

Nanotechnology Collaborative Infrastructure Southwest

NCI
Southwest



NNCI Annual Meeting

2-3 November 2021



Trevor Thornton – Director

Inès Montañó - PI at NAU, Quantum Materials

Jameson Wetmore - Deputy Director

Gabe Montañó – Nano-Biomaterials

Mariana Bertoni - Renewable Energy



Award # ECCS 2025490 |

New Program for Year 6

Added ¡MIRA! at Northern Arizona University as a partner in the NCI-SW



- Bring new programming initiatives to NCI-SW
- An **existing network** throughout the southwest of minoritized communities, institutions and partners
- Extensive experience in evaluation and data analysis of outreach interventions, particularly in **diversity in STEM**.
- **World-class experts** in soft, biological nanomaterials, advanced microscopy and quantum information

¡MIRA!

- Over 1500 peer-reviewed Publications
- 53 Patents, 3 Start Up Companies
- Over **30 years combined experience in User Facility** Operations and Management
- **50% Underrepresented Minority (URM)/Female faculty**
- 100% URM/Female Leadership Team
- Diversity of leadership team provides role models for students



Inès Montaña:
NCI-SW NAU PI



Gabe Montaña:
NCI-SW NAU co-PI
¡MIRA! Founding
Director



Miguel Jose
Yacaman:
NCI-SW NAU
Chair of Applied
Physics and Materials

¡MIRA! means “Look!” in Spanish

New Program for Year 6

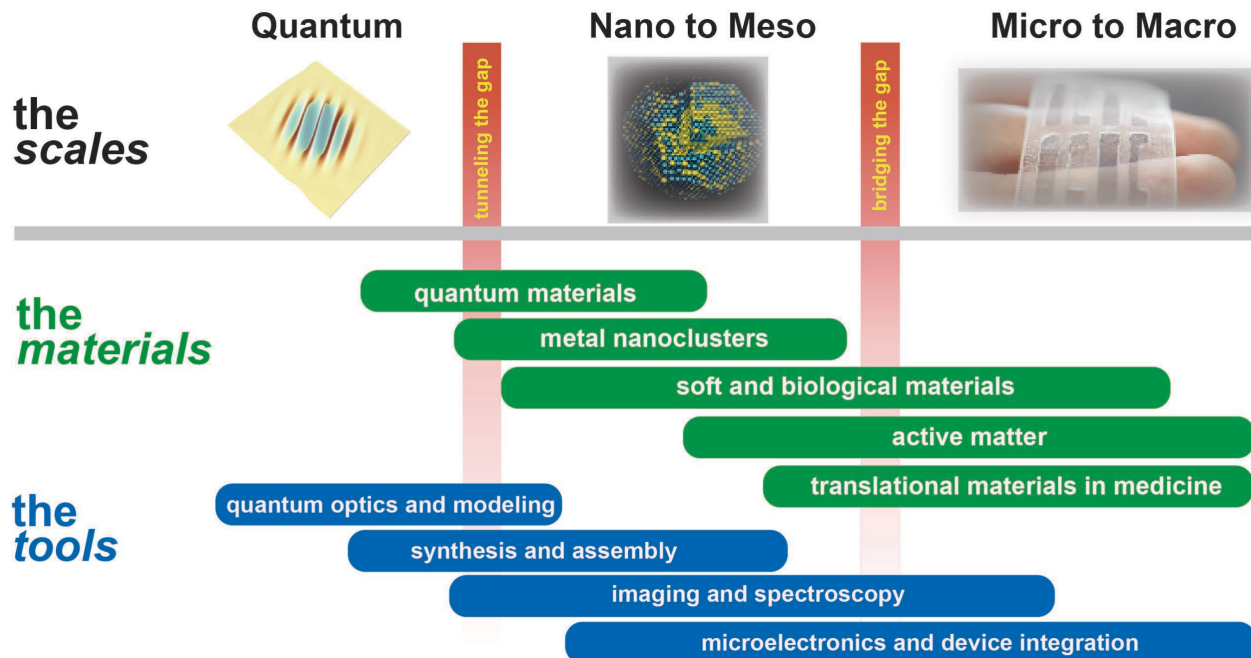


New Program for Year 6



New Program for Year 6

iMIRA! Research and Capabilities



Available Resources and Expertise

- Scanning probe microscopies
- IR & Raman Spectroscopies
- Visible steady-state and lifetime microscopies and spectroscopies
- Metal Nanocluster synthesis
- Genetic encoded polymers
- Quantum Optics and modeling
- SEM & TEM
- And More!

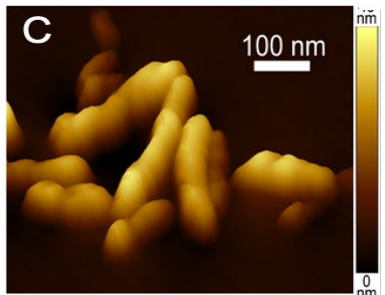
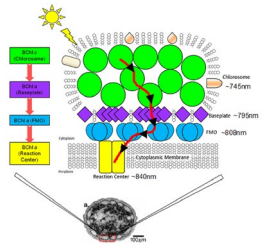
MIRA! Research Capability Highlight

NAU Scanning Probe Microscopy Facility

- *in-situ*, environmental, conductive, scanning force spectroscopy and probe synthesis
- 3 Asylum Scanning Probe Microscopes (2 MFP-3D, 1 MFP-3D-Bio)
- Probe synthesis station capable of colloidal or other material (i.e. Bio probe synthesis)

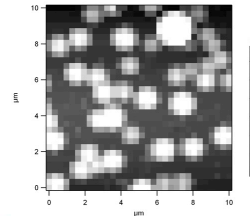
Soft/Bio Imaging

Artificial Polymer-based light-harvesting complexes

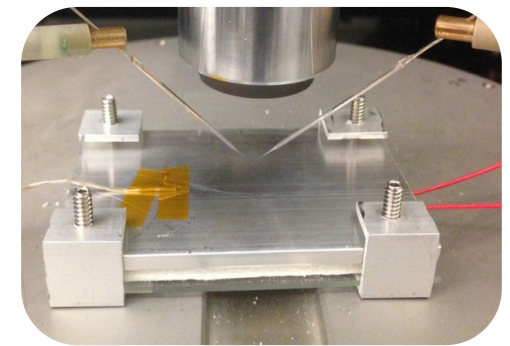


Nanomechanics

Colloidal Force mapping to determine adhesion coefficient of biospores to industrial surfaces

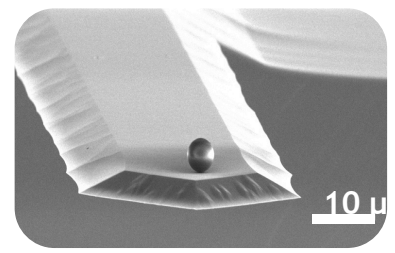


Micromanipulator Probe synthesis station

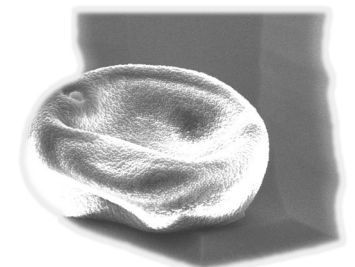


- Ability to design a variety of synthetic and biological probes

5 μm colloidal probe



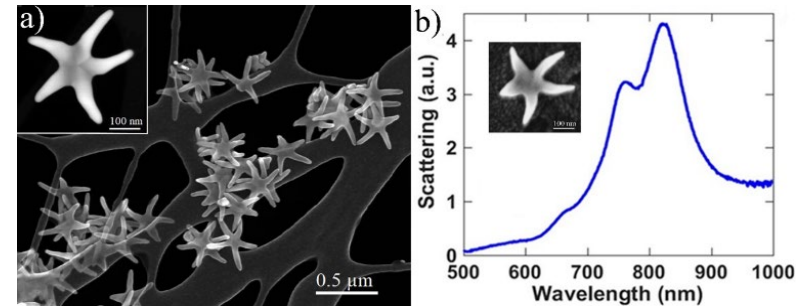
Timothy Pollen Probe



Detection of the COVID-19 virus using Surface Enhanced Raman Spectroscopy:

Miguel José Yacamán, ¡MIRA! Center, Northern Arizona University.

The COVID-19 pandemic has demonstrated the critical need for accurate and rapid testing for virus detection. Most of the testing techniques use biochemistry and require chemicals that are often expensive and might become scarce in a crisis. An alternative approach uses novel nanomaterials for surface enhanced Raman spectroscopy (SERS) that provides a very distinct spectroscopic signature of the COVID-19 virus. The spectra is mainly composed of signals from the spike and nucleocapsid proteins on the surface of the virus and can be used to develop a fast, inexpensive, and reliable COVID-19 test.



SEM image of the Au-Cu nanostars used as the SERS substrate (a). Optical absorption spectra of the nanostars revealed a strong peak in the near IR (b).

A new physics-based approach for virus detection!

New Program for Year 6

- ¡MIRA! hosted weekly Zoom webinars since the Fall 2020 Semester
- The recorded webinars are available via the NCI-SW YouTube channel
- **Allows us to have joint seminars with speakers that we normally would not have been able to host**
- **Has led to a newly funded endeavor (Burroughs Welcome Foundation) called **NetROC to create a virtual network to bring the R1 Colloquium Experience to all students!****

¡MIRA! Webinars 2021

Tweet

To access an abstract for a prior ¡MIRA! Colloquium presentation and watch it on YouTube,

[New Imaging Techniques to Explore Energy and Charge Carrier Transport in Nanoparticles](#)
Dr. Alan Van Orden, Colorado State University (March 25, 2021)

[Chemical and Enzymatic Strategies for Complex Molecule Synthesis](#)
Dr. Kyle Biegasiewicz, Arizona State University (March 18, 2021)

[Understanding and Addressing the Impostor Syndrome in the Field of STEM](#)
Dr. GiShawn Mance, Howard University (March 11, 2021)

[Hot Carrier Solar Cells and Non-Equilibrium Phonons](#)
Dr. David Ferry, Arizona State University (March 4, 2021)

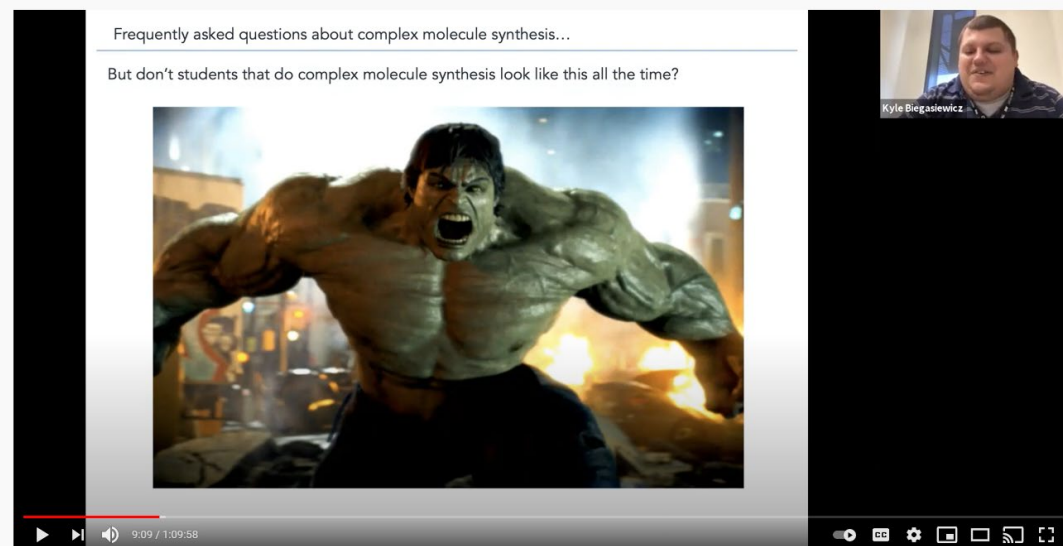
YouTube

Search



Frequently asked questions about complex molecule synthesis...

But don't students that do complex molecule synthesis look like this all the time?



Chemical and Enzymatic Strategies for Complex Molecule Synthesis

11 views · Apr 13, 2021

Like 1 Dislike 0 Share Save ...

Acknowledgements

Thanks to:

Ray Tsui - Education Coordinator

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Tom Sharp - Nano Geoscience

Dragica Vasileska - Computation and Modeling

Paul Westerhoff - Nano Environmental Science

Miguel Jose Yacaman - Nano Materials

Caroline VanIngen-Dunn - STEM Outreach Initiatives

Q&A

Program Objective

We propose a seemingly simple yet transformative alteration to the traditional colloquium/speaker series that is specifically targeted to diminish the opportunity divide between elite and non-elite institutions. In particular, we propose to bring the colloquium speaker series and most importantly, the intangible benefits of such experiences (Q&A, informal conversations, networking) to the STEM students, postdocs and faculty at non-elite institutions.

The Concept

The goal of NetROC is to enable audiences at non-elite institutions to gain access to the whole range of benefits of an elite-institution colloquium - including the all-too-important “two-way” engagement of the traditional colloquium series. During the virtual colloquium, the audience will assemble and first watch the talk that was pre-recorded by the selected NetROC-ambassador. After the talk, the NetROC-ambassador then joins the local audience through a zoom call for a 1h networking session to answer questions and connect. The virtual colloquium visit thus allows e.g. a small tribal college on the Navajo Nation to be connected with a guest speaker living on the East Coast and will facilitate interaction and connections that otherwise are highly unlikely to be realized, all in a cost and time-efficient manner.