

Born in:

Resident in:



ÓSCAR JOVER ARRATE

SUMMARY

PhD. Student in Condensed Matter Physics, Nanoscience and Biophysics by “Universidad Autónoma de Madrid” (UAM), under the project “Quantum Properties of the Light Emitted from a Tunnel Junction (QuPoLET)”, studying the optoelectronic properties of organic molecules in plasmonic nanocavities of noble metals and the use of dielectric materials by means of an optical set up coupled to a Low-Temperature Ultra High Vacuum Scanning Tunnelling Microscope (LT-STM) that allows the collection of electroluminescence information (STM-EL).

His research activities are particularly focused on the study of different electroluminescence phenomena that arise from the coupling strength of the excitonic modes of organic molecules with the plasmonic modes of the substrates such as Purcell effect for weak coupling or Rabi splitting for strong coupling. The optical information obtained in these experiments can be studied separated from the electrical information due to an innovative normalization process developed in our group, being able to study the modifications of plasmonic resonances by adsorption of organic molecules deposited directly on noble metal surfaces. In addition, he has studied other electroluminescence phenomena such as the single photon emission process by implementing a Hanbury-Brown-Twiss (HBT) interferometer in the previous optical set up.

EDUCATION

MASTER IN MOLECULAR NANOSCIENCE AND NANOTECHNOLOGY (UAM)

2018-2019: Average mark of 8,86 over 10. At “Universidad Autónoma de Madrid (UAM)”.

BACHELOR'S DEGREE IN ENERGY ENGINEERING (UPM)

2014-2018: Average mark of 8,20 over 10. At “Universidad Politécnica de Madrid (UPM)”.

FIRST CERTIFICATE EXAM OF CAMBRIDGE

2014: From 10 to 18 years old, spending a month at CIB being hosted by native families.

ACCESS TO UNIVERSITY EXAM (PAU)

2014: Mark of 13,365 over 14.

TECNOLOGICAL HIGH SCHOOL DIPLOMA

2014: Average mark of 9,75 over 10. At “Escuelas Pías Tenerife”, Sta. Cruz de Tenerife, Canarias, España.

EMPLOYMENT HISTORY

PHD. STUDENT AT “INSTITUTO MADRILEÑO DE ESTUDIOS AVANZADOS” (IMDEA) NANOSCIENCE

October 2019 to Current Date. Supervisor, **Dr. Roberto Otero Martín**. Studying the opto-electronic properties of different organic molecules (C_{60} , BPEN, BPEA, FeCl and Pd-Porphyrins) over noble metals (Au (111), Ag (111)) and atomic-layers of dielectric materials (NaCl). Applying Scanning Tunnelling Microscope-induced Luminescence (STML) at Ultra High Vacuum (UHV). /

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MASTER THESIS AT "INSTITUTO MADRILEÑO DE ESTUDIOS AVANZADOS" (IMDEA) NANOSCIENCE.

December 2018 to September 2019. Supervisor, **Dr. Roberto Otero Martín.** Studying the electronic properties of the fullerene D_{5h} - C_{90} over noble metals (Au (111), Ag (111)) and atomic-layers of dielectric materials (NaCl) with an LT-STM.

SUMMER STUDIES AT THE FACULTY OF SCIENCE "UNIVERSIDAD DE LA LAGUNA" TENERIFE, SPAIN.

June 2017 to July 2017. Optical Laser spectroscopy studies on different types of bones to determine its composition. studies on phosphate glass micro-spheres, concretely the "Whispering Gallery Modes" effect.

CIB CANARIAS MONITOR HARLOW, ESSEX, UK.

June 2016. Monitor in a summer camp for exchange students in Essex, UK.

RESEARCH STAYS "STM-induced Luminescence on organic molecules and graphene nanoribbons"

January 2022-April 2022. "Institut the Physique et Chimie des Matériaux de Strasbourg (IPCMS)". Guillaume Schull's group. Study of induced electroluminescence by STM on organic molecules decoupled from metallic surfaces by atomic layers of

PUBLICATIONS "Electronic Temperature and Two-Electron Processes in Overbias Plasmonic Emission from Tunnel Junctions"

Alberto Martín-Jiménez, Koen Lauwaet, **Óscar Jover**, Daniel Granados, Andrés Arnau, Vyacheslav M. Silkin, Rodolfo Miranda, and Roberto Otero. **Nano Letters** 2021, 21 (16), 7086-7092. DOI: 10.1021/acs.nanolett.1c00951

"Selectively addressing plasmonic modes and excitonic states in a nanocavity hosting a quantum emitter"

Alberto Martín-Jiménez, **Óscar Jover**, Koen Lauwaet, Daniel Granados, Rodolfo Miranda, and Roberto Otero. **Nano Letters** 2022, 22 (23), 9283-9289. DOI: 10.1021/acs.nanolett.2c02758

"Nanotube-like electronic states in [5,5]- C_{90} fullertube molecules"

Óscar Jover, Alberto Martín-Jiménez, Hannah M. Franklin, Ryan M. Koenig, José I. Martínez, Nazario Martín, Koen Lauwaet, Rodolfo Miranda, José M. Gallego, Steven Stevenson and Roberto Otero. **Small** 2023, 2307611. <https://doi.org/10.1002/sml.202307611>

"Topographical, Electrical and Optical Characterization of Naphthalene and Anthracene based Molecules by LT-STM"

Óscar Jover, Alberto Martín-Jiménez, Koen Lauwaet, Rodolfo Miranda, and Roberto Otero. (Manuscript in preparation)

CONFERENCES "Fuerzas y Túnel 2023" (July 2023)

Poster Contribution, "Crystalline and Electronic Properties of C_{90} on different surfaces by STM"

"Light Matter Interaction (LMI) at Nanoscale" (October 2022)

Oral Contribution, "Modifying plasmon resonances at nanocavities by molecular adsorption: A Scanning Tunnelling Microscopy Study"

"ECOSS 35 Luxembourg" (September 2022)

Oral Contribution, "STM study on plasmon resonance modifications by molecular adsorption at nanocavities"

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"American Physical Society (APS) March Meeting 2022" (March 2022)

Oral Contribution, "Changes in plasmonic resonances due to organic molecules adsorption at nanocavities on an STM"

"11th Early Stage Researchers Workshop at IMDEA Nanoscience" (December 2021)

Oral Contribution, "Plasmonic resonance's changes by molecular adsorption on STM"

"10th Early Stage Researchers Workshop at IMDEA Nanoscience" (December 2020)

Poster Contribution, "Optical properties of single organic molecules on metal surfaces by STM"

SEMINARS

"Annual Meeting Scientific Session 2023" (January 2023)

"Annual Meeting Doctorate Program" (December 2021)

"Emergence of Quantum Phases in Novel Materials" (September 2021)

"Spanish Conference on Biomedical Applications of Nanomaterials 2021" (June 2021)

"Spanish Conference on Biomedical Applications of Nanomaterials 2020" (September 2020)

"CMD2020GEFES" (August 2020)

"Virtual Workshop on Scanning Probe Microscopy" (June 2020)

GRANTS

PhD. STUDIES

2020/2024 National Grant "Contratos predoctorales para la formación de Doctores (FPI)"

MASTER STUDIES

2018/2019 Local Grant "Concurso General de Estudios Universitarios del Cabildo de Tenerife"

UNDERGRADUATE STUDIES

2014/2015; 2015/2016; 2017/2018 Local Grant "Concurso General de Estudios Universitarios del Cabildo de Tenerife"

2016/2017 National Grant for Final Project "Colaboración Departamento de Energía de la UPM por el Ministerio de Educación y Cultura" and National Grant "Carácter General del Ministerio de Educación y Cultura"

ADDITIONAL STUDIES

PYTHON COURSES FROM THE GEORGIA INSTITUTE OF TECHNOLOGY

- COMPUTING IN PYTHON I
- COMPUTING IN PYTHON II
- COMPUTING IN PYTHON III
- COMPUTING IN PYTHON IV

FUNDAMENTALS OF PYTHON 3 COURSES FROM CODECADEMY

- LEARN PYTHON 3 COURSE
- LEARN INTERMEDIATE PYTHON 3 COURSE
- LEARN ADVANCE PYTHON 3 COURSE

DATA SCIENCE WITH PYTHON 3 FROM CODECADEMY

- LEARN DATA ANALYSIS WITH PANDAS COURSE
- LEARN DATA VISUALIZATION WITH PYTHON COURSE

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QUANTUM MECHANICS COURSES FROM MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

- QUANTUM MECHANICS: WAVEFUNCTIONS, OPERATORS AND EXPECTATION VALUES
- QUANTUM MECHANICS: QUANTUM PHYSICS IN 1D POTENTIALS
- QUANTUM MECHANICS: 1D SCATTERING AND CENTRAL POTENTIALS

ACADEMICAL ASSISTANCE

MASTER'S FINAL PROJECTS

- David Mateos Roncero
- Miguel Varea Martín
- Mohammed Shams

UNDERGRADUATE'S FINAL PROJECTS

- David Mateos Roncero
- Miguel Varea Martín
- Juan Francisco González
- Alba Santos
- Antonio Gañan

PERSONAL COMPETENCES

- **Languages:** Spanish (Native), English (Advanced level), French (Basic level).
- **Programming languages:** Python (Advanced), C, FORTRAN, Matlab (Basic level).
- **STML measurements:** MATRIX, Andor SOLIS.
- **Data processing:** Vernissage, WSxM, Gwiddion, OriginPro, Engauge Digitizer, Inkscape, gnuplot, Jupyter Notebook

OTHER MERITS

- Dissemination activities at IMDEA Nanoscience
- Technical assistant at "Fuerzas y Túnel 2023" (July 2023)

REFERENCES

INSTITUTO MADRILEÑO DE ESTUDIOS AVANZADOS (IMDEA) EN NANOCIENCIA

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