

Molecular Sciences Research Center

Ana R. Guadalupe, PhD
Executive Director
August 13, 2019



152,000 sq. ft.
Research space

Seven Floors

Laboratory Space

Co-working Space

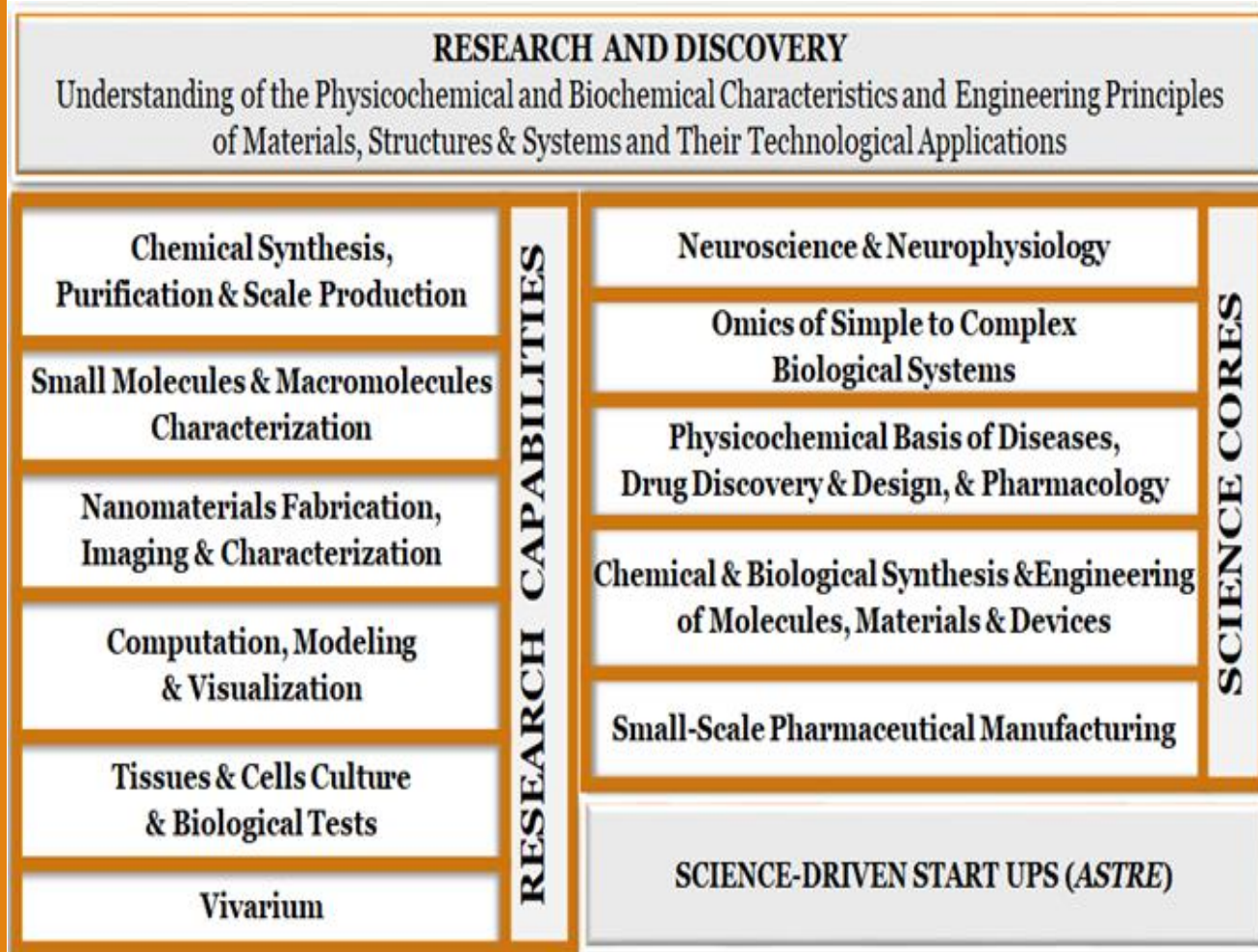
Vivarium

Scientific
Instrumentation

Specialized
Research Services

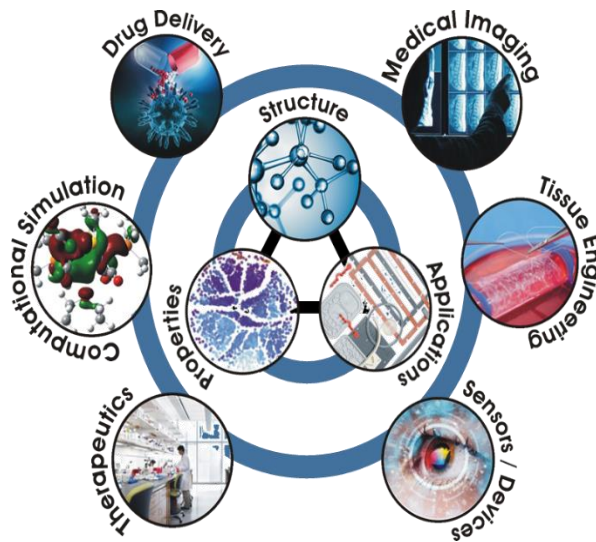


Research



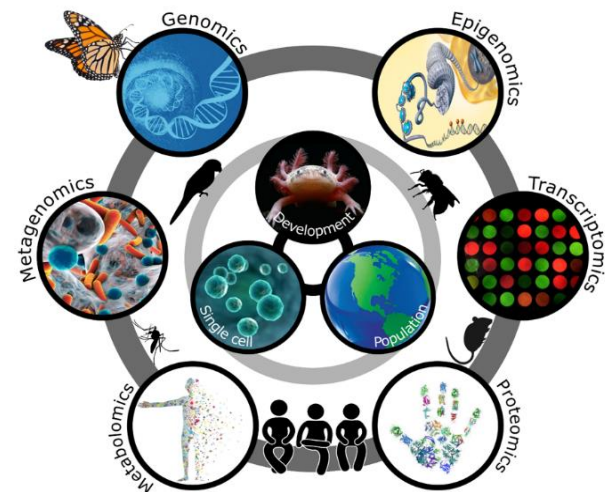
Mission

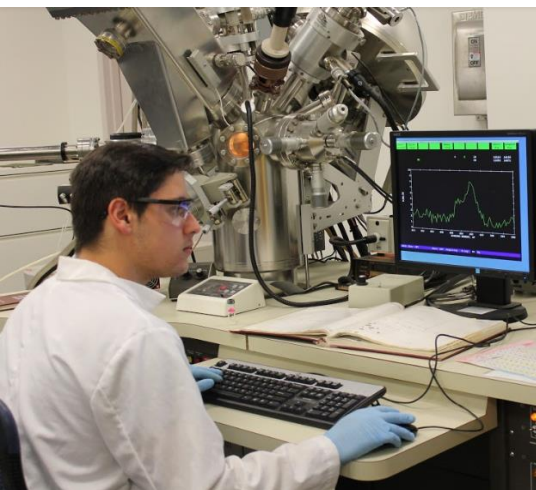
To develop competitive scientific research with high social and economic value to position the UPR and Puerto Rico as a key player in molecular sciences research worldwide.



Biotechnology and Life Sciences
In-depth insights of biological systems at different scales

Nanobiotechnology
Nanomaterials Interaction in Complex Biological Environments





Core Research Facilities



- *Nuclear Magnetic Resonance*
- *Mass Spectrometry*
- *Atomic & Molecular Light Spectroscopy*
- *Neuroimaging & Electrophysiology Facility*
- *Functional Genomics and Sequencing*
- *Surface Spectroscopy and Microscopy*

Diverse
Scientific
Community:

Collaborations
&
Partnerships



Protein Structure Workshop
March 16 and 17, 2019



Rigaku



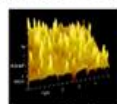
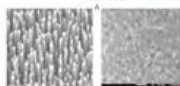
A National Science Foundation
Science and Technology Center

Nanotechnology and MicroChips

Carlos Cabrera Ph.D.



MICROFABRICATION



Electrochemical Biosensors



Enzyme-Palladium Nanoparticle Based Electrode

Interdigital Au Electrode Microarray

Enzyme- Carbon Nanofiber Based Electrode

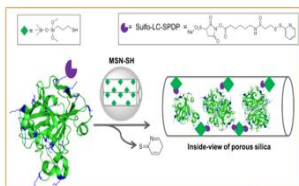
>40 Researchers
>182 G & U Students

2013-2018

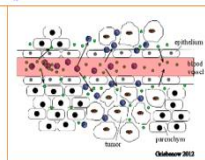
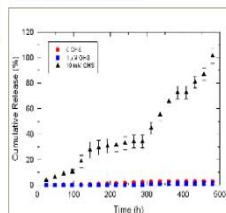
~200 Publications
\$33M Funding
27 Patents
1 SBIR
2 SBIR (In Progress)

Modern Targeted Cancer Medicines

Kai Griebenow Ph.D.



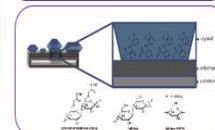
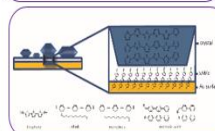
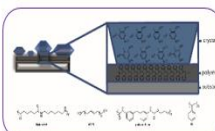
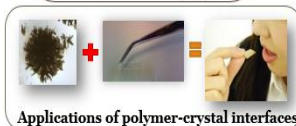
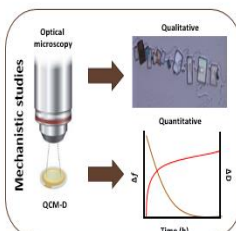
An apoptosis inducing protein is immobilized in silica nano-spheres via a smart bond system. Homing ligands will be bound to this system next.



Nanoparticles accumulate in tumors by the enhanced permeation/retention effect which is based on the leaky blood vessels.

Design, Applications, and Mechanistic Studies of Crystallizations on Polymers

Vilmali López-Mejías Ph.D.



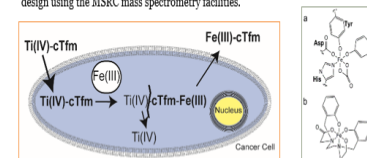
Developing Ti(IV)-Based Anticancer Drugs using Chemical Transferrin Mimetics

Arthur Tinoco Ph.D.



Seek to revolutionize the design of Ti(IV)-based anticancer drugs:

- Using chemical transferrin mimetic (cTfm) ligands, which stably transport Ti(IV) into cells and release Ti(IV) to bind and deplete cells of Fe(III). This work will couple coordination chemistry and cell-based assays.
- Bioconjugating bioactive proteins and peptides to the cTfm moieties to facilitate passive and active targeting of cancer cells. MALDI/ToF experiments will provide for structure confirmation.
- Performing metallomics studies to determine the intracellular molecular targets of Ti(IV) to improve the drug design using the MSRC mass spectrometry facilities.



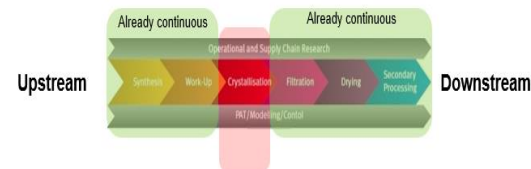
a. The transferrin metal binding site
b. A cTfm representative.

Small Scale Pharmaceuticals Manufacturing

Torsten Steltzer Ph.D.



- Small-scale, continuous, pharmaceutical manufacturing
- Crystallization from solution and melt of small & macro (protein) molecules
- Process intensification
- Case studies



Education, Professional Training & Outreach

A job alternative for scientists with expertise in tissues and cells culture, scientific instrumentation management, and compliance.



STEM Professionals



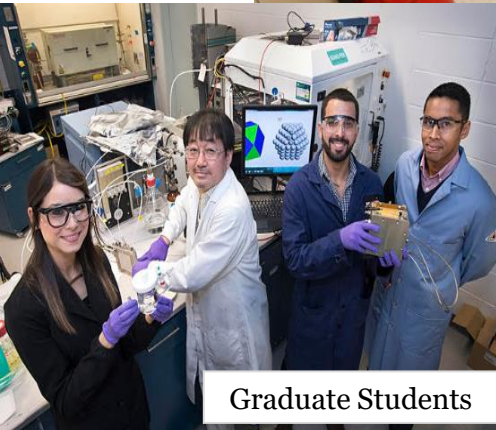
BioScience Week

A STEM experiential opportunity for High School students and the community.



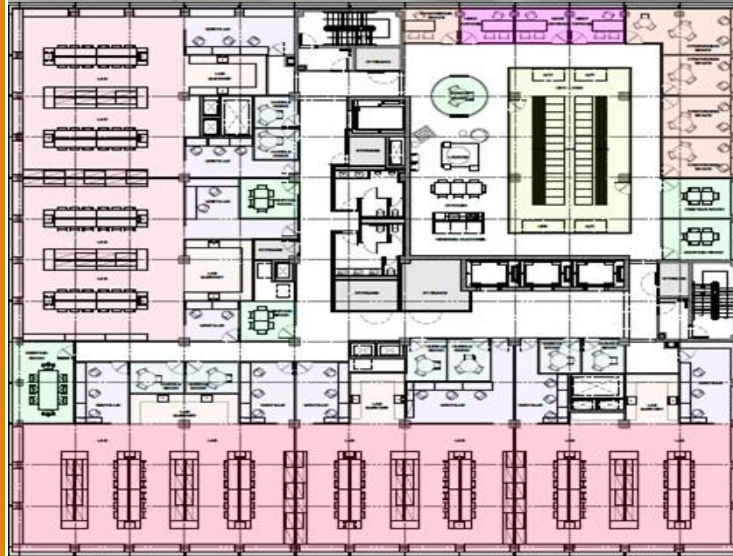
High School Students

A laboratory for the STEM education of students, postdoctoral, associate and affiliate researchers, technicians, and professional scientists.



Graduate Students

Co-Working Space





THANK YOU!

How to
interact with
the MSRC?

MOUs for...

- COOP & Internship Experiences
- Career Opportunities
- Research Partnerships
- Academic Collaborations
- Business: space allocation, start-ups, scientific research services