

Alberto Ascencio, Ph.D.

Phone: (+52) 221424-2829 | Email: j.albertoar10@gmail.com

LinkedIn: [linkedin.com/in/alberto-ascencior](https://www.linkedin.com/in/alberto-ascencior)

ORCID: <https://orcid.org/0000-0002-4967-4159>

1. Profile:

Postdoctoral researcher specializing in **biophotonics, optical tweezers, and nanofluidic systems**, with strong expertise in **laser-based manipulation and biomechanical characterization** of cells. Experienced in **nanomaterial-biological interface studies, optical system design, and advanced fluorescence imaging**. Skilled in interdisciplinary research across Mexico and Europe, combining **physics, nanotechnology, and biology**. Passionate about applying advanced photonic tools to explore biological mechanisms and drive biomedical innovation.

2. Education:

Ph.D. in Optical Sciences — INAOE, Mexico (Jan 2019 – Jun 2024)

Advisor: Dr. Rubén Ramos García. Thesis: Applications of an optical tweezers system: force measurements, microhole and microbubble generation. GPA: 4.0

M.Sc. in Optical Sciences — INAOE, Mexico (Aug 2016 – Jan 2019)

Advisor: Dr. Michael Krieg (ICFO, Spain). Thesis: Measuring mechanical properties of isolated touch receptor neurons using optical tweezers. GPA: 3.7

B.Sc. in Physics — University of Veracruz, Mexico (Sep 2010 – Sep 2015)

Advisor: Dr. Remy Ávila. Thesis: Optical guidance of cell projections. Graduated with honors. GPA: 3.75

3. Research Experience:

Postdoctoral Researcher

Dioscuri Centre of Single Molecule Optics. Institute of Physics of the Czech Academy of Sciences (FZU, Chequia)

Marie Skłodowska-Curie Actions – Physics for Future Fellowship

Jun 2026 – May 2028

Leading the project **“Real-Time Single-Molecule Analysis of Nanoplastic-Protein Interactions and Folding Dynamics Using Nanofluidic Scattering Microscopy”**.

Investigating nanoplastic-protein interactions at the single-molecule level using nanofluidic scattering microscopy (NSM) to study, in real time, protein corona formation and its effects on the conformation and folding dynamics of proteins of biomedical relevance.

Aiming to uncover the physicochemical mechanisms governing nanoplastic-protein interactions and their potential connection to processes associated with neurodegenerative diseases.

Developing advanced experimental methodologies at the interface of nanophotonics, biophysics, and nanomedicine, while strengthening my profile as an independent researcher through the formulation and execution of interdisciplinary international research projects.

Postdoctoral Researcher

Dioscuri Centre of Single Molecule Optics. Institute of Physics of the Czech Academy of Sciences (FZU, Chequia)

WATERsense Project (EU Horizon EIC 2024)

Sep 2025 – May 2026

Member of the international WATERsense project, funded by the European Union under HORIZON-EIC-2024, focused on the development of a mobile prototype for real-time detection of water contaminants.

Contributing to the design and optimization of plasmonic sensing platforms through electromagnetic simulations based on the finite-difference time-domain (FDTD) method, aiming to maximize the sensitivity and robustness of plasmonic nanoparticles used as nanosensors.

Designing, implementing, and integrating an optical tweezers system into an optical scattering microscope, expanding the experimental platform for precise manipulation and characterization of nano- and micro-objects in solution.

Combining advanced numerical modeling, instrumental development, and experimental validation within a highly interdisciplinary international consortium.

Actively participating in scientific and coordination meetings held in Barcelona (October 2025) and Prague (May 2026).

Postdoctoral Researcher

National Institute of Astrophysics, Optics and Electronics (INAOE, Mexico)

Jun 2024 – Aug 2025

Continuation of doctoral research focused on **laser-matter interactions**, **microbubble dynamics**, and **optical manipulation techniques** for biological and nanomaterial applications.

Conducted **microbubble pen lithography** experiments for **controlled deposition of gold nanoparticles** on titanium nanofilms.

Synthesized **TiO₂ nanoparticles** via low-power laser ablation and analyzed **metallic film dewetting** (Ti, Ag, Au) under CW irradiation.

Leading the development of **laser-assisted nanostructuring** methods for bio-interactive surfaces and studying their potential use in **biophysical sensing**.

Mentored **two master's and three undergraduate students** in optical trapping, microscopy, and data analysis.

Ph.D. Research Student, Biophotonics Laboratory

National Institute of Astrophysics, Optics and Electronics (INAOE, Mexico)

Supervisor: Dr. Rubén Ramos García

Jan 2019 – Jun 2024

Designed and calibrated an **optical tweezers setup**, performing **quantitative force measurements** and **simulations of optical trapping dynamics**.

Developed a **novel laser micropatterning technique** on titanium nanofilms using low-power CW lasers — results **published and presented internationally**.

Pioneered the **generation and manipulation of microbubbles** on titanium thin films, enabling multiple trapping of *Candida tropicalis* and *Candida albicans*.

Used **optical tweezers** to measure the **mechanical properties** of *Candida* cells **before and after photodynamic therapy (PDT)**.

Contributed to a **microfluidic biosensor project** for SARS-CoV-2 detection, developing and fabricating prototype platforms.

Master Researcher. Neurophotonics and Mechanical Systems Biology Laboratory
The Institute of Photonic Sciences (ICFO, Spain)
Supervisor: Dr. Michael Krieg
Sep 2017 – Sep 2018

Designed a **force-stimulation assay** using optical tweezers on isolated **mechanosensitive neurons of *C. elegans***. Quantified neuronal responses through **calcium imaging** using **genetically encoded activity indicators (GCaMP)**. Implemented **force-sensor calibration** and **Matlab-based quantitative analysis** for high-precision data processing. Collaborated in an **international, multidisciplinary environment** combining physics, biology, and engineering.

Postgraduate Researcher. Applied Optics Laboratory
University of Veracruz (UV, Mexico)
Supervisor: Dr. Héctor Cerecedo
Aug 2015 – Apr 2016

Designed and adapted an **optical fiber system** for **particle manipulation** and **thermo-cavitation** studies.
Developed **fs-laser ablation techniques** to synthesize copper nanoparticles and characterized their optical characteristics.
Guided undergraduate students in experimental optics and nanomaterial projects.

Undergraduate Researcher. NanoBio-Optics Laboratory
National Autonomous University of Mexico (UNAM)
Supervisor: Dr. Remy Ávila
Aug 2014 – Jul 2015

Integrated an **optical tweezers system** into a **confocal microscope** for single and multiple particle trapping.
Investigated **optical guidance** of fibroblast cell projections and **bead chaining** under NIR laser illumination.
Published as **first author in *Optics Letters*** and presented results at **OSA/OPTICA international conferences**.

Summer Undergraduate Researcher. Ultrafast Pulses and Material Processing Laboratory
Ensenada Center for Scientific Research and Higher Education (CICESE, Mexico)
Supervisor: Dr. Santiago Camacho
Jun 2014 – Jul 2014

Synthesized **silver nanoparticles by laser ablation in liquid**.
Conducted **TEM characterization** to study morphology and particle-size distribution.

4. Skills:

- Optical systems: optical tweezers, nanofluidics, and laser microfabrication.
- Microscopy: AFM, SEM, TEM, confocal, and fluorescence imaging.
- Programming: MATLAB, Python, COMSOL Multiphysics.
- Cell biology: culture of NIH 3T3, PC12, MBA-MBS231, and C. elegans cells.
- Soft skills: Leadership, mentoring, science communication, interdisciplinary teamwork.

5. Publications:

- * Doralycia Carranza, Joaquín A. Ascencio-Rodríguez, Teresita Spezzia-Mazzocco, and R. Ramos García. Optical trapping of lipidic bodies reveals increased intracellular viscosity in Candida tropicalis after antimicrobial photodynamic therapy. Journal of Optics. Vol. 26. 125302, (2024).
- * Joaquín Ascencio-Rodríguez, R. Ramos García, S. Masurova. Analysis of Micro-Hole Formation in Titanium Nanofilms Using a Low Power Cw Laser. Optics and Laser Technology (111709) Vol. 181, (2024).
- * Joaquín Ascencio-Rodríguez, R. Ramos García, S. Masurova. "Formation and manipulation of micro bubbles with low laser power on Ti thin films". (2025 - submitted).
- * Doralycia Carranza, Joaquín A. Ascencio-Rodríguez, Teresita Spezzia-Mazzocco, and R. Ramos García. Optical tweezers reveal increased intracellular viscosity in Candida tropicalis after APDT. SPIE Optics + Photonics. San Diego, USA. (2024).
- * Joaquín A. Ascencio-Rodríguez. The Microscopic World Within Reach: Light as a Tool. Saberes y Ciencias 135, UNAM Mexico. (2023).
- * J. A. Sarabia Alonso, J. G. Ortega, Joaquín A. Ascencio-Rodríguez, R. Ramos G. 3D manipulation of vapor micro bubbles driven by the Marangoni force. Optical Trapping Applications. Photonics West SPIE August (2022).
- * Joaquín Ascencio-Rodríguez, Remy Avila, et. al. Optical concatenation of a large number of beads with a single-beam optical tweezer. Optics Letters 42(7) 1393-1396. (2017).

Proceedings:

- * Joaquín A. Ascencio-Rodríguez, S. Mansurova, R. Ramos García. Formation of microbubbles and micro-holes with low laser power on Ti thin films. Latin America Optics and Photonics Meeting (LAOPM, OPTICA). Recife Brazil (2022).
- * Cerecedo-Nunez, Ascencio-Rodríguez, Joaquín A., Padilla-Sosa, Patricia. The knife edge method for estimation of profile force gradients. Optical Trapping Applications. Photonics West SPIE (2017).
- * R. Avila, O. Rodríguez-Herrera, A. González- Suárez, J. Ascencio-Rodríguez. Optical chaining of tens of silica beads with single trap. Optics in the Life Sciences, OSA Technical Digest (2015).

6. Selected conferences attended:

- * Doralycia Carranza, Joaquín A. Ascencio-Rodríguez, Teresita Spezzia-Mazzocco, and R. Ramos García. Optical tweezers reveal increased intracellular viscosity in Candida tropicalis after APDT. SPIE Optics + Photonics. San Diego, USA. (2024).

* Doralycia Carranza, **Joaquin A. Ascencio-Rodriguez**, Teresita Spezzia-Mazzocco, and R. Ramos García. Effect of photodynamic therapy on the viscoelastic properties of *Candida tropicalis* using optical tweezers. Mexican Optics and Photonics Meeting (2023).

* Doralycia Carranza, Teresita Spezzia-Mazzocco, R. Ramos García, **Joaquin A. Ascencio-Rodriguez**. Effect of photodynamic therapy on the viscoelastic properties of *Candida tropicalis*. XI Ibero-American Meeting of Optics, XIV Latin America Meeting of Optics, Lasers and Applications (RIAO OPTILAS 2023). San José Costa Rica March 27th – 31st (2023).

* **Joaquin A. Ascencio-Rodriguez**, S. Mansurova, R. Ramos García. Formation of micro-holes and manipulation of microbubbles with a CW low power laser on Ti nanofilms. XI Ibero-American Meeting of Optics, XIV Latin America Meeting of Optics, Lasers and Applications (RIAO OPTILAS 2023). San José Costa Rica March 27th – 31st (2023).

7. Awards and Fellowships:

- Best Poster Award, SPIE Optics + Photonics, USA (2024).
- CONACYT Fellowship, Ph.D. (2019–2022), MSc (2016–2018).
- ICFO Fellowship, Spain (2017–2018).
- Talent Young Meeting Veracruz, Winner (2015).
- Distinguished Bachelor Graduate, University of Veracruz (2015).

8. Leadership and Outreach:

- President, OPTICA Student Chapter, INAOE (2022–2023): organized international seminars, outreach, and workshops.
- Treasurer, SPIE Student Chapter, INAOE (2019–2021): coordinated national congresses and science promotion.
- Evaluator, Mexican Physics Society (2021–2024): judged regional experimental competitions.
- Science Communicator, Love Science program (Puebla Science Dept, 2022).
- STEM Outreach Leader: promoted optics education for children and underrepresented communities.

9. References:

Dr. Barbora Špačková (leader of Dioscuri Centre of Single Molecule Optics)

barboraspachkova@fzu.cz

Institute of Physics of the Czech Academy of Sciences (Cz)

Dr. Rubén Ramos García (PhD and master advisor)

rgarcia@inaoep.mx

National Institute of Astrophysics, Optics and Electronics (MX)