

# FACULTY RESEARCH TALKS

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Zoom talk | Friday, Oct. 4, 2024 | Noon to 1 p.m.



PRESENTER 1:  
**NEEDA BROWN**  
Assistant Professor  
Materials Science  
and Engineering,  
Infectious Disease  
and Travel Health  
Initiative

## NanoBio: Nanomaterials for Biomedical Applications

Dr. Brown's research is centered around understanding and leveraging inherent material-biological interactions to design next-generation nanomaterial systems, specifically looking at shifts in tumor immunogenicity, combination efficacies and new drug toxicology. In this presentation, she will present her ongoing work on designing bio/nanomaterials to circumvent drug delivery barriers and how material-biological interactions can be leveraged for better nanomaterial design.

Dr. Brown earned her doctorate in biomedical engineering from the University of Oklahoma and continued as a postdoctoral fellow in the Division of Medical Physics and Biophysics at Brigham and Women's Hospital at Harvard Medical School, and at the Dana-Farber Cancer Institute, where she was promoted to instructor. In September 2021, she moved to Northeastern University as an assistant teaching professor, where she was the founder and director of a master's degree program in nanomedicine, served as assistant director of CaNCURE and launched her CDMRP and NIH funded nanobio research program.



PRESENTER 2:  
**ZHIPENG DENG**  
Assistant Professor  
Mechanical  
and Aerospace  
Engineering

## Quantum Computing: An Emerging Approach to Sustainability and Decarbonization in Buildings and Cities

In this presentation, Dr. Deng will discuss using quantum computing to solve non-linear optimization and control problems with discrete variables for building and urban energy systems in real time. He will share a novel optimization using quantum annealing for model predictive control of rooftop units in buildings. He will also present a new framework for building-to-grid integration, having proved its potential to solve large-scale discrete optimization problems for urban energy systems. Dr. Deng will also cover future research directions for employing quantum computing and quantum machine learning to revolutionize energy usage, optimize renewable energy systems and mitigate climate change impacts.

Dr. Deng received a bachelor's degree from Shanghai Jiao Tong University and completed his doctorate at Purdue University. His research interests include decarbonization in buildings and cities, smart control, quantum computing, building and urban energy simulation, grid-interactive buildings, the sustainable built environment, data mining, computational fluid dynamics and airflow simulation.



PRESENTER 3:  
**QICHEN YANG**  
Assistant Professor  
Electrical and  
Computer  
Engineering,  
RISES Center

## High Power Dense, Agile and Robust Energy Conversion and Delivery Systems

Medium-voltage (MV) power conversion technology is crucial for modern electric ships, electric aircraft and power grids. However, challenges like coupled multi-physics stresses, unverified reliability and the need for advanced protection schemes in DC grids need to be solved. Dr. Yang will discuss research uncovering the mechanisms behind the damaging effects of intense electrical fields on the insulation of MV power conversion systems, a novel DC circuit breaker and the application of a multi-physics analysis in developing MV converters.

Dr. Yang received his doctorate from the Georgia Institute of Technology. Before joining the UCF, he was a research faculty member at the Center for the Advanced Power Systems at Florida State University, where he joined as a postdoctoral scholar in 2019. His research interests include MV multilevel converters, MV DC circuit breakers and high-voltage insulation technology.