

# FACULTY RESEARCH TALKS

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Zoom talk | Friday, June 10, 2022 | Noon to 1 p.m.



PRESENTER 1:  
**YANG YANG**  
Associate Professor,  
Materials Science  
and Engineering,  
NanoScience  
Technology Center

## Advanced Materials Technology for Energy and Sustainability

In this talk, Dr. Yang will discuss his group's efforts to improve safety, reliability, performance and energy efficiency for emerging renewable energy technologies. Emerging materials engineering technologies will be discussed and demonstrated to improve the performance of energy devices such as batteries, fuel cells and hydrogen production.

Dr. Yang's research is focused on materials development for energy and sustainability, including batteries, electrolyzers, hydrogen production, fuel cells, reduction of greenhouse gas emissions, etc. Before joining UCF in 2015, he was an Alexander von Humboldt Postdoctoral Fellow and the Peter M. & Ruth L. Nicholas Postdoctoral Fellow at the University of Erlangen-Nuremberg Germany and Rice University, respectively. He earned his Ph.D. in materials science and engineering from Tsinghua University. Dr. Yang leads the Advanced Materials & Renewable Energy group at UCF. His group constantly publishes in the most prestigious materials science and renewable energy journals.

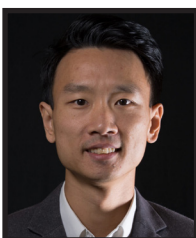


PRESENTER 2:  
**VLADIMIR BOGINSKI**  
Professor, Industrial  
Engineering and  
Management  
Systems

## Networks of Causal Relationships in Financial Markets

Dr. Boginski will share a network-based framework for studying causal relationships in financial markets and demonstrate this approach by applying it to the entire U.S. stock market. Directed networks (referred to as "causal market graphs") are constructed based on publicly available stock price time series data during 2001-2020. His group has studied the dynamics of structural properties of the constructed network snapshots. Interestingly, they have observed drastic changes of the considered network characteristics in years that corresponded to significant global-scale events, most notably, the financial crisis of 2008 and the COVID-19 pandemic of 2020.

Dr. Boginski received his Ph.D. from the University of Florida and he has been a faculty member at UCF since 2015. His research interests focus on mathematical modeling and optimization techniques in the context of network science and engineering. Dr. Boginski has co-authored more than 80 refereed publications and served as PI/co-PI on externally funded projects with more than \$15M in total funding. In 2018, he was selected by the U.S. National Academy of Engineering as a participant in the Japan-America Frontiers of Engineering Symposium.



PRESENTER 3:  
**KAWAI KWOK**  
Assistant Professor,  
Mechanical  
and Aerospace  
Engineering

## Piezoresistive Modeling of Carbon Nanotube Polymer Composites

Polymer nanocomposites produce a resistance change when subjected to a mechanical strain. This piezoresistive effect can be utilized in sensing and monitoring highly-deformable structures with remarkable sensitivity. In this talk, Dr. Kwok will discuss efforts in understanding the piezoresistivity of carbon nanotube polymer composites using a dual-scale model. The model combines a tunneling resistance model at the nanoscale and a random network deformation model at the microscale. His group reproduces results from experiments and quantum simulations, and elucidates the origin of resistance relaxation and sensor degradation, which are standing issues faced by nanocomposite sensors.

Dr. Kwok is interested in deployable, morphing, lightweight and multifunctional structures for aerospace applications. His current research includes deployable propeller blade design, ultrathin composite deployable spacecraft, in-space manufacturing of large structures and high-altitude superpressure balloons. He received his Ph.D. and M.S. degrees in aeronautics from the California Institute of Technology. Prior to joining UCF in 2017, he was a research scientist at the Technical University of Denmark. He is a recipient of the NSF CAREER award and NASA RHG Exceptional Achievement for Engineering award.