

# Andres F. Roca-Arroyo, Ph.D. Student

Biomedical Engineering Department, University of Miami  
1251 Memorial Drive, McArthur Engineering Building, Coral Gables, FL, 33146  
Tel: +1 (786) 301-3501, Email: [afr130@miami.edu](mailto:afr130@miami.edu)  
[Google Scholar](#) – [LinkedIn](#) – [ORCID](#)

## EDUCATION AND TRAINING

---

**Ph.D. Student in Biomedical Engineering**, University of Miami, Miami, FL 01/2025 — Present

Second-year Ph.D. Student | **GPA: 4.0/4.0**

Advisor: David A. Castilla-Casadiegos, Ph.D.

*Thesis: Regulating the Quality and Potency of Stem Cells with Biophysical Cues from Nanofibrous Hydrogels for Therapeutic Purposes*

**B.Sc. in Chemical Engineering**, Universidad del Atlantico, Barranquilla, COL 02/2018 — 08/2024

**Ranked #1 in Chemical Engineering class** | Recipient of 3 merit-based GPA scholarships | **GPA: 3.65/4.0**

Advisor: Alberto Albis, Ph.D.

*Thesis: Evaluation of Nanofibrous Membranes Obtained by Electrospinning for Membrane Distillation of Aqueous Sodium Chloride Solutions*

## RESEARCH AND PROFESSIONAL APPOINTMENTS

---

**Graduate Research Assistant** 01/2025 — Present

Biomedical Engineering Department, Castilla-Casadiegos Lab  
University of Miami, Miami, FL

- Lead doctoral project developing nanofibrous hydrogel systems for human mesenchymal stem cell manufacturing and therapeutic applications.
- Investigate how nanofiber density regulates hydrogel mechanics, cell morphology, viability, cell-material interactions, and secretory behavior.
- Fabricate and characterize hydrogel-based biomaterials using cell culture, confocal microscopy, immunofluorescence staining, Luminex cytokine assays, rheology, and image-based analysis.
- Support collaborative biomaterials projects involving injectable hydrogels and microneedle platforms.
- Mentor undergraduate researchers in laboratory safety, experimental techniques, data interpretation, scientific writing, and professional development.

**Undergraduate Research Assistant** 10/2022 — 08/2024

Bioprocesses Research Group, Chemical Engineering Department  
Universidad del Atlantico, Barranquilla, COL

- Developed electrospun nanofibrous membranes for membrane distillation and water treatment applications.
- Optimized and evaluated electrospinning parameters to fabricate uniform nanofibrous membranes for aqueous sodium chloride solutions.

- Contributed to the development and validation of a low-cost electrospinning system with bidirectional collector motion, later published in *HardwareX*.
- Performed membrane characterization and supported experimental analysis related to nanofiber morphology and membrane performance.

**Licensing Analyst Apprentice**  
Procaps S.A., Atlantico, COL

04/2023 — 10/2023

- Supported regulatory documentation, product dossier review, and technical analysis for pharmaceutical product licensing and compliance.
- Assisted with qualitative and quantitative review of technical information required for pharmaceutical product registration and regulatory processes.
- Contributed to the organization and evaluation of product documentation in a regulated pharmaceutical environment.

**LEADERSHIP, MENTORSHIP, AND SERVICE**

---

**Academic Chair**  
Alpha Eta Mu Beta Biomedical Engineering Honor Society, University of Miami Chapter

2026 — Present

- Coordinate tutoring initiatives to support undergraduate students in Biomedical Engineering during high-demand academic periods.
- Help facilitate access to academic support resources and promote peer-to-peer learning within the department.

**Undergraduate Research Mentor**  
Castilla-Casadiago Lab, University of Miami, Miami, FL

2025 — Present

- Mentored seven undergraduate students in biomaterials research, laboratory techniques, data interpretation, scientific writing, and professional development.
- Helped students build confidence in research, contribute to ongoing projects, and strengthen their preparation for academic and professional opportunities.

**Laboratory Safety and Inventory Lead**  
Castilla-Casadiago Lab, University of Miami, Miami, FL

2025 — Present

- Support safe laboratory operations by helping implement internal practices for equipment use, material organization, and laboratory safety.
- Maintain inventory organization and internal systems that improve day-to-day lab efficiency and research continuity.

**Judge and Evaluator at University of Miami Research, Creativity, and Innovation Forum (RCIF)**  
University of Miami, Miami, FL

2025 — 2026

- Evaluated undergraduate research projects across multiple disciplines and provided constructive feedback to student presenters.
- Supported undergraduate research development by assessing project clarity, scientific quality, presentation skills, and overall impact.

## AWARDS AND HONORS

---

- 2024 **Winner of the Call for Scholarships for Doctoral Studies at the Castilla-Casadieago Laboratory at the University of Miami, United States of America**, Universidad del Atlantico, Colombia
- 2024 **Top-Ranked Professional Ranking in Chemical Engineering**, Chemical Engineering Department at the Universidad del Atlantico, Colombia
- 2024 **Winner of 3 Scholarships for the Best Grade Point Average (GPA)**, Chemical Engineering Department at the Universidad del Atlantico, Colombia, 2018-2024
- 2024 **Perfect Score in Oral Presentation**, at the XXI Departmental Meeting of Research Groups RedCOLSI Atlantico - 2024
- 2022 **Research Project Selected**, in the "Internal Call for the Strengthening of Research Groups with Tools for Creation, Innovation, and Research - 2022", funded by the Universidad del Atlantico

## PROFESSIONAL MEMBERSHIPS AND SOCIETIES

---

- 2026 **Sigma Xi, The Scientific Research Honor Society**, Associate Member
- 2026 **Society For Biomaterials (SFB)**, Full Student Member
- 2026 **Alpha Eta Mu Beta (AEMB), National Biomedical Engineering Honor Society, University of Miami Chapter**, Full Member
- 2025 **The National Society of Leadership and Success (NSLS), University of Miami Chapter**, Full Member

## RESEARCH INTERESTS

---

Membranes, Nanoparticle-Based Membrane Modification, Electrospinning, Membrane Distillation, Water Treatment, Biomedical Engineering, Cell and Tissue Engineering, Regenerative Medicine, Cell Manufacturing, Bioengineering, Polymeric Biomaterials, Cell-Material Interactions.

## SCIENTIFIC PUBLICATIONS (PEER-REVIEWED)

---

1. Deihl, A. C., Odibo, A. O., Gutierrez-Rivera, J. A., **Roca-Arroyo, A. F.**, Maduka, C. V., Castilla-Casadieago, D. A., & Rodriguez Rivera, G. (2026). The Impact of Biomaterial Charge on Cells' Bioelectrical Signaling. *Cells Tissues Organs*. <https://doi.org/10.1159/000552765>
2. **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A., Mejia-Rosales, L. M., Morton, L. D., & Castilla-Casadieago, D. A. (2026). Nanofibrous-Composite Hydrogels for Modulating Stem Cell Behavior. *Cells Tissues Organs*. <https://doi.org/10.1159/000552028>
3. **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A., Castilla-Casadieago, D. A., & Albis, A. (2025). Development of a low-cost electrospinning system with a bidirectional collector for uniform nanofibrous membrane. *HardwareX*, 24, e00704. <https://doi.org/10.1016/j.ohx.2025.e00704>
4. **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A., Morton, L. D., & Castilla-Casadieago, D. A. (2025). Hydrogel Network Architecture Design Space: Impact on Mechanical and Viscoelastic Properties. *Gels*, 11(8), 588. <https://doi.org/10.3390/gels11080588> (**Editor's Choice**)

## INTERNATIONAL AND NATIONAL PRESENTATIONS

---

- **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A., Castilla-Casadiegos, D. A. Engineering Nanofibrous Hydrogels for Human Mesenchymal Stem Cell Manufacturing. Poster Presentation at the Society For Biomaterials 2026 Annual Meeting & Exposition. March 2026.
- **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A., Castilla-Casadiegos, D. A. Engineering Nanofibrous Hydrogels for Human Mesenchymal Stem Cell Manufacturing. Poster Presentation at the Annual College of Engineering Research Symposium of the University of Miami. October 2025.
- **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A. Evaluation of Nanofibrous Membranes Obtained by Electrospinning for Membrane Distillation of Aqueous Sodium Chloride Solutions. Poster Presentation at 5th Annual LatinXChem Poster Conference. October 2024.
- **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A. Evaluation of Nanofibrous Membranes Obtained by Electrospinning for Membrane Distillation of Aqueous Sodium Chloride Solutions. Oral Presentation at the 2nd Annual Virtual Symposium of LatinX in Chemical Engineering. September 2024.
- **Roca-Arroyo, A. F.**, Gutierrez-Rivera, J. A. Evaluation of Nanofibrous Membranes Obtained by Electrospinning for Membrane Distillation of Aqueous Sodium Chloride Solutions. Poster Presentation at the XXI Departmental Meeting of Research Groups RedCOLSI Atlantico. May 2024.

## SKILLS

---

Leadership, outstanding interpersonal relationships, and teamwork skills.  
The ability to manage, organize, and solve complex tasks.

Scanning Electron Microscopy (SEM)  
Fourier Transform Infrared Spectroscopy (FTIR)  
Nuclear Magnetic Resonance (NMR)  
Immunofluorescence Staining via Confocal Microscopy  
Cytokine Secretion via Magnetic Luminex Assay  
Cell culture: Human Mesenchymal Stem Cells

**Techniques:** Electrospinning, Freeze Drying, Rheometer, Membrane Distillation.

**Software:** MATLAB, Python, GraphPad, OriginLab, Inkscape, Blender.

## LANGUAGES

---

Fluent in oral and written Spanish  
Proficient in oral and written English

## PROFESSIONAL REFERENCES

---

### **Ph.D. Advisor**

David A. Castilla-Casadiegos, Ph.D.

Assistant Professor

Department of Biomedical Engineering

University of Miami

1251 Memorial Drive, McArthur Engineering Building, Coral Gables, FL, 33146

Phone: +1 (305) 284-8237

Email: [dac439@miami.edu](mailto:dac439@miami.edu)

URL: <https://orcid.org/0000-0003-2350-5194>

<https://scholar.google.com/citations?user=OACu0PYAAAAJ&hl=es>

**B.Sc. Advisor**

Alberto Albis, Ph.D.

Associate Professor

Department of Chemical Engineering

Universidad del Atlantico

Carrera 30 # 8-49 Puerto Colombia, Atlantico, 081007, Colombia

Phone: +57 (304) 261-0548

Email: [albertoalbis@mail.uniatlantico.edu.co](mailto:albertoalbis@mail.uniatlantico.edu.co)

URL: <https://www.researchgate.net/profile/Alberto-Albis-Arrieta>

<https://scholar.google.com/citations?user=3z0Q5xAAAAAJ&hl=en>