. "Deciphering regulators of telomere homeostasis during adaptive responses*"*

## COLLABORATIONS (extramural)

- **Prof. Dr. Xavier Salvatella (X.S., ORCID ID 0000-0002-8371-4185), Institute for Biomedical Research, Barcelona, Spain.** We are working on the hypothesis that the progesterone receptor association with chromatin could change the biophysical properties and promote liquid-liquid phase separation. We are using their tools to perform *in vitro* experiments.

- **Prof. Dr. Maciej Lewenstein (M.L., ORCID ID 0000-0002-0210-7800), the Institute of Photonic Sciences, Barcelona, Spain.** We are working together with Maciej Lewenstein in developing new machine learning analyses of progesterone receptor-mediated transcriptional condensates.
- **Prof. Dr. Maria Garcia Parajo (M.G.P., ORCID ID 0000-0001-6618-3944), the Institute of Photonic Sciences, Barcelona, Spain.** We are working together in developing new imaging and analysis techniques.
- **Dr. Priyanka Sharma (P.S., ORCID ID 0000-0003-3890-3590), the Insitute of Pharmacology and Structural Biology, Toulouse, France.** We are working together in deciphering the role of biocondensates in transcription initiation of the RNA Polymerase II.
- **Dr. Sergi Padilla-Parra (S.P.-P., ORCID ID 0000-0002-8010-9481), King's College London, U.K.** We have been working together in the study of HIV-1 infections.
- **Prof. Mohamed Abdel-Mohsen (M.A.M., ORCID ID 0000-0002-9945-4314), Feinberg School of Medicine, U.S.A.** We are working together to decipher the role of the glycocalyx in defining the spatial organization of cell membrane.
- **Dr. Eva Bertosin (E.B., ORCID ID 0000-0001-9185-3954), Utrecht University, The Netherlands.** We are working together in the development of DNA origamis to manipulate the cell membrane.

## SUMMARY OF RESEARCH CAREER

I am a biophysicist specialized in quantitative single molecule sensitive fluorescence microscopy in living cells. As such, I have a broad experience of more than 17 years in tackling cell biology questions and precision medicine using advanced imaging approaches. Since January 2025, I am an independent Ramon y Cajal Group Leader at the National Centre for Biotechnology (CNB)-CSIC in Madrid, Spain.

**DOCTORAL RESEARCH:** I developed my doctoral studies at the Institute of Photonic Sciences (ICFO) in Barcelona under the supervision of Prof. M. Garcia-Parajo.

- I addressed the lateral behavior of the HIV membrane receptor DC-SIGN and of the antigen-presenting protein CD1d using cutting-edge quantitative fluorescence microscopy. Indeed, by combining multiple-color Single Particle Tracking (SPT) and STED super-resolution microscopy, I aimed to tackle how these two transmembrane proteins are organized on the surface of antigen-presenting cells.
- Also, I succeeded in connecting the spatiotemporal behavior of these two proteins with their biological function within the context of the human immune system. By combining multiple approaches, I have demonstrated that DC-SIGN nanocluster dissolution exclusively compromised binding to virus-size pathogens (Manzo* C., Torreno-Pina, J.A.*, et al., *Journal of Biological Chem.* 2012).
- *In a subsequent study, I characterized for the first time, to the best of my knowledge, a novel regulatory mechanism of membrane proteins on the extracellular part of cell: the glycocalyx.* (Torreno-Pina, J.A., et al. *P.N.A.S.* 2014, Manzo, C.*, Torreno-Pina*, J.A. et al. *Physical Review X* 2015).
- I revealed a novel role of the actin cytoskeleton in controlling iNKT cell activation by segregating CD1d molecules on the cell membrane of antigen presenting cells (Torreno-Pina, J.A. *P.N.A.S.* 2016).

**POSTDOCTORAL RESEARCH:** As a postdoctoral researcher, I had the privilege of working under the supervision of Prof. Facundo Batista at the Ragon Institute of MGH, MIT, and Harvard (Boston, USA) for two years followed by my return to Barcelona (Spain) where I started a postdoc under the guidance of Prof. Maria Garcia-Parajo:

- At the Ragon Institute, I analyzed, at the single cell level, the response of the memory B cell repertoire of human samples in response to an *in-vitro* boosting vaccination strategy (*Sanjuan-Nandin, I., et al. Journal of Exp. Med. 2017*).
- After returning to Barcelona, I started a postdoc between ICFO and the Centre de Regulació Genomica (CRG) under the guidance of Prof. Miguel Beato and Prof. Maria Garcia-Parajo. The aim of the research has been to address how the progesterone receptor (PR), a nuclear receptor of steroid hormones, forms transcriptional condensates in breast cancer cells. To address this, I have been applying cutting-edge advanced fluorescence imaging microscopy, *in-vitro* proteomics and theory modeling by coordinating several labs at different research centers (Muñoz-Gil, G. et al., *P.N.A.S. 2022,* Torreno-Pina et al.*, in preparation)*. To coordinate this overarching project, I successfully generated a 75K€ Research Grant ("PHASE-CHROM") from the BIST Ignite Programme. This has allowed me to expand my project management skills, interdisciplinary collaborations and the coordination of several different labs.

- In parallel to this overarching project, I have been co-supervising a doctoral student at ICFO. Under my guidance, he has been developing new analysis and multi-color imaging techniques that we are currently applying to address how viruses are initially captured on the cell membrane by multiple (co-)receptors. (*Mateos, N. et al., ACS Nano, 2024)*.

**GROUP LEADER:**

- Currently, I am an independent Ramon y Cajal group leader with national funding (Plan Nacional 2025) and intramural funding.
- I am currently supervising my first PhD Student (Chenyu Wang) who will study the role of the glycocalyx in viral infections.

## PUBLICATIONS

1. N. Mateos, E. Gutierrez-Martinez, J. Angulo-Capel, I. Carlon-Andres, S. Padilla-Parra, M. F. Garcia-Parajo, **J.A. Torreno-Pina***, "Early Steps of Individual Multireceptor Viral Interactions Dissected by High-Density, Multicolor Quantum Dot Mapping in Living Cells", *ACS Nano 18, 28881-28893* **(2024)** . doi: doi.org/10.1101/2023.09.29.560105 ***last and corresponding author.**

2. J. Font-Mateu, P. Sanllehi, J. Sot, B. Abad, N. Mateos, **J.A. Torreno-Pina**, et al. , "A progesterone derivative linked to a stable phospholipid activates breast cancer cell response without leaving the cell", ***CMLS 81**, 98* **(2023)**. doi: doi.org/10.1007/s00018-024-05116-3

3. G. Muñoz-Gil, C. Romero-Aristizabal, N. Mateos, F. Campelo, L. I. de Llobet Cucalon, M. Beato, M. Lewenstein, M. F. Garcia-Parajo, **J.A. Torreno-Pina***, "Stochastic particle unbinding modulates growth dynamics and size of transcription factor condensates in living cells", ***P.N.A.S. USA* 19**, 31 (**2022**). doi: 10.1073/pnas.2200667119 ***last and corresponding author**

4. M. Balcerek, H. Loch-Olszewska, **J.A. Torreno-Pina**, et al., "Inhomogeneous membrane receptor diffusion explained by a fractional heteroscedastic time series model", ***Phys. Chem. Phys***. **21**, 3114 (**2019**). doi: doi.org/10.1039/C8CP06781C

5. L. Martinez-Munoz, J.M. Rodríguez-Frade, R. Barroso, C.O.S. Sorzano, **J.A. Torreno-Pina** et al., "Separating actin-dependent chemokine receptor nanoclustering from dimerization indicates a role for clustering in CXCR4 signaling and function", ***Molecular Cell* 70**, 106 (**2018**). doi: 10.1016/j.molcel.2018.02.034

6. I. Sanjuan-Nandin, C. Fong, C. Deantonio, **J.A. Torreno-Pina**, et al., "Novel in vitro booster vaccination to rapidly generate antigen-specific human monoclonal antibodies", ***J. of Exp. Med.* 214**, 2471 (**2017**). doi: 10.1084/jem.20170633

www.the-scientist.com
www.medicalnewstoday.com
**-> Best of JEM 2017**

7. **J.A. Torreno-Pina**, et al., "Uncovering homo- and hetero-interactions on the cell membrane using single-particle tracking approaches**",** ***J. Phys. D.*** **49**, 104002 (**2016**). doi: 10.1088/0022-3727/49/10/104002

8. **J.A. Torreno-Pina** et al.,"The actin cytoskeleton modulates the activation of iNKT cells by segregating CD1d nanoclusters on antigen presenting cells", ***P.N.A.S. USA* 113**, 772 (**2016**). doi: 10.1073/pnas.1514530113

**-> Highlighted in F1000Prime**

9. C. Manzo*, **J.A. Torreno-Pina*** et al., "Weak ergodicity breaking of receptor motion in living cells stemming from random diffusivity", ***Physical Review X*** **5**, 011021 (**2015**). doi: doi.org/10.1103/PhysRevX.5.011021, * equal contributing authors

10. M.F. Garcia-Parajo, A. Cambi, **J.A. Torreno-Pina**, et al., "Nanoclustering as a dominant feature of plasma membrane organization", ***J. of Cell Sci.*** **127**, 4995 (**2014**). doi: 10.1242/jcs.146340

**-> Human Frontier Science Program Awardees' Article**

11. **J.A. Torreno-Pina***, B.M. Castro* et al., "Enhanced receptor-clathrin interactions induced by N-glycan-mediated membrane micropatterning", ***P.N.A.S. USA*** **111**, 11037 (**2014**). doi: https://doi.org/10.1073/pnas.140204111* equal contributing authors

**-> Highlighted in F1000Prime**

**-> Human Frontier Science Program Awardees' Article**

12. P. Massignan, C. Manzo, **J.A. Torreno-Pina**, et al., "Nonergodic subdiffusion from Brownian motion in an inhomogeneous medium", ***Physical Review Letters*** **112**, 150603 (**2014**). doi: 10.1103/PhysRevLett.112.150603

13. C. Manzo, T.S. van Zanten, S. Saha, **J.A. Torreno-Pina**, et al., "PSF decomposition of nanoscopy images via Bayesian analysis unravels distinct molecular organization of the cell membrane", ***Scientific Reports*** **4**, 4354 (**2014**). doi: 10.1038/srep04354

14. B.M. Castro, **J.A. Torreno-Pina**, et al., "Biochemical and imaging methods to study receptor membrane organization and association with lipid rafts", ***Methods in Cell Biology*** **117**, 105 (**2013**). doi: 10.1016/B978-0-12-408143-7.00006-2

**-> Coverpage Image**

15. C. Manzo*, **J.A. Torreno-Pina*** et al., "The neck region of the C-type lectin DC-SIGN regulates its surface spatiotemporal organization and virus-binding capacity on antigen-presenting cells", ***Journal of Bio. Chem.*** **287**, 38946 (**2012**). doi: 10.1074/jbc.M112.380121

**-> Highlighted in F1000Prime**

16. G.J. Bakker, C. Eich, **J.A. Torreno-Pina**, et al., "Lateral mobility of individual integrin nanoclusters orchestrates the onset for leukocyte adhesion", ***P.N.A.S. USA*** **109**, 4869 (2012). doi: 10.1073/pnas.1116425109