

## Energy Research

### Current Projects:

Project Title: X-ray Imaging of Multiphase Flows of Interest to ONR

PI: T.J. **Heindel**

Funding Agency: Office of Naval Research (ONR)

Dollar Amount and Duration: \$250,000; 04/2018 - 03/2023

Project Title: Wind Turbines in Cold Winter: Icing Physics and Novel Strategies for Wind Turbine Icing Mitigation

PI: H. **Hu**

Funding Agency: Iowa Energy Center, the State of Iowa

Dollar Amount and Duration: \$303,000; 08/2019 - 08/2022.

Project Title: Collaborative Research: A fundamental Study on Supercooled Large Droplets: Impacting, Splashing, Surface Water Dynamics, and Ice Accretion.

PI: H. **Hu**

Funding Agency: National Science Foundation

Dollar Amount and Duration: \$281,156; 07/2019 - 06/2022

Project Title: Collaborative Research: Bridging the Gap Between Particle-scale Thermal Transport and Device-scale Predictions

PI/Co-PIs: J. Capecehatro, S. **Subramaniam** and F. Coletti

Funding Agency: NSF

Dollar Amount and Duration: \$581,689; 06/2019 - 05/2022

Project Title: IRES Track-1: International Research Experiences for Students in Renewable Energy and Environmental Sustainability

PI/Co-PIs: X.L. Bai, H. **Hu**

Funding Agency: National Science Foundation;

Dollar Amount and Duration: \$285,000; 01/2019 - 12/2021.

Project Title: RAPID: Autothermal Pyrolysis of Lignocellulosic Wastes to Sugars and Other Biobased Products

PI/co-PIs: R.C. Brown, M. **Mba-Wright**

Funding agency: American Institute of Chemical Engineers

Dollar Amount and Duration: \$2,100,000; 01/2019 - 12/2021

Project Title: Controlling Spray Formation and Dispersion

Funding Agency: Office of Naval Research (ONR)

PI/co-PIs: O. Desjardins (overall PI – Cornell), T.J. **Heindel** (ISU PI), S. Balachandar (University of Florida), A. Aliseda (University of Washington – Seattle), and D.J. Bodony (University of Illinois at Urbana-Champaign)

Dollar Amount and Duration: \$7,500,000 (\$1,604,001 to ISU); 06/2016 - 05/2021

Project Title: Testing of Durable Elastomeric and Metal Based Icephobic Coatings for Turbomachinery Ice Protection Applications

PI: H. **Hu**

Funding Agency: NAVY SBIR Phase I & II

Dollar Amount and Duration: \$300,000; 01/2019 - 04/2021

Project Title: Controlled Polymerization of Lignin for Ideal Precursor of High-Quality Carbon Fiber  
PI/co-PIs: X. Bai, R.C. Brown, E.W. Cochran, M. **Mba-Wright**  
Funding agency: USDA-National Institute of Food & Agriculture (NIFA)  
Dollar Amount and Duration: \$500,000; 01/2018 - 12/2020

Project Title: Ice Adhesion Characterization of Icephobic Materials for Aircraft Icing Mitigation  
PI/co-PI: A. Bastawros, H. **Hu**  
Funding Agency: NASA- Advanced Air Transport Technology (AATT) Program  
Dollar Amount and Duration: \$113,000; 09/2019 - 08/2020

Project Title: "Development of Energy and Water Master Plan for Iowa Army National Guard  
PI: S.-C. **Kong**, A. Kimber  
Funding Agency: DOD Iowa Army National Guard  
Dollar Amount and Duration: \$100,000; 08/2018 - 08/2020

Project Title: An Open-source Framework for the Computational Analysis and Design of Autothermal Chemical Processes  
PI/co-PIs: A. **Passalacqua**, S. **Subramaniam**, R. Brown, M. **Mba-Wright**  
Funding Agency: US DOE - AMO  
Dollar Amount and Duration: \$1,072,830; 06/2018 - 05/2020

Project Title: Electromagnetic Control of Pyrotechnic Light Emission  
PI/co-PIs: T.R. **Sippel**, S. **Subramaniam**, J.B. **Michael**  
Funding Agency: SERDP / Naval Surface Warfare Center Crane  
Dollar Amount and Duration: \$149,125; 06/2019 - 05/2020

Project Title: High-Fidelity Physical Modeling of Spray-Wall Interactions for Optimized Engine Performance Using Military Fuels  
PI: S.-C. **Kong**  
Funding Agency: Army Research Laboratory  
Dollar Amount and Duration: \$344,000; 10/2016 - 04/2020

Project Title: Microwave Control of Composite Solid Propellant Combustion  
PI/co-PIs: T.R. **Sippel**, J.B. **Michael**  
Funding Agency: Air Force Office of Scientific Research  
Dollar Amount and Duration: \$327,968; 02/2017 - 02/2020

Project Title: Autothermal Pyrolysis of Western Red Cedar for Dispatchable Renewable Power  
PI/co-PIs: R.C. Brown, M. **Mba-Wright**  
Funding agency: Nebraska Public Power District  
Dollar Amount and Duration: \$22,839; 01/2020 - 02/2020

#### **Completed 2019:**

Project Title: Valorization of Biochar: Applications In Anaerobic Digestion, Livestock Odor Control and Plant Growth  
PI/co-PIs: R.C. Brown, D.S. Andersen, J.A. Koziel, M. **Mba-Wright**, Z. Wen  
Funding agency: USDA-National Institute of Food & Agriculture (NIFA)  
Dollar Amount and Duration: \$1,469,448; 01/2018 - 12/2019

Project Title: SI2-SSE: A Next-generation Open-source Computational Fluid Dynamic Code for Polydisperse Multiphase Flows in Science and Engineering

PI/co-PIs: A. **Passalacqua**, R. O. **Fox**, S. Mitra

Funding Agency: NSF - ACI

Dollar Amount and Duration: \$499,551; 10/2014 - 09/2019

Project Title: High-Speed Stereographic Imaging System for Multiphase Flows

PI/co-PIs: T.J. **Heindel**, J.B. **Michael**, T.R. **Sippel**

Funding Agency: Office of Naval Research (ONR) DURIP award

Dollar Amount and Duration: \$253,417; 06/2018 - 05/2019

**Completed 2018:**

Project Title: Rapid: Autothermal Pyrolysis of Lignocellulosic Wastes to Sugars and Other Biobased Products (Budget Period 2)

PI/co-PIs: R.C. Brown, M. **Mba-Wright**, Z. Wen

Funding agency: American Institute of Chemical Engineers

Dollar Amount and Duration: \$700,000; 01/2018 - 12/2018

Project Title: Anaerobic Digester Life Cycle Cost Analysis

PI: M. **Mba-Wright**

Funding agency: Iowa Economic Development Authority

Dollar Amount and Duration: \$16,200; 11/2017 - 05/2018

Project Title: Investigation of the Lift and Virtual Mass Force in Gas-liquid Flows with Particle-resolved Direct Numerical simulation

PI/co-PIs: A. **Passalacqua**, S. **Subramaniam**, R. O. **Fox**

Funding Agency: NSF - CBET

Dollar Amount and Duration: \$338,465; 09/2014 - 08/2018