



UCF

# FACULTY RESEARCH TALKS

LISTEN. LEARN. COLLABORATE.

Zoom talk | Friday, Feb. 3, 2023 | Noon to 1 p.m.



PRESENTER 1:

**SWAMINATHAN  
RAJARAMAN**

Associate Professor,  
Materials Science  
and Engineering

## Hybrid Micro/Nanofabrication and its Impact on Accelerating Biomedical Research

The natural applicability of micro and nano-scale technologies in life sciences, medicine and associated areas opens new avenues for powerful interdisciplinary collaboration between scientists, engineers and medical professionals. Dr. Rajaraman's research group works on the development of new micro/nanofabrication technologies to address applications in several areas. This talk will give examples in NIH and industry-funded efforts in the space of these micro/nanoengineered areas that can help accelerate various types of biomedical research.

Dr. Rajaraman received his M.S. and Ph.D. in electrical engineering from the University of Cincinnati and Georgia Institute of Technology, respectively. He is a successful entrepreneur at Axion BioSystems whose research interests include in-vitro and in-vivo microelectrode arrays, hybrid micro/nanofabrication, micro/nanofabrication on novel, biological substrates, microneedles, agricultural microsystems, microfluidic devices, multimodal cell-based nanosensors, 3D printing and implantable MEMS devices. He is the deputy director of UCF's NSF I/UCRC MIST Center and affiliated with the UCF Nanoscience Technology Center.



PRESENTER 2:

**AKIHIRO  
KUSHIMA**

Assistant Professor,  
Materials Science  
and Engineering

## Experimental and Theoretical Approaches for Development of Energy Storage Materials

Dr. Kushima's research group focuses on understanding the fundamental science of materials in atomic- and nano-scales using in-situ transmission electron microscopy (TEM) and atomistic modeling. In this talk, he will introduce some of his recent works on applications of in-situ TEM to understand the electro-chemo-mechanics in all-solid-state lithium batteries, and on computer simulations to clarify the fundamental mechanisms of battery reactions for developing new electrode design with improved performance.

After receiving a Ph.D. from Kyoto University, Dr. Kushima conducted postdoctoral studies at MIT and the University of Pennsylvania, serving as a research scientist at MIT before joining UCF. His research focuses on understanding the complex nano-scale phenomena through the combination of experimental and atomistic simulation, with particular emphasis on in-situ TEM and energy storage devices. He recently received the NSF CAREER award on the study of electro-chemo-mechanics at the interfaces of all-solid-state lithium batteries.



PRESENTER 3:

**SUBITH VASU**

Professor,  
Mechanical  
and Aerospace  
Engineering

## Fundamental and Applied Efforts to Decarbonize Power, Develop Hypersonics Vehicles and Facilitate Low-Cost Space Exploration

Dr. Vasu will discuss ongoing projects conducted by his team at CATER in collaboration with industry and government. He mainly uses optical and novel laser diagnostic techniques to investigate fundamental and applied problems in mechanical, aerospace, chemical and space engineering at practical operation conditions. This strategy provides non-intrusive, time-resolved and remote detection of thermodynamic and flow properties such as species, gases, temperature, pressure, etc. Unique and world-class facilities in his lab generate crucial experimental knowledge about these systems and provide critical validation targets for computational models used by industry.

Since Dr. Vasu's appointment at UCF's CATER in 2012 (after his Ph.D. from Stanford and postdoc training at Sandia), he has authored a plethora of journal and conference articles. He has collaborated with multiple investigators on research projects totaling more \$31 million. Graduates from his group hold key positions in academia, government, national labs, and power and aerospace industries. Dr. Vasu is a recipient of numerous prestigious early career awards, including the 2020 DARPA Director's Fellowship. He has received the highest honors from UCF, including the prestigious UCF Luminary and Reach for the Stars awards.