

Josselyn Lorena Mata Calidonio

Assay Development Scientist

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PROFESSIONAL SUMMARY

Ph.D. candidate with 4.5+ years of experience in **nanotechnology, assay development, and diagnostics**, with a track record of bridging biology, engineering, and computation to drive innovative healthcare solutions.

TECHNICAL EXPERTISE

- **Assay Development & Diagnostics:** Multiplexed assay design and validation; rapid and point-of-care diagnostics; FRET-based assays; antibody bioconjugation; experimental optimization and analytical validation.
- **Molecular & Cellular Engineering:** Molecular cloning, plasmid design, mammalian cell culture, protein expression, and purification; experience operating in BSL-2 and BSL-2+ environments.
- **Nanotechnology & Biophysical Characterization:** Nanoparticle synthesis and functionalization; characterization using DLS, UV-Vis spectroscopy, Raman/SERS, and Microscale Thermophoresis.
- **Computational & Data Analysis:** Image analysis, signal processing, machine learning, and statistical modeling; biostatistics and linear algebra-based analysis; data-driven assay development and pattern recognition.
- **Instrumentation, Fabrication & Prototyping:** Circuit design and electronics; 3D modeling/printing, laser cutting.
- **Programming & Software:** Python, MATLAB, R, C/C++; LabVIEW, OriginLab, ImageJ, Fusion 360, SPICE; data analysis and visualization workflows.
- **Collaboration & Research Translation:** Cross-functional collaboration; strong scientific communication and project execution; scientific writing and reporting; mentorship and leadership; interdisciplinary work.

KEY ACHIEVEMENTS

- **Multiplexed Diagnostic Development:** Designed and validated a multiplexed lateral flow diagnostic capable of simultaneously detecting 15+ viral targets using gold nanoparticle–antibody conjugates through novel pattern-based identification of emerging pathogens.
- **Therapeutic Nanotechnology:** Developed a nanoparticle-based vaccine platform for fungal infection in amphibians, where I gained cross-disciplinary experience in biological targeting & translational therapeutic design.
- **Space Pharmacy launch with SpaceX and NASA:** Contributed to the design and validation of 19 microfluidic diagnostic and chemical synthesis systems **launched to the International Space Station** (SpaceX CRS-27, NASA), supporting autonomous biomanufacturing and diagnostic workflows in extreme environments.
- **Clinical-Partnered Diagnostic Validation:** Led a multi-institutional collaboration to validate a multiplexed immunoassay for differential detection of dengue virus serotypes using real human clinical samples, involving iterative assay optimization, large-scale data analysis, and performance evaluation under real-world conditions.

EDUCATION

UNIVERSITY OF MASSACHUSETTS BOSTON

Boston, MA | June 2021- May 2026

Doctor of Philosophy in Integrative Bioscience; Biophysics Track

GPA: 3.97

- Dissertation: *Patterned Sensing for the Unknown: Lateral Flow Detection of Emerging Infectious Diseases*

EASTERN NAZARENE COLLEGE

Quincy, MA | August 2017- May 2021

Bachelor of Science, Double Major in Electrical Engineering and Mathematics

GPA: 3.99

PROFESSIONAL EXPERIENCE

GRADUATE RESEARCHER, UMASS BOSTON

Boston, MA | June 2021 – Present

- Designed, developed, and validated multiplexed diagnostic assays using nanoparticle–antibody conjugates, colorimetric and SERS-based readouts, and novel biosensing architectures for infectious disease detection.
- Led assay development cycles, from initial design through iterative optimization, performance characterization, & real-sample testing, addressing challenges such as signal interference, matrix effects, & cross-reactivity.
- Built data analysis and machine learning pipelines (Python, MATLAB) for quantitative interpretation of complex biosensor outputs, enabling extraction of diagnostic signatures from high-dimensional biological data.

- Developed rapid diagnostic platforms using nanoparticles and nucleic acid hybridization for sensitive viral, bacterial, and fungal pathogen detection.
- Optimized assays and formulations, performing quantitative data analysis to enhance accuracy and reproducibility.
- Validated assay sensitivity and specificity to improve diagnostic reliability for regulatory and clinical use.

SELECTED PUBLICATIONS- ORCID #: [0000-0002-4818-2638](https://orcid.org/0000-0002-4818-2638)

- **Mata Calidonio, J.**, Mathewson, K. J. & Hamad-Schifferli, K. Extending Selective Arrays for Infectious Disease Detection. *Anal Chem* (2025) doi:10.1021/acs.analchem.5c03084.
- **Mata Calidonio, J.** & Hamad-Schifferli, K. Redefining antibody cross-reactivity as an advantage for sensing and diagnostics. *Trends Biotechnology* (2025) doi: 10.1016/j.tibtech.2025.05.017.
- **Mata Calidonio, J.** et al. Development of an Immunoassay for Highly Pathogenic Avian Influenza (H5N1) across Diverse Sample Matrices. *ACS Nanoscience Au* (2025) doi:10.1021/acsnanoscienceau.4c00072.
- **Mata Calidonio, J.**, Maddox, A. I. & Hamad-Schifferli, K. A novel immunoassay technique using principal component analysis for enhanced detection of emerging viral variants. *Lab Chip* 24, 3985–3995 (2024). doi: 10.1039/D4LC00505H
- **Mata Calidonio, J.** & Hamad-Schifferli, K. An approach to use machine learning to optimize paper immunoassays for SARS-CoV-2 IgG and IgM antibodies. *Sensors & Diagnostics* 3, 677–687 (2024). doi: 10.1039/D3SD00327B
- **Mata Calidonio, J.** & Hamad-Schifferli, K. Biophysical and biochemical insights in the design of immunoassays. *Biochim Biophys Acta Gen Subj* 1867, (2023). doi: 10.1016/j.bbagen.2022.130266
- **Mata Calidonio, J.**, Gomez-Marquez, J. & Hamad-Schifferli, K. Nanomaterial and Interface Advances in Immunoassay Biosensors. *The Journal of Physical Chemistry C* 126, 17804–17815 (2022). doi: 10.1021/acs.jpcc.2c05008

SELECTED CONFERENCES

- **Mata Calidonio, J.**, (presenter), et. al, “A novel immunoassay technique using principal component analysis for enhanced detection of emerging viral variants.” Pittcon, Boston, MA, 2025
- **Mata Calidonio, J.**, (presenter), et. al, “A novel immunoassay technique using principal component analysis for enhanced detection of emerging viral variants.” American Chemical Society, Denver, CO, 2024