

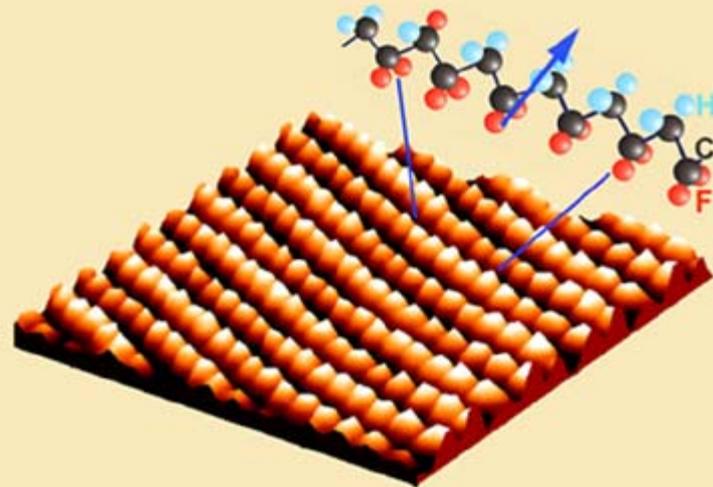
A Laser-MBE/STM Facility for Materials Research & Education

Zhang, Florida International University, DMR-0215929

Exploiting materials tailoring for desired functionalities and exploring new physical phenomena in artificially structured materials are of the focus in Materials Physics. We are striving to construct unique facilities capable of science-driven fabrication aided by advanced characterization for interdisciplinary materials research.



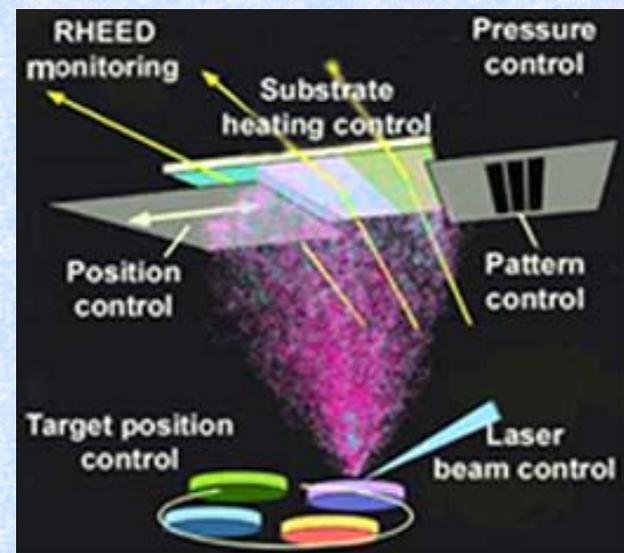
LEED Image from Ruthenate



STM Image from a Copolymer

Above: An image of the surface of the Mott-insulator material $\text{Ca}_{1.9}\text{Sr}_{0.1}\text{RuO}_4$ by (left), along with an image of a monolayered ferroelectric copolymer [P(VDF-TrFE)] with STM, show the capability to reveal atomically resolved lattice structure of complex materials.

Funded By NSF and DOD, we have built an integrated Ultra-High Vacuum (UHV) facility which includes an unique Laser-assisted Molecular Beam Epitaxy system (Left) for atomically controlled growth, a variable temperature Scanning Tunneling Microscope (STM), a Low Energy Electron Diffraction optics (LEED) and other surface-sensitive techniques for nanoscale materials characterization. The whole facility will become the flagship of the fast growing infrastructure for materials research and education at the Florida International University, a minority-serving research institution.

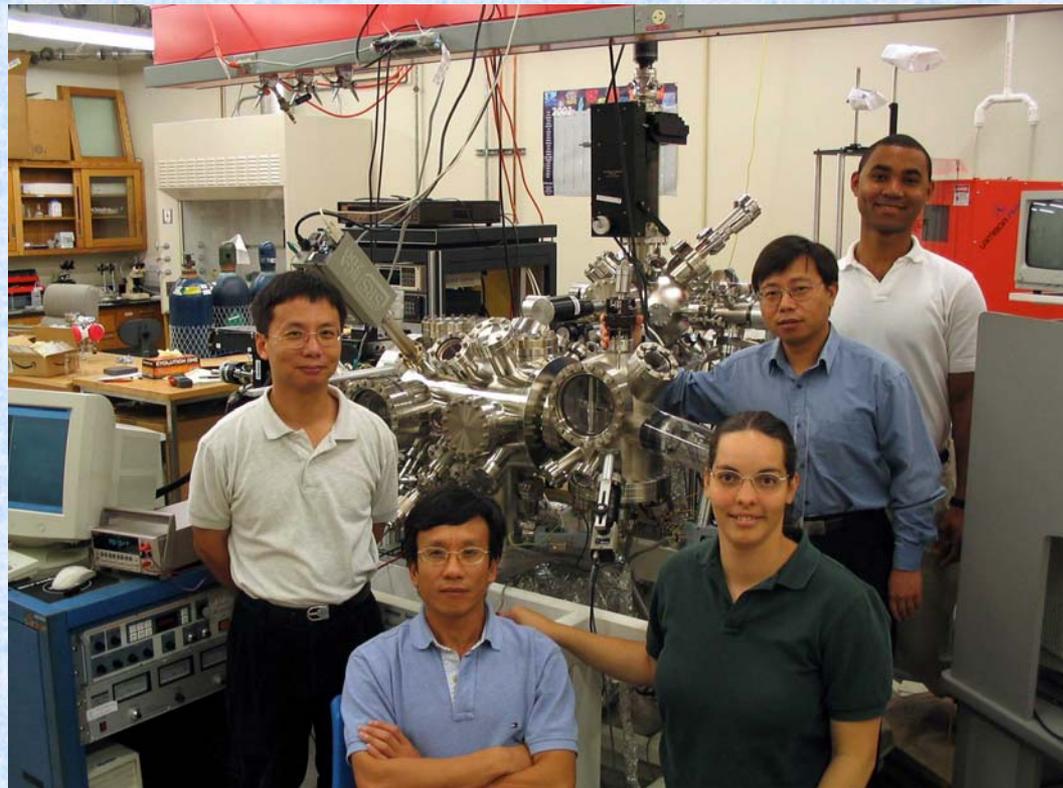


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Fernanda Foetter, a Latina student, first became involved in this work in 2002 as an undergraduate at FIU. She is now a graduate student and her Ph.D. research will involve fabrication and characterization of artificially structured oxide materials.

Stephane Stacco is an Hispanic undergraduate student in Physics. He is now learning how to use the STM, LEED and other techniques in our Materials Physics Lab. He is also involved in the construction of this facility.

To expose undergraduates and graduates in **Zhang's Surface Physics course** and the *Senior Physics Lab* course to cutting-edge research techniques, We present the results of our studies as "demonstration materials" to students. The young students learn about the exciting opportunities that await them, should they choose to continue their studies at a higher level.



The Facility with the integrated capability of materials growth and characterization *in-situ*, located at the Department of Physics, **Florida International University**, has allowed both graduates, undergraduates, etc. to participate in advanced materials research and education for their future careers in the technology-driven world. From left to right, are post-docs Lei Cai, Jiandi Zhang (PI), Fernanda Foetter, Chenxi Lu, and Stephane Stacco,