



Puerto Rico Science, Technology & Research Trust



# RESEARCH GRANTS

*funds to grow*

2024



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Science, Technology  
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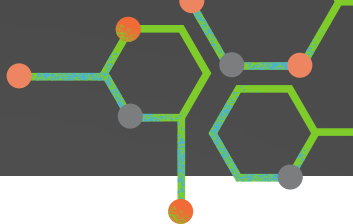


# CATALYZER RESEARCH GRANTS PROGRAM

2024



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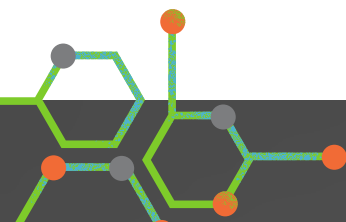


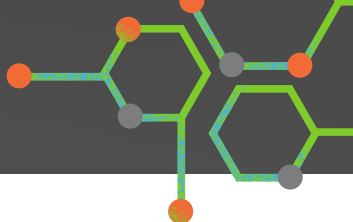
## Catalyzer Research Grants Program

The Catalyzer Research Grant (CRG) is a vital funding mechanism designed to enhance the competitiveness of local researchers. By providing critical bridge funding, the CRG aims to help researchers: (1) obtain reproducible and robust preliminary results; (2) address recommendations from previous grant reviewers to strengthen their R&D proposals; and (3) secure necessary reagents, laboratory materials, collaborations, or additional technical training to achieve their proposed goals. Awards can be up to \$70K.

In April 2024, the CRG program received 40 letters of intent, inviting 32 applicants to submit full proposals by June 2024. Of the 28 proposals submitted, they were reviewed by a panel of 57 subject matter experts from the United States, Canada, Mexico, Australia, Spain, France, the United Kingdom, Italy, and the Netherlands. We are proud to share that eight proposals have been selected following the final review by our scientific board.

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## Andre Amador, PhD

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### **Wave Transformation Dynamics over Coral Reefs: Evaluating Wave Dissipation Formulations for Coastal Defense in Puerto Rico**

(Environmental Sciences)

Studying how coral reefs can help reduce flooding and protect coastlines by evaluating models that predict how waves change as they move over reefs. This project aims to improve our understanding of wave dynamics, supporting coral restoration efforts and enhancing coastal resilience in Puerto Rico.



## Carmen M. Ortiz-Sanchez, PhD

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### **Epigenetic profiling of de novo metastatic prostate cancer in Puerto Rican Hispanic/Latino men**

(Biotechnology and Life Sciences)

Identifying new biomarkers for metastatic prostate cancer in Puerto Rican Hispanic/Latino men, a group significantly affected by this disease. By studying specific microRNAs in blood and tissue samples, the research aims to improve early diagnosis and treatment options for this high-risk population.



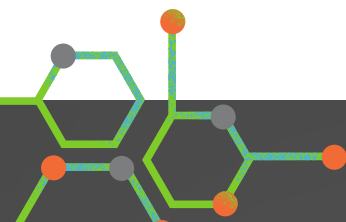
## Fernando Piñero González, PhD

fernando.pinero1@upr.edu

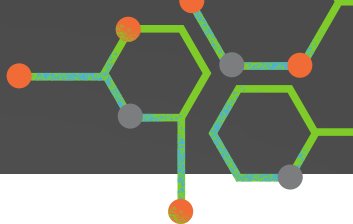
### **Unraveling endometriosis CXCR4 antagonist effects in vitro and in silico.**

(Biotechnology and Life Sciences)

Researching alternative treatments for endometriosis, which currently rely on estrogen and progesterone receptors. Using computer modeling and machine learning to identify and study potential drug effects, this project aims to identify new therapies to help women suffering from this painful condition.







## **Francisco Bezares Salinas, PhD**

francisco.bezares@upr.edu

### **Physical Vapor Deposition of Metal Nanoparticles for the Scalable, Cost-effective Fabrication of Novel Nanophotonic Devices**

(Nanophotonics)

Developing new methods to create ultra-thin nanophotonic devices using metal nanoparticles that manipulate light. This research aims to improve the performance of these devices for advanced optical applications, improving connectivity and functionality in detection and communication technologies.



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## **James T. Porter, PhD**

jporter@psm.edu

### **Novel prefrontal proteins regulating stress susceptibility in female rats**

(Biotechnology and Life Sciences)

Studying how certain proteins in the brain influence stress responses in female rats. This research aims to identify the mechanisms by which these proteins affect fear responses after trauma, contributing to a better understanding of stress susceptibility.



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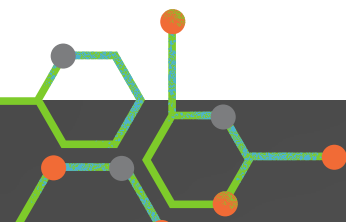
## **Kelcie Chiquillo, PhD**

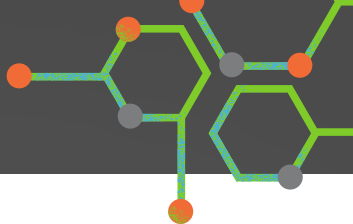
kelcie.chiquillo@upr.edu

### **Exploring the mechanisms around vanishing meadows: adaptation and resilience of seagrasses, microbial communities, and biodiversity shifts**

(Environmental Sciences)

Investigating the decline of seagrass populations and their ecological impacts, which are crucial for marine biodiversity. This research aims to understand how seagrasses adapt to invasive species, how microbial communities change as seagrasses decline, and the implications for coastal habitats, while also involving local communities in conservation efforts.





## Marcelo Mario Samsa, PhD

samsamarcelo@gmail.com

### **Development of HIV-gp145 mRNA-based Vaccine: A Comparative Study of Conventional and Self-Amplifying mRNA Platforms**

(Biotechnology and Life Sciences)

Developing a new HIV vaccine using innovative mRNA technology. This project will compare traditional mRNA methods with self-amplifying mRNA platforms to improve the immune response against HIV. He also aims to establish a new research facility and enhance vaccine development efforts at the Molecular Research Center, facilitating the integration of cutting-edge mRNA technology into the University of Puerto Rico's research infrastructure.

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## Roberto Rodriguez-Morales, PhD

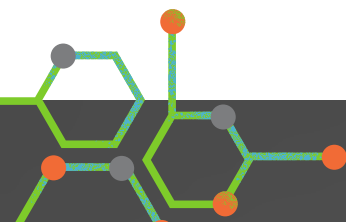
roberto.rodriguez19@upr.edu

### **Compensatory mechanisms of lateral line development in the blind Mexican cavefish**

(Biotechnology and Life Sciences)

Studying the unique sensory adaptations of the blind Mexican cavefish to understand hair cell development and regeneration. Hearing loss is a significant public health issue, as hair cells in the inner ear are crucial for hearing but do not regenerate in mammals. This research aims to uncover the mechanisms behind hair cell regeneration, offering potential insights for innovative treatments for hearing loss in humans.

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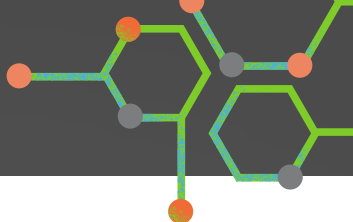




# ADVANCED RESEARCH GRANTS PROGRAM 2024



Puerto Rico  
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## Advanced Research Grants Program

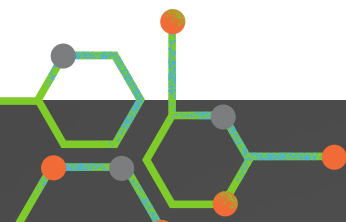
The Advanced Research Grant (ARG) is a solicited proposal mechanism that aims to provide funding for advancing science and technology projects developed locally. The goal is to bring these projects to a level where they can be further developed using alternative funding sources (such as federal R&D funding, angel and private investments, and others) and/or commercialized through licensing, sales, acquisitions, vertical venture integration, or a combination of these methods. Awards are up to \$150K.

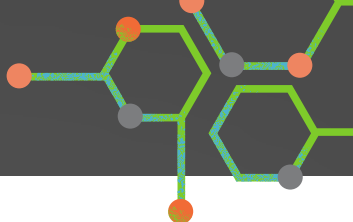
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### Advanced Research Grant: Space Edition

The Advanced Research Grant: Space Edition, announced in July 2023 in collaboration with Rhodium Scientific, is an innovative funding mechanism that will enable Puerto Rican science and technology on the ISS through a competitive, proposal-based selection process. It aims to propel Puerto Rico's existing science and engineering industries to the forefront of space innovation by providing rapid ISS access, proven space flight hardware and operations, and expert space mission development consulting.

Proposals were accepted for the following tracks: Biotechnology/Biopharma Science Mission and Hardware Technology Development Mission. Two projects from the University of Puerto Rico, Mayagüez Campus, were funded and are on track to be launched to the ISS, with results expected to be reported next year.





**Andres Calle, MSc**  
andres@applivio.com

**Detecting clinical trial communication behavior and preference patterns at a large scale to predict and improve minority-first clinical trial subject retention**

(Clinical Trials)

Developing tools to analyze communication behavior and preference patterns in clinical trial participants, particularly among minorities, to improve retention rates. This project aims to enhance participant engagement and compliance, ultimately optimizing clinical trial outcomes in the face of rising chronic diseases and the evolving landscape of post-pandemic research.



**Lisandro Cunci, PhD**  
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**Activity Study of Intercalated Electrocatalysts for the Oxygen Evolution Reaction in Full Scale Alkaline Electrolysis Cells**

(Clean Technologies/Renewable Energy)

Establishing the first Water Electrolysis Research Laboratory in Puerto Rico to test new electrocatalysts that help produce hydrogen and oxygen from water using electricity in large-scale alkaline systems. This project aims to advance clean energy technologies and enhance the efficiency of water electrolysis, contributing to energy security and sustainability in Puerto Rico.

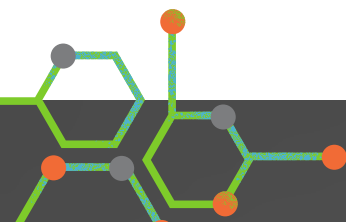


**Rodolfo J Romañach, PhD**  
rodolfoj.romanach@upr.edu

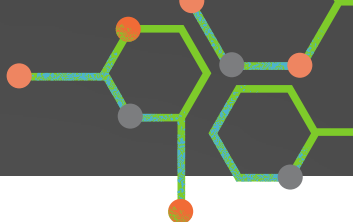
**Commercialization of an Integrated System for Sampling and Analysis of Flowing Powder Blends**

(Biotechnology and Life Sciences)

Working on the commercialization of a new stream sampler designed to analyze powder blends used in tablet and capsule manufacturing without interrupting the production process. This innovative device aims to improve efficiency in the pharmaceutical industry by providing real-time measurements of drug concentration, reducing operator exposure to potent substances, and supporting safer and more effective manufacturing practices.







## David Miranda, PhD

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### **Fostering the Creation of Small, Rural Aquaculture Farms by Evaluating the Technical Feasibility of Red Snapper Aquaculture and Establishing Autonomous Aquaculture Modules**

(Technology/Product Development for Commercialization)

Working to establish small, rural aquaculture farms in Puerto Rico by exploring the viability of farming red snapper in innovative, recirculating aquaculture systems. This project aims to enhance food security, create job opportunities in vulnerable communities, and promote sustainable practices in an environmentally and socially responsible manner, ultimately helping to develop a thriving aquaculture industry in the Caribbean.



## Beatriz Zayas, PhD

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### **Markers for hypoxia in Skin Cancer**

(Biotechnology and Life Sciences)

Researching novel markers for hypoxia in skin cancer, focusing on two patented compounds that can identify low-oxygen cells within tumors. These hypoxic cells are particularly challenging to treat due to their strong resistance to chemotherapy and radiotherapy. This study aims to develop a diagnostic tool that improves treatment monitoring and post-surgery healing, potentially offering significant benefits for skin cancer patients and paving the way for applications in other cancer types.



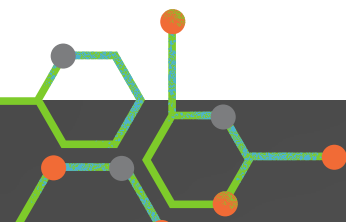
## Camilo Mora, PhD

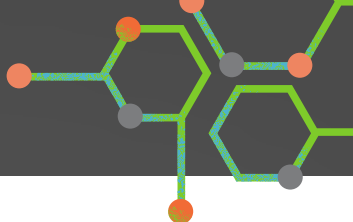
camilo.mora@upr.edu

### **Catalyzing Innovation in extracellular vesicles: Exploiting Tissue-Specific Extracellular Vesicles for Bioinstructive Substrate Engineering via Titanium Particle Adsorption and Delivery**

(Biotechnology and Life Sciences)

Exploring the use of tissue-specific extracellular vesicles to engineer bioinstructive substrates for tissue regeneration, this study aims to incorporate titanium dioxide as a delivery method for these vesicles. This approach enhances the vesicles' ability to create materials that closely resemble natural tissues. Ultimately, the project seeks to advance regenerative medicine and improve healthcare applications while providing valuable insights into the field.





## Ivette Suarez Arroyo, PhD

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### **The role of SCAMP3/ERK axis in the progression of breast cancer.**

(Biotechnology and Life Sciences)

Studying the protein SCAMP3, which plays a role in cell signaling, in relation to triple-negative breast cancer (TNBC). TNBC is aggressive and often resistant to treatment. This research focuses on how SCAMP3 affects the ERK (Extracellular Signal-Regulated Kinase) pathway, crucial for cell growth. Preliminary findings suggest that lowering SCAMP3 may enhance the effectiveness of therapies against TNBC. By exploring this interaction, the study aims to identify new treatment strategies to improve patient outcomes.



## K. Stephen Hughes, PhD

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### **Landslide Hazard Science and Risk Communication in Puerto Rico**

(Natural Hazards)

Developing a real-time landslide forecast system to address Puerto Rico's vulnerability to landslides. The system will use data on soil moisture and rainfall to provide short-term predictions, aiming to enhance community safety and preparedness. Supported by the US Geological Survey and the National Weather Service, this initiative seeks to reduce risks to lives and property.



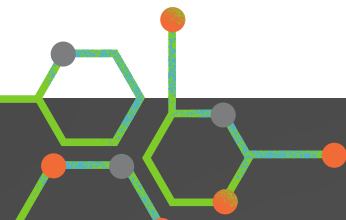
## Wanda Vélez Torres, PhD

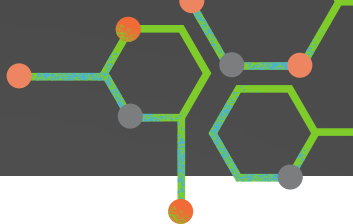
wanda.velez@uccaribe.edu

### **The role of 4R-cembranoid in age-related cognitive decline.**

(Biotechnology and Life Sciences)

Investigating the potential of 4R-cembranoid, a natural compound found in tobacco, to improve cognitive function and neurogenesis in middle-aged mice. The study aims to determine if 4R treatment enhances memory and promotes neuronal survival in the hippocampus, with implications for preventing age-related neurodegenerative diseases. Preliminary results suggest that 4R may offer therapeutic benefits, making it a promising candidate for further research.





## Michelle M. Martínez Montemayor, PhD

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**Understanding the molecular mechanisms of ergosterol peroxide in aggressive breast cancers**  
(Biotechnology and Life Sciences)

Researching ergosterol peroxide (EP), a natural compound derived from fungi, for its potential to treat inflammatory breast cancer (IBC), a particularly aggressive form of the disease. The study aims to explore how EP targets UBR4, a protein involved in cancer cell regulation, to induce cell death in IBC models while sparing non-cancerous cells. This work could pave the way for new therapeutic strategies to combat IBC and improve patient outcomes.



## David Suleiman, PhD

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**Polymer Nanocomposite Membrane Assembly for Water Purification on the International Space Station**  
(Hardware Technology Development Mission - Commercialization)

Creating a polymer nanocomposite membrane (PNM) assembly for water purification on the International Space Station (ISS). The system includes three modules to capture ions, inactivate microorganisms, and selectively allow water to pass. Preliminary experiments have shown promise, aiming to validate this technology for effective water recycling in space.



## Maribella Domenech, PhD

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**Impact of Microgravity on microcarrier culture of mesenchymal stem cells**  
(Biotechnology/Biopharma Science Mission - Basic/Translational)

Exploring how microgravity affects the growth and anti-inflammatory effects of mesenchymal stem cells (MSCs) on microcarriers (small particles that provide a surface for cells to grow on), focusing on the stability of the surface chemistry. By comparing MSC behavior from experiments on the International Space Station (ISS) with those on Earth, the research aims to enhance the use of MSCs for health applications in both space and on Earth.

