# ASME 2023 SHTC
## Summer Heat Transfer Conference

**CONFERENCE**
**July 10-12, 2023**

**The Madison DC Hotel**
**Washington, DC**

# Program

**event.asme.org/SHTC**

*The American Society of Mechanical Engineers®*
*ASME®*

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SETTING THE STANDARD

# Welcome

## FROM THE CONFERENCE CHAIRS

Dear Colleagues,

On behalf of the ASME Heat Transfer Division, it is our pleasure to welcome you to the ASME 2023 Summer Heat Transfer Conference in Washington, DC, from July 10 to 12, 2023. The conference is a premier event that offers excellent opportunities to disseminate your research and network with the international heat transfer community. The technical content of the conference is broad in scope and will provide a forum for presentations of state-of-the-art research and opportunities. It is co-located with the ASME 17th International Conference on Energy Sustainability.

The conference offers a vibrant program with several technical sessions, panels, and special workshops as well as a student-focused hackathon. This year, we have a joint plenary session focused on energy sustainability organized by Judith Vidal from National Renewable Energy Laboratory, along with plenary presentations from Hongbin Ma, the Donald Q. Kern Award winner, and George (Bud) Peterson, the Max Jakob Award winner. Two hundred and seventy papers, presentations, and posters will be presented during the conference. A number of workshops are organized over a wide range of topics, such as the Use of Machine Learning Tools for Thermophysics and Heat Transfer Research and Energy Development, Scanning Thermal Microscopy and Application, along with a panel on Nanoscale Heat Transfer and Education. Industry insight on cutting-edge advancements and pressing challenges in the field of electronics cooling is brought in through a panel on Fundamentals of Thermal Management of Electronics, with representatives from Accelsius, Zutacor Corporation, Aavid, Thermal Division of Boyd Corporation, APC, Advanced Cooling Technologies, Inc., and Yektasonics, Inc. The conference also offers you an opportunity to interact with the program managers from the National Science Foundation, ARPA-E, and the Office of Naval Research through a Funding Opportunities panel. The Heat Transfer Division has recently lost a few stalwarts, and in response, three symposiums have been organized in memory of Profs. Raymond Viskanta, Darrell Pepper. and James Beck. Finally, but not last, a student-centered program, featuring a hackathon, a career panel, and a social hour, will be included, for the first time, as part of the conference program.

The contributions of all the track, topic, and session chairs; authors; reviewers; and ASME staff have been invaluable to this event. We would like to specifically acknowledge ASME staff, Mary Jakubowski, Mark Avila, Laraine Lee, and April Tone for helping manage the conference planning, organization, and tool administration. We also thank the track and session organizers for supporting the technical program, overseeing the paper reviews, and helping maintain high standards. Most importantly, we thank you, the participants, for giving strength to the conference with your technical contributions and professional engagement.

We look forward to seeing everyone in person soon!

**Ravi Annapragada, Conference Chair,** *Carrier Corporation*

**Sandra Boetcher, Conference Co-Chair,** *Embry-Riddle Aeronautical University*

**Diana-Andra Borca-Tasciuc, Technical Program Chair,** *Rensselaer Polytechnic Institute*

**Dong Liu, Technical Program Co-Chair,** *University of Houston*

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# Conference Information

## REGISTRATION INFORMATION

**Dolley Madison Foyer, Second Floor**

**Registration Hours:**

Sunday, July 9, 3:00PM–6:00PM

Monday, July 10, 7:00AM–5:00PM

Tuesday, July 11, 7:00AM–5:00PM

Wednesday, July 12, 8:00AM–4:00PM

## EXHIBIT INFORMATION

**Dolley Madison Foyer, Second Floor**

**Hours**

Monday, July 10, 10:00AM–4:00PM

Tuesday, July 11, 10:00AM–4:00PM

Wednesday, July 12, 10:00AM–4:00PM

**Don't forget to stop by and visit with our Exhibitors from Boeing, Carrier Corporation, and FluxTeq!**

## AUDIOVISUAL EQUIPMENT IN SESSION ROOMS

All technical sessions are equipped with one LCD projector and one screen. Laptops will NOT be provided in the sessions. Presenters MUST bring their own or plan in advance with the session chairs to share theirs. Please bring your presentation on a thumb drive 15–20 minutes prior to the session start time.

## BADGE REQUIRED FOR ADMISSION

All conference attendees must always wear the official ASME 2023 SHTC badge to gain admission to technical sessions, exhibits, and other conference events. Without a badge, you will NOT be allowed to attend any conference activities.

## CONFERENCE AWARDS LUNCH

The Awards Luncheon will take place during the conference to recognize and celebrate a select group of individuals for their contributions and achievements in heat transfer engineering. The schedule is as follows:

Heat Transfer Division Awards Luncheon is on Tuesday, July 11, 12:15PM–1:45PM in Dolley Madison Ballroom/Montpelier A & B, on the Second Floor.

## CONFERENCE LUNCHES

Conference lunches will be held from 12:15PM to 1:45PM on Monday and Wednesday in Dolley Madison Ballroom/Montpelier A&B located on the Second Floor. Please join your fellow attendees for a good meal and a great networking opportunity.

## CONFERENCE APP

**SHTC/ES 2023** is utilizing a mobile event app in place of a printed program to enhance the conference experience for all attendees.

You will be able to:

- Connect with Attendees
- View Speaker Profiles
- Access Session Information
- Watch On-Demand Content
- Download Final Papers
- And More!

*All features may not be available at all events.

## CONFERENCE PROCEEDINGS

Each attendee will receive an email with a unique code to access digital copies of all the papers accepted for presentation at the conference. The official conference archival proceedings will be published after the conference and will not include accepted papers that were not presented at the conference. The official conference proceedings are registered with the Library of Congress and are submitted for abstracting and indexing. The proceedings are published in the ASME Digital Library. You will be provided with an individual link to the online papers via email. In the event you do not receive the email, send a request to toolboxhelp@asme.org.

## CONFERENCE REFRESHMENT BREAKS

Morning and afternoon breaks will be provided in the Dolley Madison Foyer, Second Floor. Come and meet our exhibitors, Carrier Corporation, Boeing and FluxTeq, and join your fellow attendees for a few minutes of networking and discussion. The schedule is as follows:

**Monday–Wednesday, July 10–12**

**10:30AM–11:30AM and 3:30PM–4:00PM**

## EMERGENCY INFORMATION

If you are experiencing a health emergency, please dial 911. If you are able or someone else is able, please dial zero and inform the operator so that the hotel can be on the alert for the emergency response team. The hotel also has 24-hour security and officers trained in first aid, CPR, & AED service.

## INTERNET ACCESS

Complimentary basic internet is provided in the sleeping rooms if you are staying at the Madison and in the hotel's public space and in the meeting space.

Network: Madison Conference
Password: No password required

## MEMBERSHIP TO ASME (4 MONTHS FREE)

Registrants who paid the non-member conference registration fees will receive a four-month complimentary ASME Membership. ASME will automatically activate this complimentary membership for qualified attendees. Please allow approximately four weeks after the conclusion of the conference for your membership to become active. Visit www.asme.org/membership for more information about the benefits of ASME Membership.

## PRESENTER ATTENDANCE POLICY

According to ASME's Presenter Attendance Policy, if a paper is not presented at the conference, the paper will not be published in the official Archival Proceedings, which are registered with the Library of Congress and are abstracted and indexed. The paper also will not be published in the ASME Digital Collection and may not be cited as a published paper.

# Schedule at a Glance

| TIME | EVENT | ROOM |
|---|---|---|
| **SUNDAY, JULY 9** | | |
| 3:00PM–6:00PM | Registration | Dolley Madison Foyer |
| 12:00PM–2:00PM | HTD EC Meeting - Closed | Executive Boardroom |
| 2:30PM–4:30PM | HTD EC Meeting - Open | Executive Boardroom |
| **MONDAY, JULY 10** | | |
| 7:00AM–6:00PM | Mothers Room | Office |
| 7:00AM–5:00PM | Registration | Dolley Madison Foyer |
| 8:00AM–9:00AM | Welcome and Plenary Session I - Bud Peterson, Max Jakob Award | Dolley Madison Ballroom |
| 9:00AM–10:30AM | Raymond Viskanta Memorial Symposium-01 - Thermal Radiation in Energy Systems | Montpelier A |
| 9:00AM–10:30AM | K7 - Thermophysical and Radiative Properties of Materials | Montpelier B |
| 9:00AM–10:30AM | K9-01 - Thermal Transport in Nanomaterials/across Interfaces 1 | Hamilton A |
| 9:00AM–10:30AM | K8-01 - Fundamentals of Boiling/Condensation Including Micro/Nano-scale Effects (Includes Molecular Level Simulation of Phase Change) I | Hamilton B |
| 9:00AM–10:30AM | K13-01 - Enhanced Condensation and Anti-Fouling Studies | Constitution A |
| 9:00AM–10:30AM | K6-01 - Heat Transfer in Energy Systems - Solar | Constitution B |
| 9:00AM–10:30AM | K20-01 - Applications of Computational Heat Transfer I | Adams B |
| 10:30AM–11:00AM | AM Coffee Break- SHTC/ES | Dolley Madison Foyer |
| 10:30AM–11:00AM | SHTC/ES Student Hackathon Meet & Greet | Dolley Madison Ballroom |
| 11:00AM–12:30PM | Raymond Viskanta Memorial Symposium-02 - Nanoscale Thermal Radiation | Montpelier A |
| 11:00AM–12:30PM | K16-01 - Heat Transfer in Electronic Equipment I | Montpelier B |
| 11:00AM–12:30PM | K9-02 - Thermal Transport in Nanomaterials/across Interfaces 2 | Hamilton A |
| 11:00AM–12:30PM | K8-02 - Fundamentals of Boiling/Condensation Including Micro/Nano-scale Effects (Includes Molecular Level Simulation of Phase Change) II | Hamilton B |
| 11:00AM–12:30PM | K13-02 - Pool Boiling Fundamentals | Constitution A |
| 11:00AM–12:30PM | K6-02 - Heat Transfer in Energy Systems - Energy Storage | Constitution B |
| 11:00AM–12:30PM | K20-02 - Applications of Computational Heat Transfer II | Adams B |
| 12:30PM–1:45PM | Lunch - SHTC/ES | Dolley Madison Ballroom & Montpelier A & B |
| 12:30PM–1:45PM | Underrepresented in STEM Lunch Discussion - SHTC/ES | Constitution A |
| 1:45PM–3:15PM | Raymond Viskanta Memorial Symposium-03 - Thermal Radiation in Manufacturing and Energy | Montpelier A |
| 1:45PM–3:15PM | K16-02 - Heat Transfer in Electronic Equipment II | Montpelier B |
| 1:45PM–3:15PM | K9-03 - Thermal Transport in Nanomaterials/across Interfaces 3 | Hamilton A |
| 1:45PM–3:15PM | K8-03 - Fundamentals of Single Phase Heat Transfer and Melting and Solidification | Hamilton B |
| 1:45PM–3:15PM | K13-03 - Flow Boiling Fundamentals | Constitution A |
| 1:45PM–3:15PM | K6-03 - Heat Transfer in Energy Systems - Waste Heat | Constitution B |

| TIME | EVENT | ROOM |
|---|---|---|
| 1:45PM–3:15PM | K20-03 - Computational Methods | Adams B |
| 3:15PM–3:45PM | PM Coffee Break- SHTC/ES | Dolley Madison Foyer |
| 3:15PM–3:45PM | Poster Session SHTC/ES | Potomac Pre-function Foyer |
| 3:45PM–5:15PM | Raymond Viskanta Memorial Symposium-04 - Thermal Radiation in Energy Systems | Montpelier A |
| 3:45PM–5:15PM | K16-03 - Heat Transfer in Electronic Equipment III | Montpelier B |
| 3:45PM–5:15PM | K9-04 - Tunable Thermal Transport | Hamilton A |
| 3:45PM–5:15PM | K8-04 - Fundamentals of Conduction Heat Transfer | Hamilton B |
| 3:45PM–5:15PM | K13-04 - Spray Cooling | Constitution A |
| 3:45PM–5:15PM | K6-04 - Heat Transfer in Energy Systems - Batteries | Constitution B |
| 3:45PM–5:15PM | K20-04 - Machine Learning and Modeling for Heat Transfer Problems | Adams B |
| 6:00PM–7:00PM | Student Career Panel | Potomac C |
| 6:00PM–8:00PM | K16 - Committee Meeting | Hamilton A |
| 6:00PM–8:00PM | SHTC/ES Student Networking Event | Hamilton B |
| 6:00PM–8:00PM | K8 - Committee Meeting | Constitution A |
| 6:00PM–8:00PM | K13 - Committee Meeting | Constitution B |
| 6:00PM–8:00PM | K20 - Committee Meeting | Adams A |
| 6:00PM–8:00PM | K23 - Committee Meeting | Adams B |
| **TUESDAY, JULY 11** | | |
| 7:00AM–5:00PM | Registration | Dolley Madison Foyer |
| 7:00AM–6:00PM | Mothers Room | Office |
| 8:00 AM–9:00AM | Plenary Session: Energy Storage for Sustainable Buildings, Judith Vidal, NREL - SHTC/ES | Dolley Madison Ballroom |
| 9:00AM–10:30AM | Raymond Viskanta Memorial Symposium-05: Thermal Management | Mount Vernon A |
| 9:00AM–10:30AM | K6-05 - Heat Transfer in Energy Systems - Heat Pump | Mount Vernon B |
| 9:00AM–10:30AM | K8-05 - Fundamental of Radiative Heat Transfer | Hamilton A |
| 9:00AM–10:30AM | K9-05 - Radiative Cooling and Radiative Properties of Nanomaterials | Hamilton B |
| 9:00AM–10:30AM | K13-05 - Phase-Change from Enhanced Surfaces | Constitution A |
| 9:00AM–10:30AM | K8/K17 - Workshop on Scanning Thermal Microscopy (SThM) and Applications | Constitution B |
| 10:30AM–11:00AM | AM Coffee Break - SHTC/ES | Dolley Madison Foyer |
| 11:00AM–12:30PM | Raymond Viskanta Memorial Symposium-06: Thermal Management and Phase Change | Mount Vernon A |
| 11:00AM–12:30PM | K6-06 - Heat Transfer in Energy Systems - Heat Exchangers | Hamilton A |
| 11:00AM–12:30PM | K17 - Heat and Mass Transfer in Biotechnology | Hamilton B |
| 11:00AM–12:30PM | K9-06 - Radiative Thermal Energy Conversion with Nanostructures | Constitution A |
| 11:00AM–12:30PM | K13-06 - Heat Transfer in Multi-Phase Flow | Constitution B |
| 11:00AM–12:30PM | K9 - Panel: Nanoscale Heat Transfer Education | Mount Vernon B |

# Schedule at a Glance

| TIME | EVENT | ROOM |
|---|---|---|
| 12:30PM–1:45PM | SHTC Awards Lunch | Dolley Madison Ballroom & Montpelier A & B |
| 1:45PM–3:15PM | SHTC/ES Panel - Funding Opportunities | Mount Vernon B |
| 1:45PM–3:15PM | K8 - Workshop: Use of Machine Learning Tools for Thermophysics and Heat Transfer Research and Energy Technology Development | Hamilton A |
| 1:45PM–3:15PM | K11 - Fire and Combustion | Hamilton B |
| 1:45PM–3:15PM | K9-07 - Surface-Enhanced Phase Change Heat Transfer 1 | Constitution A |
| 1:45PM–3:15PM | K18 - Heat Transfer under Extreme Conditions | Constitution B |
| 3:15PM–3:45PM | PM Coffee Break SHTC/ES | Dolley Madison Foyer |
| 3:45PM–5:15PM | Raymond Viskanta Memorial Symposium-07 - Heat Conduction | Hamilton A |
| 3:45PM–5:15PM | K6-07 - Heat Transfer in Energy Systems - General | Hamilton B |
| 3:45PM–5:15PM | Darrell Pepper Memorial Symposium | Constitution A |
| 3:45PM–5:15PM | K9-08 - Surface-Enhanced Phase Change Heat Transfer 2 | Constitution B |
| 3:45PM–5:15PM | K8 - Industry Panel: Fundamentals on Thermal Management of Electronics | Mount Vernon A |
| 3:45PM–4:45PM | IMECE 2023 Session Organizers Meeting | Montpelier A |
| 3:45PM–5:15PM | SHTC/ES Program Directors 1-1 Appointments | Montpelier B |
| 5:15PM–8:00PM | SHTC/ES Student Hackathon - Presentations | Hamilton A |
| 6:30PM–8:00PM | J. V. Beck Symposium Committee Meeting | Potomac C |
| 6:00PM–8:00PM | K10 - Committee Meeting | Mount Vernon A |
| 6:00PM–8:00PM | K6 - Committee Meeting | Mount Verson B |
| 6:00PM–8:00PM | K15 - Committee Meeting | Hamilton A |
| 6:00PM–8:00PM | K9 - Committee Meeting | Hamilton B |
| 6:00PM–8:00PM | K12 - Committee Meeting | Constitution A |
| 6:00PM–8:00PM | K8 - Industry/Student Networking | Constitution B |
| **WEDNESDAY, JULY 12** | | |
| 8:00AM–4:00PM | Registration | Dolley Madison Foyer |
| 7:00AM–5:30PM | Mothers Room | Office |
| 8:00AM–9:00AM | Plenary Session III - Hongbin Ma, Donald Q. Kern Award | Dolley Madison Ballroom |
| 9:00AM–10:30AM | Raymond Viskanta Memorial Symposium-08 - Energy Systems | Hamilton A |
| 9:00AM–10:30AM | James V. Beck Memorial Symposium-01 - Inverse Problems, Parameter Estimation and Heat Conduction | Hamilton B |
| 9:00AM–10:30AM | K10-01 - Heat Transfer Equipment I | Constitution A |
| 9:00AM–10:30AM | K9-09 - Thermal Emission Control with Nanostructures | Constitution B |
| 9:00AM–10:30AM | K12-01 - Aerospace Heat Transfer I | Mount Vernon B |
| 10:30AM–11:00AM | AM Coffee Break - SHTC/ES | Dolley Madison Foyer |
| 11:00AM–12:30PM | Raymond Viskanta Memorial Symposium-09 - Phase Change in Materials Processing | Hamilton A |

| TIME | EVENT | ROOM |
|---|---|---|
| 11:00AM–12:30PM | James V. Beck Memorial Symposium-02 - Inverse Problems, Parameter Estimation and Heat Conduction | Hamilton B |
| 11:00AM–12:30PM | K10-02 - Heat Transfer Equipment II | Constitution A |
| 11:00AM–12:30PM | K9-10 - Nanothermal Metrology | Constitution B |
| 11:00AM–12:30PM | K12-02 - Aerospace Heat Transfer II | Adams B |
| 12:30PM–1:45PM | Lunch - SHTC/ES | Dolley Madison Ballrom & Monteplier A & B |
| 1:45PM–3:15PM | Raymond Viskanta Memorial Symposium-10 - Phase Change Heat Transfer | Hamilton A |
| 1:45PM–3:15PM | James V. Beck Memorial Symposium-03 - Inverse Problems, Parameter Estimation and Heat Conduction | Hamilton B |
| 1:45PM–3:15PM | K10-03 - Heat Transfer Equipment III | Constitution A |
| 1:45PM–3:15PM | K9-11- Phonon Modeling and Machine Learning for Thermal Transport | Constitution B |
| 1:45PM–3:15PM | K15-01 - Transport Phenomena in Manufacturing and Materials Processing | Adams A |
| 3:15PM–3:45PM | PM Coffee Break - SHTC | Dolley Madison Foyer |
| 3:45PM–5:15PM | K12/K14-03 - Aerospace Heat Transfer/Gas Turbine Heat Transfer | Adams B |
| 3:45PM–5:15PM | K19/K22/ K23 - Environmental Heat - Transfer/Heat Transfer Education/Diversity, Equity, and Inclusion in Heat Transfer Community | Hamilton A |
| 3:45PM–5:15PM | K9-12 - Nanoscale Thermal Transport Modeling and Machine Learning | Hamilton B |
| 3:45PM–5:15PM | K15-02 - Transport Phenomena in Additive Manufacturing | Constitution A |
| 5:15PM | Conference Ends | |

# Committee Meetings

| TIME | EVENT | ROOM |
|---|---|---|
| **SUNDAY, JULY 9** | | |
| 12:00PM–2:00PM | HTD EC Meeting - Closed | Executive Boardroom |
| 2:30PM–4:30PM | HTD EC Meeting - Open | Executive Boardroom |
| **MONDAY, JULY 10** | | |
| 6:00PM–8:00PM | K8 Committee Meeting | Constitution A |
| 6:00PM–8:00PM | K13 Committee Meeting | Constitution B |
| 6:00PM–8:00PM | K20 Committee Meeting | Adams A |
| 6:00PM–8:00PM | K23 Committee Meeting | Adams B |
| **TUESDAY, JULY 11** | | |
| 6:30PM–8:00PM | J. V. Beck Symposium Committee Meeting | Potomac C |
| 6:00PM–8:00PM | K10 Committee Meeting | Mount Vernon A |
| 6:00PM–8:00PM | K6 Committee Meeting | Mount Vernon B |
| 6:00PM–8:00PM | K15 Committee Meeting | Hamilton A |
| 6:00PM–8:00PM | K9 Committee Meeting | Hamilton B |
| 6:00PM–8:00PM | K12 Committee Meeting | Constitution A |
| 6:00PM–8:00PM | K8 Industry/Student Networking | Constitution B |

**MONDAY, JULY 10 • 8:00 AM–9:00 AM**
**DOLLEY MADISON BALLROOM, SECOND FLOOR**

**THE MAX JAKOB AWARD**

**G. P. Peterson**
*President Emritus and Regents Professor*
*Woodruff School of Mechanical Engineering*
*Georgia Institute of Technology*
*Atlanta Georgia Institute of Technology*
*Atlanta, GA*

**The Application of Phase Change Materials for the Thermal Control of Hypersonic Vehicles**

**ABSTRACT:** The technological challenges associated with the development of next generation commercial Low Earth Orbit (LEO) and Department of Defense (DOD) hypersonic vehicles are substantial. Friction between the vehicle and the surrounding environment results in aero-thermodynamic heating and generates extremely high heat fluxes and thermally induced stresses, all in a high-g, potentially corrosive environment. The extremely high heat fluxes at the vehicle leading edges may result in temperatures in the range of 3,000°C on the vehicle surface and dictates the need for new, robust thermal management solutions capable of operating at Mach 13-16 and altitudes of 50 to 55 km at local gravitational loads of 3 to 5 g's, while still retaining the structural integrity required in the complex geometry of these hypersonic vehicles. The combination of recent advancements in refractory-additive manufacturing technology, when coupled with phase change materials, presents an opportunity for the development of novel integrated thermal management systems capable of operating at these extreme conditions.

Presented here is an overview of several of the approaches that utilize phase change technology and advanced materials and fabrication techniques to address these and other related issues to develop systems that are capable of transporting the very high heat fluxes occurring at the leading edges of the vehicles to other areas where the heat can be dissipated. A brief summary of the operational requirements and historical development of these systems, along with the current state-of-the art and challenges presented in these applications is presented and discussed.

**BIOGRAPHY:** G. P. "Bud" Peterson is president emeritus and Regents Professor at the Georgia Institute of Technology. Peterson's research interests have focused on the fundamental aspects of phase-change heat transfer, including the heat transfer in reduced-gravity environments, boiling from enhanced surfaces, and some of the earliest work in the area of flow and phase-change heat transfer in micro/nanochannels. Previous investigations have focused on applications involving the thermal control of manned and unmanned spacecraft and progressed through applications of phase-change heat transfer in the thermal control of electronic components and devices. His current research includes the use of phase-change heat transfer for arresting epileptic seizures, fundamental applications of phase-change heat transfer to the cooling of the leading edges of hypersonic vehicles, and heat dissipation from personal and wearable technologies. He earned a B.S. in Mechanical Engineering, a second B.S. in Mathematics, and a M.S. in Engineering, all from Kansas State University and a Ph.D. in Mechanical Engineering from Texas A&M University. He is the author or co-author of 17 books or book chapters, 255 refereed journal articles, and 145 conference publications, and holds 19 patents, with three others pending.

**TUESDAY, JULY 11 • 8:00AM–9:00AM**
**DOLLEY MADISON BALLROOM, SECOND FLOOR**

**Judith C. Vidal, Ph.D.**
*Distinguished Member of Research Staff*
*Manager of Building Energy Science Group*
*Leader of Buildings Emerging Technologies Program*
*Buildings Technologies and Science Center*
*National Renewable Energy Laboratory (NREL)*

**Energy Storage for Sustainable Buildings**

**ABSTRACT:** Alongside expansion in intermittent renewable power generation, electrification of building end uses like heating, water-heating, and cooking can transition residential and commercial buildings to net-zero CO2 emissions. Widespread electrification, however, has the potential to increase annual heating electricity use by over 250% and will also be a major driver of peak period electricity demand growth, particularly in colder regions. Cost-effectively decarbonizing the electricity and building sectors in parallel will require the ability to shift electricity demand to match variable and intermittent renewable generation as well as to satisfy distribution constraints. Behind-the-meter storage (BTMS) in buildings for both thermal energy storage (TES) and battery or electrical energy store (EES) can significantly increase a building's ability to manage and shift electricity demand and is a key enabler of a net-zero CO2 energy system in the United States. NREL and other National Laboratory partners such as LBNL and ORNL are co-leading an energy storage consortium for buildings—Stor4Build—that will focus on developing and advancing integrated/packaged and stand-alone/modular energy storage systems that will accelerate the growth, optimization, deployment, and adoption of simplified and novel technologies that can be easily adopted by all Americans. Stor4Build's 5-year outcome is a community-scale demonstration of technologies to showcase the initial achievements of the consortium, which will serve to lay a foundation for large-scale deployments of TES along with EES and systems capable of satisfying

both the heating and cooling needs in buildings and thus validate the transition toward needed market transformation.

**BIOGRAPHY:** Dr. Judith Vidal from the National Renewable Energy Laboratory (NREL) is the Manager of Building Thermal Energy Science Group, the Sub-Program Lead of Buildings Emerging Technologies, and a Distinguished Member of Research Staff. Dr. Vidal is also a joint faculty member at the Colorado School of Mines (CSM). She has established an international reputation for her cutting-edge work on thermal systems and has published many journal articles on her work in journals such as Nature Materials Degradation. Dr. Vidal has received prestigious awards such as the NREL Distinguished Member of Research Staff in February 2021 and the NREL Chairman's Award in 2017.

In the area of thermal systems, optimization of thermal materials, thermomechanical evaluations of wrought alloys, their weldments, and advanced manufacturing, Dr. Vidal is currently leading several R&D efforts evaluating systems to extend the lifetime thermal components. Dr. Vidal has diversified her expertise and capabilities in other technologies such as building emerging technologies, water splitting electrolysis, fuel cells, thermoelectric, and biofuels. Her collaborative efforts, domestically and internationally, cover several technologies and leverage the R&D activities for early-stage research to create efficient and interactive buildings to help decrease energy consumption.

**WEDNESDAY, JULY 12 • 8:00AM–9:00AM**
**DOLLEY MADISON BALLROOM, SECOND FLOOR**

## DONALD Q. KERN AWARD

**Hongbin Ma**
*Chair, Curators' Distinguished Professor, & Glen A. Barton Professor*
*Director, Multiphysics Energy Research Center (MERC)*
*Mechanical & Aerospace Engineering*
*University of Missouri*
*Columbia MO*

### Oscillating Heat Pipe and Its Extra-High Heat Transport Capability

**ABSTRACT:** Heat transfer process in an oscillating heat pipe (OHP) involves liquid-vapor interfacial phenomenon, surface forces, thermally excited mechanical vibration, evaporation and condensation heat transfer, oscillated forced convection, and heat conduction. The most outstanding feature is that an OHP can effectively integrate the state-of-the-art of heat transfer processes such as thin film evaporation, oscillating flow, thermally-excited mechanical vibration, nanoparticles, high heat transfer coefficient of entrance region, turbulent flow and vortexes induced by the oscillating flow of liquid plugs and vapor bubbles. Therefore, the OHP can achieve an extra high effective thermal conductivity. OHP has been tremendous advances in the past 20 years. This presentation introduces recent results of OHPs in the field including theoretical models of oscillating motion and heat transfer of single phase in capillary channels, mathematical modeling of mechanical vibration OHP system, exciting forces, operating limitation, heat transfer mechanisms enhancing oscillating motions and heat transfer of two-phase flows, neutron imaging study of oscillating motions, and nanofluid's effect on the heat transfer performance in OHPs. The importance of thermally-excited oscillating motion combined with phase change heat transfer to the extra-high heat transport capability in OHPs is emphasized.

**BIOGRAPHY:** Dr. Hongbin Ma is Chair, Curators' Distinguished Professor, & Glen A. Barton Professor, in the Department of Mechanical & Aerospace Engineering, and the director of the Multiphysics Energy Research Center (MERC) in the College of Engineering at the University of Missouri (MU). He received his Ph.D. in 1995 from Texas A&M University. Since he joined MU in 1999, he has conducted active research in the fields of phase-change heat transfer, heat pipes, ejector refrigeration, and thermal management. His research has been supported by NSF, ONR, NIH, Intel, Dell, Foxconn, DARPA, Northrop Grumman, and many other federal agencies and private companies. His research work has resulted in more than 320 publications including one book, eight book chapters, and over 180 refereed journal papers as well as 23 patentable technologies. The contributions he made are not only in scientific fundamental research but also in engineering applications. His research efforts led to the establishment of ThermAvant Technologies, where he is co-founder and president, have made ThermAvant become the world's leader in the OHP thermal control technology, the sole company providing the OHP thermal control technology to the top defense companies in the U.S. and a winner of the 2018 100 R&D Award. His earlier heat pipe research on capillary flow, thin film evaporation, and micro/nanostructures had resulted in the low-cost highly efficient heat pipe heat sinks. ISoTherM (Innovative Solution of Thermal Management) consortium, where he was the founding director, was supported by Intel to develop innovative cooling technologies for laptop and desktop computers, which have contributed to the advancement of heat pipe applications in computer cooling. He is a Fellow of American Society of Mechanical Engineering (ASME) and a Fellow of National Academy of Inventor (NAI).

## AWARDS AND RECOGNITIONS

**Max Jakob Award**
G. P. Peterson

**Donald Q. Kern Award**
Hongbin Ma

**2023 HTD Boelter-McAdams Prize**
Ravi Annapragada

**James V. Beck Memorial Symposium Best Paper Award**

HT2023-107530 - Study of Inclusion Detection using Bayesian Inference for an Application in Breast Tumors

**Authors:** Gabriela L. Menegaz, Cleudmar A. Araujo, Gilmar Guimaraes

## K8(/K17) WORKSHOP ON SCANNING THERMAL MICROSCOPY (STHM) AND APPLICATIONS

**TUESDAY, JULY 11 • 9:00AM–10:30AM**
**CONSTITUTION B, SECOND FLOOR**

**Organizaing Committee: K-8 Theory & Fundamental Research**

**ABSTRACT:** The workshop will review scanning thermal microscopy (SThM) and SThM applications. It will discuss heat transfer mechanisms at the nanoscale, SThM tip-sample heat transfer interactions, spatial resolution and sensitivity for thermal characterization, accurate theoretical models to extract sample temperatures and thermal conductivity, as well as limitations of the technique. The discussion will mainly focus on SThM using resistive and thermocouple type probes, recent developments and commercially available probes, AFM platforms, and calibration methods. The workshop will evaluate available SThM probes and discuss the experimental setups used with emphasis on practical use. Finally, it will discuss various relevant applications in material science, semiconductor, and biology.

Learning outcomes: heat transfer mechanisms at the nanoscale, theoretical models for SThM based thermal conductivity and temperature measurements, SThM probes, evaluation of commercially available SThM systems, experimental SThM setups, SThM applications.

**Workshop Leaders:**

**Theodorian (Theo) Borca-Tasciuc**
*Mechanical Aerospace and Nuclear Engineering Department*
*Rensselaer Polytechnic Institute, Troy, NY*

**BIOGRAPHY:** Dr. Theodorian (Theo) Borca-Tasciuc has a B.S. in Physics from Bucharest University and a Ph.D. in Mechanical Engineering from UCLA. He started his academic career in 2001 at Rensselaer Polytechnic Institute and since 2013 he is a full professor. He is the director of the Nanoscale Thermophysics and Energy Conversion Laboratory (NanoTEC) on the Rensselaer campus. His research interests include development of advanced metrology techniques for fast, accurate, and high spatial resolution characterization of thermal and thermoelectric properties, fundamental and multiscale investigations of thermal transport and energy conversion particularly in solid-state and development of innovative materials, devices, and systems with applications ranging from sustainable buildings to medical devices. He received the NSF CAREER award, School of Engineering Outstanding Team award, is a member of the ASME's K8 committee on Fundamentals of Heat Transfer, and a member of the ASME's K-9 committee on Nanoscale Thermal Transport. He organized and chaired multiple symposia and sessions on nanoscale thermal transport and energy conversion with ASME, MRS, and CIMTEC International Conferences.

**Angelo Gaitas**
*Icahn School of Medicine*
*Mount Sinai, New York, NY*

**BIOGRAPHY:** Dr. Angelo Gaitas is an Assistant Professor at the Icahn School of Medicine at Mt Sinai (ISMMS), where he is currently focused on developing AFM based single cell analysis methods. One of these includes a MEMS thermocouple cantilever with funding from the National Science Foundation (NSF). This innovative device will allow for the direct measurement of temperature variations at the nanoscale, enabling a deeper understanding of the role temperature gradients play in cellular function.

Dr. Gaitas has extensive training in micro- and nano-engineering, physics, and project management in biomedical engineering. He is the leader of a research group that specializes in the development of new devices for single-cell measurements. His educational background includes a Bachelor's degree in Physics and Mathematics, a Master's in Mesoscopic Physics/Nanotechnology, an MBA, and a Ph.D. in Microsystems from Delft.

Prior to joining ISMMS, Dr. Gaitas worked as a Research Associate in Microsystems at the University of Michigan and founded a small business focused on the commercialization of MEMS devices including SThM devices for AFM applications. He has served as a Principal Investigator on several small business research grants from the NSF and NIH, totaling more than $4.5 million. These grants supported the development of thermal microdevices and other MEMS devices with applications in semiconductors, material characterization, and biomedical research.

Dr. Gaitas has invented and developed novel sensors and actuators for temperature and mechanical measurement and microfluidics, including scanning thermal probes for AFM measurements. His scanning thermal probe sensors were successfully commercialized and used in various research and commercial settings. Dr. Gaitas has published 34 peer-reviewed journal papers, many of which focus on SThM, and holds eight issued patents.

## K8 WORKSHOP: USE OF MACHINE LEARNING TOOLS FOR THERMOPHYSICS AND HEAT TRANSFER RESEARCH AND ENERGY TECHNOLOGY DEVELOPMENT

**TUESDAY, JULY 11 • 1:45PM–3:15PM**
**HAMILTON A, SECOND FLOOR**

**Organizaing Committee: K8 Theory and Fundamental Research**

**ABSTRACT:** This workshop will begin with a presentation that will aim to summarize the features and uses of data science-based machine learning tools that may be relevant to researchers with interests in heat transfer, thermophysics and/or energy technology development. Principles behind genetic algorithms and neural network models will be discussed together with the features of thermophysics, heat transfer and associated energy technologies that can dictate the types of data science tools that are most useful. Pathways to access open-source python machine learning computational tools will be described with recommendations on how to get started. Typical Computer program algorithm structures will be described.

The presentation will aim to provide information that an investigator can use to initiate research use of machine learning tools, with the target audience being young ME faculty or researchers who want to grow their knowledge of machine learning tools, or more senior faculty who may want to provide a path to train post doc or grad student researchers. Several aspects of using machine learning tools will be described including:

- Physics based models and data science models of system behavior—Can they be complementary perspectives?
- Strategies to achieve a synergistic combination of physics-based modeling and machine learning tools that yield more than the sum of the parts
- Use of machine learning tools for energy component/system design optimization
- Machine-learning-based energy system adaptive control

**Use of Machine Learning Tools to Make Strategic Choices in Research Experiments or Device Performance Tests**

Strategies for incorporating machine learning data science into engineering education will also be discussed and a new graduate course entitled, Machine Learning Tools for Modeling Energy Transport and Conversion Processes, that is being taught in Mechanical Engineering at UC Berkeley, will be described. The structure and topic coverage will be explained and student class project examples using machine learning tools for design optimization and adaptive control of energy systems will be presented. The final segment of this workshop will be dedicated to questions and discussion.

Professor Carey is widely recognized for his research on near-interface micro/nanoscale thermophysics and transport in liquid-vapor systems, and computational modeling and simulation of energy conversion and transport processes. His research has frequently included modeling at multiple scales, ranging from the molecular level (molecular dynamics simulation of thermophysics) to the device and system level (multidevice system models). His research is also exploring the use of machine learning strategies to enhance performance of energy conversion and transport in applications and create energy technologies that can autonomously adapt to maximize their performance and reduce their environmental impact.

**Presenter, Discussion Lead:**

**Van P. Carey**
*University of California at Berkeley*
*Berkeley, CA*

**BIOGRAPHY:** Since joining the Berkeley faculty in 1982, Professor Van P. Carey's research has spanned a variety of applications areas, including high performance solar thermal power systems, building and vehicle air conditioning, smelting, and casting of aluminum, phase change thermal energy storage, heat pipes for aerospace applications, high heat flux cooling of electronics, data center thermal management, and energy efficiency of digital information systems. His research has also contributed to developing advanced heat rejection technologies for electronics cooling, building AC systems, and power plants, and developed performance models for Tesla turbine expanders for green energy conversion technologies and thermionic power generation technologies for space applications.

Carey's current research emphasizes development of strategies to use machine learning tools to better understand and model flame spread processes in electronic systems and the physics of boiling heat transfer at surfaces covered with hydrophilic nanostructured coatings. This includes exploring innovative ways to combine advanced instrumentation data and machine learning image analysis to understand the physics of boiling processes. He is also using machine learning tools to enhance performance modeling of energy conversion devices, and developing machine-learning-based adaptive energy conversion systems that can autonomously adjust their operation to simultaneously maximize energy efficiency and meet operating requirements for the application of interest.

Carey is a Fellow of the American Society of Mechanical Engineers (ASME) and the American Association for the Advancement of Science, and he has also served as the Chair of the Heat Transfer Division of ASME. Carey received the James Harry Potter Gold Medal in 2004 for his eminent achievement in thermodynamics, and the Heat Transfer Memorial Award in the Science category (2007) from the ASME. Carey is also a three-time recipient of the Hewlett Packard Research Innovation Award for his research on electronics thermal management and energy efficiency (2008, 2009, and 2010), and he received the 2014 Thermophysics Award from the American Institute of Aeronautics and Astronautics.

## K8 INDUSTRY PANEL: FUNDAMENTALS ON THERMAL MANAGEMENT OF ELECTRONICS

**TUESDAY, JULY 11 • 3:45PM–5:15PM**
**MOUNT VERNON A, SECOND FLOOR**

**Organizaing Committee: K8 Theory and Fundamental Research**

**Panel Moderators:**
**Amitabh Narain**, *Michigan Technological University*
**An Zou**, *Advanced Cooling Technologies, Inc.*

**Panelists:**
**Richard Bonner,** *Chief Technology Officer, Accelsius, Austin, TX*
**Nahson Eadelson**, *Zutacor Corporation, Chief Technology Officer and Co-founder*
**Sukhvinder Kang**, *Aavid, Thermal Division of Boyd Corporation, Chief Technology Officer*
**Jeff Zahnd**, *APC International, Inc., Vice President of Engineering*
**Reza Shaeri**, *Advanced Cooling Technologies, Inc., R&D Engineer III*
**Gilbert Moreno**, *National Renewable Energy Laboratory (NREL), Senior Research Engineer (Power Electronics Thermal Management)*
**Navid Gougol**, *Yektasonics, Inc., CEO, and Founder*

The primary goal of this interactive panel is to create a vibrant platform for exchanging ideas and insights on cutting-edge advancements and pressing challenges in the field of electronics cooling and thermal management. To kick off the panel, each panelist will deliver a brief presentation that delves into the current and emerging hurdles the electronics industry faces. These presentations will highlight the existing knowledge gaps that impede the development of efficient solutions to address these rapidly evolving demands.

scanning thermal probes for AFM measurements. His scanning thermal probe sensors were successfully commercialized and used in various research and commercial settings. Dr. Gaitas has published 34 peer-reviewed journal papers, many of which focus on SThM, and holds eight issued patents.

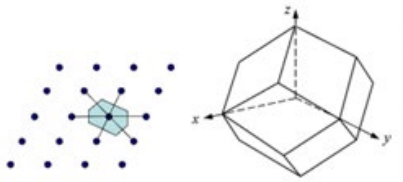
## K9 PANEL: NANOSCALE HEAT TRANSFER EDUCATION

**TUESDAY, JULY 11 • 11:00AM–12:30AM**
**MOUNT VERNON B**

**Organizaing Committee: K9 Nanoscale Thermal Transport**

**Co-Moderators:**
**Zhuomin Zhang**, *Georgia Institute of Technology*
**Patrick Hopkins,** *University of Virginia*

**Panelists/Topics:**
**Timothy Fisher**, *University of California – Los Angeles, Modern, Interactive Programming Tools for Enhanced Learning and Assessment*
**Xiulin Ruan**, *Purdue University, Onsite and Online Delivery of Nanoscale Thermal Transport Curriculum*
**Jun Liu**, *North Carolina State University, Project-based Learning of Molecular-level Theory and Modeling Techniques*
**Patrick Hopkins**, *University of Virginia, Hands-on Experimental-based Module for Nanoscale Thermal Conductivity Measurements*
**Zhuomin Zhang**, *Georgia Institute of Technology, Textbooks and Monographs in Nanoscale Thermal Transport*



**Synopsis:** Nano/microscale heat transfer emerged as an active research field around late 1980s, pioneered by late Professor Chang-Lin Tien along with his mentees and promoted by many distinguished leaders in the heat transfer community. Significant progress has been made in both research and engineering education in this field over the past 30 years. This panel focuses on the educational aspects of nanoscale heat transfer at both the graduate and undergraduate levels, such as the development of textbooks, teaching tools, mentorship, and teaching methods. Panelists will share their experiences and the audience will participate in the discussion or ask questions.

## SHTC/ES: FUNDING OPPORTUNITY PANEL

**TUESDAY, JULY 11 • 1:45PM–3:15PM**
**MOUNT VERNON B**

**Speakers:**

**Sumanta Acharya**, *National Science Foundation*
**Mark Spector**, *Office of Naval Research*
**Laurent Pilon**, *ARPA-E*
**Peter DeBock**, *ARPA-E*

SHTC 2023 features several activities dedicated to students, including a hackathon and career panel.

## STUDENT HACKATHON MEET AND GREET/ COFFEE BREAK

**Dolley Madison Ballroom**
**Monday, July 10**
**10:30AM–11:00AM**

## STUDENT HACKATHON

**SHTC/ES Presentations**
**Tuesday, July 11**
**5:30PM–7:00PM**
**Hamilton A**

**Description:** Student teams from across institutions are given two days to develop and present their design to a problem of global significance.

Students will receive an initial email to detail the project itself, what they are expected to do and final deliverables.

- Hackathon Meet and Greet: Monday from 10:30AM to 11:00AM (during AM coffee break) – Dolley Madison Foyer
- Hackathon Final: Tuesday from 5:30PM to 7:00PM – Hamilton A

Cost: Complimentary

## STUDENT CAREER PANEL

**Monday, July 10**
**6:00PM–7:00PM**
**Potomac C**

Description: Members of industry, academia and national labs will discuss their careers, how they selected the path they have taken and answer questions from the audience about work/life balance in each respective field, etc.

**Panelists:**

**Ravi Annapragada**
*Carrier Corporation*

**Leslie Phinney**
*Sandia National Laboratories*

**Rydge Mulford**
*Student Activities Chair*

## MONDAY, JULY 10, 2023

### MAX JAKOB MEMORIAL AWARD
**8:00AM–9:00AM** **DOLLEY MADISON BALLROOM**

Chair: **Sandra Boetcher** - *Embry Riddle Aeronautical University*
Co-Chair: **Subramanyaravi Annapragada** - *Carrier Corporation*

**Invited: An Abstract for the Max Jacob Memorial Lecture on the Application of Phase Change Materials for the Thermal Control of Hypersonic Vehicles**

**Technical Presentation Only:** SHTC2023-119139

**G.P. Bud Peterson** - *Georgia Institute of Technology*

### K8-01 - FUNDAMENTALS OF BOILING/CONDENSATION INCLUDING MICRO/NANO-SCALE EFFECTS (INCLUDES MOLECULAR LEVEL SIMULATION OF PHASE CHANGE) I
**9:00AM–10:30AM** **HAMILTON B**

Chair: **Navdeep Singh Dhillon** - *California State University, Long Beach*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **An Zou** - *Advanced Cooling Technologies*

**Invited: Flow-Physics and Summarized Results for a Combined Active (Piezos) and Passive (Microstructuring) Enhancement of Micro-Nucleation Rates in a Flow-Boiling Approach for Stable High Heat-Flux Cooling**

**Technical Presentation Only:** SHTC2023-107032

**Amitabh Narain** - *Michigan Technological University,* **Divya Pandya** - *Michigan Technological University,* **Vibhu Vivek** - *Vivek Technologies LLC,* **Jeff Zahnd** - *APC International, Ltd.,* **Soroush Sepahyar** - *Michigan Technological University,* **Chaitanya Jaolekar** - *Michigan Technological University*

**Rethinking Theories of Thermodynamic Optimization**

**Technical Presentation Only:** SHTC2023-116737

**Yaodong Tu** - *Massachusetts Institute of Technology,* **Gang Chen** - *Massachusetts Institute of Technology*

**Aluminum Surfaces for Jumping Droplet Thermal Diodes**

**Technical Presentation Only:** SHTC2023-112897

**Trevor Shimokusu** - *Rice University,* **Alia Nathani** - *Rice University,* **Zhen Liu** - *Rice University,* **Te Faye Yap** - *Rice University,* **Daniel Preston** - *Rice University,* **Geoff Wehmeyer** - *Rice University*

### K20-01 - APPLICATIONS OF COMPUTATIONAL HEAT TRANSFER I
**9:00AM–10:30AM** **ADAMS B**

Chair: **Hamidreza Najafi** - *Florida Institute of Technology*
Co-chair: **Shima Hajimirza** - *Stevens Institute of Technology*

**Understanding Saline Water Droplet-Membrane Surface Interaction Using Molecular Dynamics Simulations**

**Technical Paper Publication:** SHTC2023-106871

**Khadije El Kadi** - *Khalifa University of Science and Technology,* **Mohamed Ali** - *Khalifa University of Science and Technology,* **Md Didarul Islam** - *Khalifa University of Science and Technology,* **Isam Janajreh** - *Khalifa University of Science and Technology*

**Modeling Gas Permeation in Membrane Modules to Optimize Counter Currency**

**Technical Presentation Only:** SHTC2023-111031

**Vimal Ramanuj** - *Oak Ridge National Laboratory,* **Ramanan Sankaran** - *Oak Ridge National Laboratory,* **Zamidi Ahmad** - *Generon IGS,* **Fred Coan** - *Generon IGS*

**Analysis of Solar Radiation Effects on Skin Temperature of Driver Inside a Vehicle**

**Technical Presentation Only:** SHTC2023-115109

**Mohammad Fakhrulrezza** - *Kookmin University,* **Woo Geun Kim** - *Korea Automotive Technology Institute,* **Chung-Won Cho** - *Korea Automotive Technology Institute,* **Hyunjin Lee** - *Kookmin University*

**Development of Cost Functions and Multi-Objective Evolutionary Optimization Tools for Supercritical CO2 Power Cycles in Applications Limited by Finite Thermal Reservoirs**

**Technical Presentation Only:** SHTC2023-116517

**Andrew Schrader** - *University of Dayton,* **Christopher Hyland** - *University of Dayton,* **Robert Lowe** - *University of Dayton*

## K9-01 - THERMAL TRANSPORT IN NANOMATERIALS/ACROSS INTERFACES 1

**9:00AM–10:30AM** **HAMILTON A**

Chair: **Jun Liu** - *North Carolina State University*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Geoff Wehmeyer** - *Rice University*

**Invited: High Thermal Conductivity and Ultra-Low-K Dielectric Constants in Two-Dimensional Polymers**

**Technical Presentation Only:** SHTC2023-108208

**Ashutosh Giri** - *University of Rhode Island*

**Thermal Conductivity of Aluminum Scandium Nitride Grown by Molecular Beam Epitaxy**

**Technical Presentation Only:** SHTC2023-111652

**Gustavo Alvarez** - *Cornell University,* **Joseph Casamento** - *Cornell University,* **Len Van** *Deurzen - Cornell University,* **Kamruzzaman Khan** - *University of Michigan,* **Eugene Jeong** - *Cornell University,* **Elaheh Ahmadi** - *University of Michigan,* **Huili Grace Xing** - *Cornell University*, **Debdeep Jena** - *Cornell University,* **Zhiting Tian** - *Cornell University*

**Phonon Scattering and Vibrational Localization in Embedded Nanoparticle Composites**

**Technical Presentation Only:** SHTC2023-106801

**Ongira Chowdhury** - *University of Delaware,* **Joseph Feser** - *University of Delaware*

**An Anisotropic Model for the Umklapp Phonon-Phonon Scattering and Its Constraint From Onsager Reciprocity**

**Technical Presentation Only:** SHTC2023-107287

**Bo Jiang** - *Southeast University*, **Zhen Chen** -*Southeast University*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-01: THERMAL RADIATION IN ENERGY SYSTEMS

**9:00AM–10:30AM - MONTPELIER A**

Chair: **Xiulin Ruan** - *Purdue*
Co-Chair: **Laurent Pilon** - *University of California, Los Angeles*

**Invited: Coupled Thermal Radiation Processes in Solar-Thermal Synthesis of High-Yield Flake Graphite and Hydrogen via Methane Decomposition**

**Technical Presentation Only:** SHTC2023-106085

**Timothy S. Fisher** - *University of California, Los Angeles*

**Accelerated Prediction of Photon Transport in Nanoparticle Media Using Machine Learning Trained With Monte Carlo Simulations**

**Technical Presentation Only:** SHTC2023-113603

**Daniel Carne** - *Purdue University,* **Joseph Peoples** - *Purdue University,* **Dudong Feng** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

**Effect of Gas Bubbles on Light Transfer During Photoelectrochemical Water Splitting**

**Technical Presentation Only:** SHTC2023-117232

**Laurent Pilon** - *University of California, Los Angeles,* **Abhinav Bhanawat** - *University of California, Los Angeles*

**Hybrid Nongray Radiative Transfer Equation Solver Using Full Spectrum Correlated K-Distribution (FSCK) Method for Combustion Gases**

**Technical Paper Publication:** SHTC2023-106792

**Nehal Jajal** - *The Ohio State University,* **Sandip Mazumder** - *The Ohio State University*

**Passive House in the Himalayas**

**Technical Presentation Only:** SHTC-2023-108298

**Tae-Ho Song**, *Korea Advanced Institute of Science & Technology*

## K6-01 - HEAT TRANSFER IN ENERGY SYSTEMS - SOLAR

**9:00AM–10:30AM** **CONSTITUTION B**

Chair: **Myeongsub "Mike "Kim** – *Florida Atlantic University*
Co-Chair: **Dong Liu** - *University of Houston*
Co-Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Rydge Mulford** - *University of Dayton*

### Heat Transport Study of Ternary Hybrid Nanofluid Flow Under Magnetic Dipole Together With Nonlinear Thermal Radiation

**Technical Presentation Only:** SHTC2023-110056

**Saleem Nasir** - *Khalifa University of Science and Technology,* **Taza Gul** - *City University of Science and Information Technology,* **Abdallah Berrouk** - *Khalifa University of Science and Technology*

### Thermal Analysis of Solar Photovoltaic Panel With and Without Heat Sink Using a Thermal Resistance-Capacitance Network Model

**Technical Presentation Only:** SHTC2023-111241

**Sayuj Sasidharan** - *Trinity College Dublin,* **Erik Soderholm** - *Trinity College Dublin,* **David McCloskey** - *Trinity College Dublin*

### Annual Energy Estimate for Planar Luminescent Solar Concentrator Utilizing Asymmetric Light Transmitting Nanostructures

**Technical Presentation Only:** SHTC2023-116637

**Hannah Arnow** - *Rensselaer Polytechnic Institute,* **Vincent Oliveto** - *Rensselaer Polytechnic Institute,* **Duncan Smith** - *Rensselaer Polytechnic Institute,* **Michael Hughes** - *Rensselaer Polytechnic Institute,* **Diana Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

### A Comprehensive Analysis of Radiative Cooling Paints as a Deterrent Against Climate Change

**Technical Presentation Only:** SHTC2023-114829

**Emily Barber** - *Purdue University,* **Navdeep Vansal** - *Purdue University,* **Ziqi Fang** - *Purdue University,* **Yu-Wei Hung** - *Purdue University,* **Joseph Peoples** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

### Efficient, Hydrophobic, and Weather-Resistant Radiative Cooling Paints Based on Mp-101 Binder

**Technical Presentation Only:** 23-114820

**Emily Barber** - *Purdue University,* **Wonjune Lee** - *Purdue University,* **Ziqi Fang** - *Purdue University,* **Dudong Feng** - *Purdue University,* **Orlando Rivera** - *Purdue University,* **Navdeep Vansal** - *Purdue University,* **Jianguo Mei** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

## K7 - THERMOPHYSICAL AND RADIATIVE PROPERTIES OF MATERIALS

**9:00AM–10:30AM** **MONTPELIER B**

Chair: **Xinwei Wang** - *Iowa State University*

### Oil-Paper-Umbrella-Inspired Passive Radiative Cooling Using Recycled Packaging Foam

**Technical Presentation Only:** SHTC2023-115151

**Yang Liu** - *Northeastern University,* **Yi Zheng** - *Northeastern University,* **Fangqi Chen** - *Northeastern University*

### Retrieval of Infrared Optical Constants of a Thin Film From Thermal Emittance

**Technical Presentation Only:** SHTC2023-106983

**Yu-Bin Chen** - *National Tsing Hua University*

### IR Spot Heater: Thermal Conductivity Estimation of Sub-Millimeter Thick Porous Materials

**Technical Presentation Only:** SHTC2023-116638

**Yashraj Gurumukhi** - *University of Illinois at Urbana-Champaign,* **Ho Chan Chang** - *University of Illinois at Urbana-Champaign,* **Md. Jahidul Hoque** - *University of Illinois at Urbana-Champaign,* **Jingcheng Ma** - *University of Illinois at Urbana-Champaign,* **Nathan Fritz** - *University of Illinois at Urbana-Champaign,* **Zhuoyuan Zheng** - *University of Illinois at Urbana-Champaign,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign,* **Paul Braun** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**Development of Polytetrafluoroethylene - Boron Nitride Composite Processing Methods for Enhanced Thermal Conductivity**

**Technical Presentation Only:** SHTC2023-116324

**Liam Alexis** - *Cornell University,* **Jaejun Lee** - *Cornell University,* **Gustavo Alvarez** - *Cornell University,* **Samer Awale** - *Cornell University,* **Md Milon Hossain** - *Cornell University,* **Diana Santiago De Jesus** - *NASA Glenn Research Center,* **Zhting Tian** - *Cornell University*

**Natural Fiber Reinforced Composite Materials for Insulation Applications**

**Technical Presentation Only:** SHTC2023-116958

**Birce Dikici** - *Embry-Riddle Aeronautical University*

## K13-01 - ENHANCED CONDENSATION AND ANTI-FOULING STUDIES

**9:00AM–10:30AM** **CONSTITUTION A**

Chair: **Dion S. Antao** - *Texas A&M University*
Co-Chair: **Vinod Srinivasan** - *University of Minnesota*
Co-Chair: **Chanwoo Park** - *University of Missouri*

**Data-Driven Modelling of Droplet Dynamics on Tubes During Atmospheric Water Vapor and Pure Steam Condensation**

**Technical Presentation Only:** SHTC2023-105687

**Siavash Khodakarami** - *University of Illinois at Urbana-Champaign,* **Pouya Kabirzadeh** - *University of Illinois at Urban-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**Experimental Studies on Droplet Nucleation, Growth, Dynamics, and Thermal Signatures During Dropwise Condensation on Lubricant-Infused Surfaces**

**Technical Presentation Only:** SHTC2023-110731

**Jianxing Sun** - *Washington University in St Louis,* **Patricia Weisensee** - *Washington University in St. Louis*

**Pure Water Dehumidifier Based on 3D Printed TPMS Architecture Compact Condenser**

**Technical Presentation Only:** SHTC2023-111671

**Omar Abdelqader** - *Khalifa University of Science and Technology,* **Mohamed Ali** - *Khalifa University of Science and Technology,* **Rashid Abu Al-Rub** - *Khalifa University of Science and Technology*

**Surface With Wettability Gradient: A Novel Approach for Fouling Control**

**Technical Presentation Only:** SHTC2023-114836

**Mohammad Arafat Zaman** - *University of Illinois at Urbana-Champaign,* **Hongqing Jin** - *Honeywell,* **Tanvir Islam Joy** - *University of Illinois at Urbana-Champaign, Sophie Wang - University of Illinois at Urbana-Champaign,* **Kashif Nawaz** - *Oak Ridge National Laboratory*

**Prediction of Heat Transfer During Condensation of Superheated Vapor Flowing Inside Channels**

**Technical Presentation Only:** SHTC2023-115064

**Mirza Mohammed Shah** - *Engineering Research Associates*

## K16-01 - HEAT TRANSFER IN ELECTRONIC EQUIPMENT I

**11:00AM–12:30PM** **MONTPELIER B**

Chair: **Amanie Abdelmessih** - *California Baptist University*
Co-Chair: **Chirag Kharangate** - *Case Western Reserve Univerisity*
Co-Chair: **Tiwei Wei** - *Purdue University*

**Heat Transfer of Supercritical CO2 Near the Critical Condition Inside a Microchannel**

**Technical Paper Publication:** SHTC2023-105751

**Pranzal Ahmed** - *University of Central Florida,* **Anatoly Parahovnik** - *University of Central Florida,* **Yoav Peles** - *University of Central Florida*

**Experimental Investigation of Orientation Effects on Pseudocritical Transition Dynamics in Heated Microchannel With Side-View Schlieren Imaging**

**Technical Paper Publication:** SHTC2023-107272

**Trevor Whitaker** - *The University of Utah,* **Sameer Rao** - *The University of Utah*

**Investigation of the Entropy Generation and Exergy Destruction Rates for a Novel Micro-Jet Heat Sink Working With a Nanofluid for Efficient Cooling of Motor Inverters in Electric Vehicles**

**Technical Paper Publication:** SHTC2023-106968

**Nima Mazaheri** - *University of Calgary,* **Aggrey Mwesigye** - *University of Calgary*

**The Effect of Bending on Sintered Wicked Heat Pipes for Multiple Component Cooling**

**Technical Paper Publication:** SHTC2023-108110

**Eoin Guinan** - *University of Limerick,* **Vanessa Egan** - *University of Limerick,* **Joseph Mooney** - *University of Limerick,* **Jeff Punch** - *University of Limerick*

**Irreversibility's in Thermal Energy Storage**

**Technical Presentation Only:** SHTC2023-116936

**Michael Fish** - *U.S. Army Research Laboratory,* **Rachel Mcafee** - *U.S. Army Research Laboratory,* **Adam Wilson** - *U.S. Army Research Laboratory,* **Mustafa Ozsipahi -** *The National Academies of Sciences, Engineering, and Medicine*

## K20-02 - APPLICATIONS OF COMPUTATIONAL HEAT TRANSFER II

**11:00AM–12:30PM** **ADAMS B**

Chair: **Nehal Jajal** - *Ohio State University*
Co-chair: **Mohamed Abdelhady** - *University of Calgary*

**Hydrogen-Fueled Regenerative Burners in a Reheating Furnace**

**Technical Paper Publication:** SHTC2023-106395

**Anurag Karambelkar** - *Purdue University Northwest,* **Chukwunedum Uzor** - *Purdue University Northwest,* **Nicholas Walla** - *Purdue University Northwest, Armin Silaen - Purdue University Northwest,* **Kurt Johnson** - *Cleveland-Cliffs,* **Chenn Zhou** - *Purdue University Northwest*

**The Effect of a Pulsed Flow Inlet on Vacuum Membrane Distillation Performance**

**Technical Paper Publication:** SHTC2023-107337

**Justin Caspar** - *Lehigh University,* **Guanyang Xue** - *Lehigh University,* **Alparslan Oztekin** - *Lehigh University*

**The Effect of Inlet and Outlet Configuration on the Performance of Hollow Fiber Direct Contact Membrane Distillation**

**Technical Paper Publication:** SHTC2023-107349

**Jaber M. Asiri** - *Lehigh University,* **Justin Caspar** - *Lehigh University,* **Guanyang Xue** - *Lehigh University,* **Alparslan Oztekin** - *Lehigh University*

**A Numerical Study of Refrigerant Leakage From a Propane-Based Refrigeration System**

**Technical Paper Publication:** SHTC2023-107381

**Mingkan Zhang** - *Oak Ridge National Laboratory,* **Vishaldeep Sharma** - *Oak Ridge National Labotatory,* **Brian Fricke** - *Oak Ridge National Laboratory*

## K8-02 - FUNDAMENTALS OF BOILING/CONDENSATION INCLUDING MICRO/NANO-SCALE EFFECTS (INCLUDES MOLECULAR LEVEL SIMULATION OF PHASE CHANGE) II

**11:00AM–12:30PM** **HAMILTON B**

Chair: **An Zou** - *Advanced Cooling Technologies*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **Navdeep Singh Dhillon** - *California State University, Long Beach*

**Use of a Genetic Algorithm to Model the Interaction of Conduction and Nucleate Boiling Mechanisms During Evaporation of Water Droplets on Superheated ZnO Nanostructured Surfaces**

**Technical Paper Publication:** SHTC2023-107422

**Anisa Silva** - *University of California at Berkeley,* **Van Carey** - *University of California at Berkeley*

**Process and Flow-Control Results for a Combined Active (Piezos) and Passive (Microstructuring) Enhancement of Micro-Nucleation Rates in a Flow-Boiling Approach for Stable High Heat-Flux Cooling**

**Technical Presentation Only:** SHTC2023-106766

**Divya Pandya** - *Michigan Technological University,* **Amitabh Narain** - *Michigan Technological University,* **Noah Agata** - *Michigan Technological University,* **Jeff Zahnd** - *APC International Ltd.,* **Soroush Sepahyar** - *Michigan Technological University,* **Chaitanya Jaolekar** - *Michigan Technological University*

**Resolving Discrepancy in Accommodation Coefficients: Rethinking Local Equilibrium Constructs in Evaporation Modeling**

**Technical Presentation Only:** SHTC2023-107376

**Kishan Bellur** - *University of Cincinnati,* **Ezequiel Medici** - *Michigan Technological University,* **James Hermanson** - *University of Washington,* **Chang Kyoung Choi** - *Michigan Technological University,* **Jeffrey Allen** - *Michigan Technological University*

**Approaches for Phenomenological Studies in Nucleate Boiling Using a Laser-Based Controlled Bubble Generation Technique**

**Technical Paper Publication:** SHTC2023-106648

**Navdeep Singh Dhillon** - *California State University, Long Beach,* **Dilipkumar Choudhary** - *California State University, Long Beach,* **Jayden Maree** - *California State University, Long Beach*

## K9-02 - THERMAL TRANSPORT IN NANOMATERIALS/ACROSS INTERFACES 2

**11:00AM–12:30PM** **HAMILTON A**

Chair: **Geoff Wehmeyer** - *Rice University*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Ashutosh Giri** – *University of Rhode Island*

**Invited: In-Plane Electro-Thermal Transport in Silicon Thin-Films and 2D Materials**

**Technical Presentation Only:** SHTC2023-116680

**Mona Zebarjadi** - *University of Virginia,* **Tianhui Zhu** - *University of Virginia,* **Sabbir Akhanda** - *University of Virginia,* **Sourav Das** - *University of Virginia*

**Transient Evaluation of Thermoelectric Active Cooling Using Frequency Domain Thermoreflectance**

**Technical Presentation Only:** SHTC2023-116799

**Hao-Yuan Cheng** - *Carnegie Mellon University,* **Yihan Liu** - *University of Pittsburgh,* **Feng Xiong** - *University of Pittsburgh,* **Jonathan Malen** - *Carnegie Mellon University*

**Effect of Interface Curvature at the Axial Junction in Silicon-Germanium (Si-Ge) Nanowires**

**Technical Presentation Only:** SHTC2023-115250

**Oreoluwa Adesina** - *University of Wyoming, Laura De Sousa Oliveira* - *University of Wyoming,*

**Electron-Phonon Interactions for Nanoscale Energy Transport Simulations in Semiconductor Devices**

**Technical Paper Publication:** SHTC2023-106873

**Michael Medlar** - *Rochester Institute of Technology,* **Edward Hensel** - *Rochester Institute of Technology*

## K6-02 - HEAT TRANSFER IN ENERGY SYSTEMS - ENERGY STORAGE

**11:00AM–12:30PM** **CONSTITUTION B**

Chair: **Rydge Mulford** - *University of Dayton*
Co-Chair: **Dong Liu** - *University of Houston*
Co-Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Leitao Chen** – *Tennessee State University*

**Thermophoresis in Nanoparticle Loaded Phase Change Material**

**Technical Presentation Only:** SHTC2023-108682

**Udit Sharma** - *Michigan Technological University,* **Jeffrey Allen** - *Michigan Technological University*

**CFD Modelling of the Non-Isobaric Evaporation of Cryogenic Liquids in Storage Tanks**

**Technical Presentation Only:** SHTC2023-110247

**Felipe Huerta Pérez** - *Pontificia Universidad Católica de Chile,* **Velisa Vesovic** - *Earth Science and Engineering Department at Imperial College London*

**Experimental Study of Enhanced Heat Transfer in Phase Change Material Based Thermal Energy Storage in Compact Heat Exchangers**

**Technical Paper Publication:** SHTC2023-107111

**Sarath Kannan** - *University of Cincinnati,* **Milind Jog** - *University of Cincinnati,* **Raj Manglik** - *University of Cincinnati*

**Composite Phase Change Material With Metal Foam in Shell and Convergent Tube Thermal Energy Storage Systems**

**Technical Paper Publication:** SHTC2023-107330

**Bernardo Buonomo** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Maria Rita Golia** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Oronzio Manca** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Sergio Nardini** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Renato Elpidio Plomitallo** - *Università degli Studi della Campania "Luigi Vanvitelli"*

**An Experimental and Numerical Study of Heat and Mass of SrCl2-Based Thermochemical Materials for Thermal Energy Storage**

**Technical Presentation Only:** SHTC2023-115237

**Yi Zeng** - *National Renewable Energy Laboratory,* **Ruby-Jean Clark** - *University of Auckland,* **Adewale Odukomaiya** - *National Renewable Energy Laboratory,* **Mohammed Farid** - *University of Auckland,* **Jason Woods** - *National Renewable Energy Laboratory*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-02: NANOSCALE THERMAL RADIATION

**11:00AM–12:30PM** **MONTPELIER A**

Chair: **Mehmet Pınar Mengüç** - *Ozyegin University*
Co-Chair: **Dudong Feng** - *Purdue University*

**Invited: Near-Field Radiative Heat Transfer and Applications Using Hexagonal Boron Nitride**

**Technical Presentation Only:** SHTC2023-114739

**Zhuomin Zhang** - *Georgia Institute of Technology,* **Dudong Feng** - *Purdue University*

**Invited: Interfacial Absorption and Generalized Boundary Conditions for Maxwell Equations**

**Technical Presentation Only:** SHTC2023-115006

**Gang Chen** - *Massachusetts Institute of Technology*

**A Nighttime Thermoradiative Device Boosted by Near-Field Radiation**

**Technical Presentation Only:** SHTC2023-116351

**Dudong Feng** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

**Greatly Enhanced Radiative Heat Transfer in Hyperbolic Materials**

**Technical Presentation Only:** SHTC2023-107878

**Yikang Chen** - *Purdue University,* **Hakan Salihoglu** - *Purdue University,* **Xianfan Xu** - *Purdue University*

## K13-02 - POOL BOILING FUNDAMENTALS

**11:00AM–12:30PM** **CONSTITUTION A**

Chair: **Vinod Srinivasan** - *University of Minnesota*
Co-Chair: **Chanwoo Park** - *University of Missouri*

**Modeling of Bubble Growth in a Fluctuating Pressure Field**

**Technical Presentation Only:** SHTC2023-115015

**Vikas Jukanti** - *University of Minnesota,* **Vinod Srinivasan** - *University of Minnesota*

**A Review of Two-Phase Flow Boiling Heat Transfer Coefficient and Correlations for Hydrocarbons**

**Technical Paper Publication:** SHTC2023-105709

**Mohamed Elfaham** - *University of North Dakota,* **Clement Tang** - *University of North Dakota*

**Persistent and Anti-Persistent Nature of Temperature Fluctuations in Pool Boiling**

**Technical Presentation Only:** SHTC2023-116655

**Ankit Saini** - *University of Minnesota Twin Cities,* **Vinod Srinivasan** - *University of Minnesota Twin Cities,* **Reese Peck Cowles** - *University of Minnesota Twin Cities*

**Understanding Heat Transfer Mechanisms Near Growing Bubbles During Nucleate Boiling**

**Technical Presentation Only:** SHTC2023-117408

**Myeongsub Kim** - *Florida Atlantic University*

**Experimental Study on Heat Transfer Characteristics of Carbon Dioxide Under Subcritical Pressures**

**Technical Paper Publication:** SHTC2023-107597

**Qingjiang Liu** - *Xi'an Jiaotong University,* **Xianliang Lei** - *Xi'an Jiaotong University,* **Ji'an Liu** - *Xi'an Jiaotong University*

## K20-03 - COMPUTATIONAL METHODS

**1:45PM–3:15PM** **ADAMS B**

Chair: **Aaron Wemhoff** - *Villanova University*
Co-chair: **Shima Hajimirza** - *Stevens Institute of Technology*

### A 3D Heat Transfer Model of a Glass Additive Manufacturing Process

**Technical Paper Publication:** SHTC2023-106673

**Zechariah Jibben** - *Los Alamos National Laboratory,* **Naren Raghavan** - *Boeing,* **John Bernardin** - *Los Alamos National Laboratory*

### Variable Properties via Excel: Numerical and Computational Heat Transfer Methods

**Technical Paper Publication:** SHTC2023-107153

**Amanie Abdelmessih** - *California Baptist University*

### Numerical Study on Natural Convection With Nanofluids in Vertical Channels Asymmetrically Heated

**Technical Paper Publication:** SHTC2023-107353

**Bernardo Buonomo** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Oronzio Manca** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Sergio Nardini** - *Università della Campania "Luigi Vanvitelli",* **Gianluca Sarli** - *Università degli Studi della Campania "Luigi Vanvitelli"*

### Accelerating DEM Code for Heat Transfer Simulations Using GPU: Challenges and Solutions

**Technical Presentation Only:** SHTC2023-117092

**Justin Lapp** - *University of Maine,* **Alireza Kianimoqadam** - *University of Maine*

## K8-03 FUNDAMENTALS OF SINGLE-PHASE HEAT TRANSFER AND MELTING AND SOLIDIFICATION

**1:45PM–3:15PM** **HAMILTON B**

Chair: **Navdeep Singh Dhillon** - *California State University, Long Beach*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **An Zou** - *Advanced Cooling Technologies*

### Transport in Mazes; Simple Geometric Representations to Represent Engineered and Natural Systems

**Technical Presentation Only:** SHTC2023-106927

**Joel Plawsky** - *Rensselaer Polytechnic, Alex Rishty - Rensselaeer Polytechnic Institute,* **Corey Woodcock** - *Rensselaer Polytechnic Institute,* **Shanbin Shi** - *Rensselaer Polytechnic Institute,* **Ronald Hedden** - *Rensselaer Polytechnic Institute,* **Alex Guo** - *Rensselaer Polytechnic Institute*

### Hydrophilic Reentrant Slips Enabled Flow Separation for Rapid Water Harvesting

**Technical Presentation Only:** SHTC2023-106741

**Zongqi Guo** - *The University of Texas at Dallas* , **Dylan Boylan** - *The University of Texas at Dallas,* **Li Shan** - *The University of Texas at Dallas,* **Xianming Dai** - *The University of Texas at Dallas*

### An Air Conditioning Cycle Using Lower Critical Solution Temperature Mixtures

**Technical Paper Publication:** SHTC2023-107065

**Jordan Kocher** - *Georgia Institute of Technology,* **Akanksha Menon** - *Georgia Institute of Technology,* **Shannon Yee** - *Georgia Institute of Technology*

### Porosity Effects of Melting Process for Phase Change Material (PCM) With Metal Foams

**Technical Presentation Only:** SHTC2023-107391

**Safa Sabet** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Bernardo Buonomo** - *Università degli Studi della Campania "Luigi Vanvitelli",* **Hüseyin Kaya** - *Karabük University and Università degli Studi della Campania "Luigi Vanvitelli",* **Oronzio Manca** - *Università degli Studi della Campania "Luigi Vanvitelli"*

## K9-03 - THERMAL TRANSPORT IN NANOMATERIALS/ACROSS INTERFACES 3

**1:45PM–3:15PM** **HAMILTON A**

Chair: **Yaguo Wang** - *The University of Texas at Austin*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Geoff Wehmeyer** - *Rice University*
Co-Chair: **Mona Zebarjadi** - *University of Virginia*

**Invited: Understanding Phonon Transport in Complex Crystals, Organic Systems, and Hybrid Materials**

**Technical Presentation Only:** SHTC2023-109889

**Jun Liu** - *North Carolina State University*

**Nanoscale Thermal Interface Rectification in the Quantum Regime**

**Technical Presentation Only:** SHTC2023-115308

**Jinghang Dai** - *Cornell University,* **Zhiting Tian** - *Cornell University*

## K16-02 - HEAT TRANSFER IN ELECTRONIC EQUIPMENT II

**1:45PM–3:15PM** **MONTPELIER B**

Chair: **Tiwei Wei** - *Purdue University*
Co-Chair: **Amanie Abdelmessih** - *California Baptist University*
Co-Chair: *Chirag Kharangate - Case Western Reserve University*

**Effect of Modified Fin Geometries on the Effectiveness of a Phase Change Material Heat Sink**

**Technical Paper Publication:** SHTC2023-107072

**Austin Jones** - *Southern Illinois University Edwardsville,* **Jeff Darabi** - *Southern Illinois University Edwardsville*

**Accurate Analytical Solutions for Forced Convection in a Shrouded Longitudinal-Fin Heat Sink With Tip Clearance**

**Technical Presentation Only:** SHTC2023-106803

**Toby Kirk** - *Imperial College London,* **Georgios Karamanis** - *Tufts University,* **Marc Hodes** - *Tufts University*

**Development and Evaluation of High-Performance Air-Cooled Heat Sinks With Generative Design Algorithms**

**Technical Presentation Only:** SHTC2023-106819

**Ethan Weems** - *University of Arkansas,* **Lauren Westfall** - *University of Arkansas,* **Corbin Russ** - *University of Arkansas,* **Grant Resler** - *University of Arkansas,* **Han Hu** - *University of Arkansas*

## K6-03- HEAT TRANSFER IN ENERGY SYSTEMS - WASTE HEAT

**1:45PM–3:15PM** **CONSTITUTION B**

Chair: **Myeongsub "Mike" Kim** - *Florida Atlantic University*
Co-Chair: **Dong Liu** - *University of Houston*
Co-Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Rydge Mulford** - *University of Dayton*
Co-Chair: **Leitao Chen** – *Tennessee State University*

**Simulation of Silencing Heat Exchangers for Waste Heat Recovery**

**Technical Presentation Only:** SHTC2023-111567

**Bakhtier Farouk** - *Drexel University,* **Michael Lucidi** - *Drexel University*

**Development of a Cm-Scale Passive Heat Switch**

**Technical Presentation Only:** SHTC2023-112465

**Steve Park** - *Washington University in St. Louis,* **Patricia Weisensee** - *Washington University in St. Louis*

**Development of a Liquid-Metal Based Passive Thermal Switch**

**Technical Presentation Only:** SHTC2023-114378

**Kiersten Horton** - *Washington University in St. Louis,* **Patricia Weisensee** - *Washington University in St. Louis*

**Thermochemical Heat Pipes for District Heating and Long-Distance Thermal Transport**

**Technical Presentation Only:** SHTC2023-112673

**Yanan Zhang** - *Arizona State University,* **Robert Wang** - *Arizona State University*

**Waste Heat Recovery, Sources, Techniques, and Transport Challenges in Heavy Industries: Feasibility Study Based on Temperature Grade**

**Technical Presentation Only:** SHTC2023-114882

**Mohamed Ibrahim Ali** - *Khalifa University of Science and Technology,* **Heba Iyad** - *Khalifa University of Science and Technology,* **Lourdes Vega** - *Khalifa University of Science and Technology,* **Tiejun Zhang** - *Khalifa University of Science and Technology*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-03: THERMAL RADIATION IN MANUFACTURING AND ENERGY

**1:45PM–3:15PM** **MONTPELIER A**

Chair: **Mathieu Francoeur** - *McGill University*
Co-Chair: **Xianfan Xu** - *Purdue University*

**Invited: Fundamental Studies of the Explosive Vaporization of Materials Upon Ultrafast Laser Irradiation**

**Technical Presentation Only:** SHTC2023-107068

**Costas Grigoropoulos** - *University of California, Berkeley,* **Matthew Eliceiri** - *University of California, Berkeley*

**Invited: Bio-Inspired Infrared Structures for Antireflective Coating and Thermal Encryption**

**Technical Presentation Only:** SHTC2023-115301

**Sheng Shen** - *Carnegie Mellon University*

**Modeling and Experimental Study of Femtosecond Laser Heating of Nanoparticle-Ligand System for Microscale 3D Printing**

**Technical Presentation Only:** SHTC2023-107133

**Heng Pan** - *Texas A&M University,* **Chinmoy Podder** - *Texas A&M University*

**Heat Transfer in Directly-Irradiated High-Temperature Particle–gas Flows for Solar Particle Receiver Applications**

**Technical Presentation Only:** SHTC2023-115300

**Jingjing Chen** - *The University of Hong Kong,* **Apurv Kumar** - *Federation University,* **Joe Coventry** - *The Australian National University,* **Wojciech Lipiński** - *Independent Researcher*

## K13-03 - FLOW BOILING FUNDAMENTALS

**1:45PM–3:15PM** **CONSTITUTION A**

Chair: **Chanwoo Park** - *University of Missouri*
Co-Chair: **Vinod Srinivasan** - *University of Minnesota*

**Liquid-Film Flow Rate From Measurements of Disturbance Wave Characteristics for Applications in Two-Phase Annular Flow**

**Technical Presentation Only:** SHTC2023-106818

**Jason Chan** - *University of Wisconsin – Madison,* **Roman Morse** - *University of Wisconsin – Madison,* **Arganthael Berson** - *University of Wisconsin – Madison,* **Kristofer Dressler** - *University of Wisconsin – Madison,* **Gregory Nellis** - *Solar Energy Laboratory*

**Effect of Lateral Thermal Coupling on Two-Phase Flow Stability and Maldistribution During Flow Boiling in Parallel Microchannels**

**Technical Presentation Only:** SHTC2023-114635

**Md. Emadur Rahman** - *Purdue University,* **Justin A. Weibel** - *Purdue University*

**Visualization-Aided Experimental Study of Thermal and Hydraulic Characteristics of Subcooled Flow Boiling of R-134A in a Microchannel Evaporator of a Pumped Two-Phase Loop**

**Technical Paper Publication:** SHTC2023-106730

**Rohan Kokate** - *University of Missouri,* **Chanwoo Park** - *University of Missouri*

**Modeling Flow Boiling Utilizing Machine Learning Vision Data**

**Technical Paper Publication:** SHTC2023-107534

**Cho-Ning Huang** - *Case Western Reserve University,* **Chirag Kharangate** - *Case Western Reserve University,* **Sang Hyeon Chang** - *University of California, Irvine,* **Youngjoon Suh** - *Univeristy of California, Irvine,* **Yoonjin Won** - *Univeristy of California, Irvine*

**On the Effect of Sudden Contraction of CO2 in Microchannels for Enhancing the Cooling Performance**

**Technical Paper Publication:** SHTC2023-105745

**Soroush Niazi** - *University of Central Florida,* **Anatoly Parahovnik** , **Peles** - *University of Central Florida*

## POSTER SESSION
**3:15PM–3:45PM** **POTOMAC PRE-FUNCTION**

Chair: **Rydge Mulford** - *University of Dayton*

**Engineering the Electronic and Thermal Properties of Two-Dimensional Covalent Organic Frameworks**

**Student Poster Presentation:** SHTC2023-108218

**Muhammad Akif Rahman** - *University of Rhode Island,* **Ashutosh Giri** - *University of Rhode Island*

**Tailoring the Thermal Conductivity of Two-Dimensional Metal Halide Perovskites**

**Student Poster Presentation:** SHTC2023-108227

**Sandip Thakur** - *University of Rhode Island,* **Ashutosh Giri** - *University of Rhode Island*

**Superionic Behavior and Phonon Analysis of Thoria at High Temperatures**

**Student Poster Presentation:** SHTC2023-109426

**Yuqing Huang** - *North Carolina State University,* **Jacob Eapen** - *North Carolina State University*

**Flow and Heat Transfer Characteristics of a Liquid-Liquid Plug Flow**

**Student Poster Presentation:** SHTC2023-106702

**Toshikazu Esaki** - *Aoyama Gakuin University,* **Yu Fujita** - *Aoyama Gakuin University,* **Takashi Morimoto** - *Aoyama Gakuin University,* **Hiroyuki Kumano** - *Aoyama Gakuin University*

**Coarsening Droplets Delay Frost Propagation**

**Student Poster Presentation:** SHTC2023-107035

**Jyotirmoy Sarma** - *The University of Texas at Dallas,* **Deepak Monga** - *The University of Texas at Dallas,* **Zongqi Guo** - *The University of Texas at Dallas,* **Fangying Chen** - *The University of Texas at Dallas,* **Xianming Dai** - *The University of Texas at Dallas*

**Elucidating the Role of Departure Speed in Dropwise Condensation: Beyond Contact Angle and Contact Angle Hysteresis**

**Student Poster Presentation:** SHTC2023-107098

**Deepak Monga** - *The University of Texas at Dallas,* **Dylan Boylan** - *The University of Texas at Dallas,* **Jyotirmoy Sarma** - *The University of Texas at Dallas,* **Zongqi Guo** - *The University of Texas at Dallas,* **Xianming Dai** - *The University of Texas at Dallas*

**System, Hardware, and Measurements Describing Piezos, Drivers, and Mesh Structures Used for a Combined Active (Piezos) and Passive (Microstructuring) Enhancement of Micro-Nucleation Rates in a Flow-Boiling Approach for Stable High Heat-Flux Cooling**

**Student Poster Presentation:** SHTC2023-107165

**Chaitanya Jaolekar** - *Michigan Technological University,* **Divya Pandya** - *Michigan Technological University,* **Amitabh Narain** - *Michigan Technological University,* **Rachel Store** - *Michigan Technological University,* **Jeff Zahnd** - *APC International Ltd.,* **Soroush Sepahyar** - *Michigan Technological University*

## K20-04 - MACHINE LEARNING AND MODELING FOR HEAT TRANSFER PROBLEMS
**3:45PM–5:15PM** **ADAMS B**

Chair: **Hamidreza Najafi** - *Florida Institute of Technology*
Co-chair: **John Tencer** - *Sandia National Laboratories*

**Tailoring Thermal Radiative Properties in Porous Media Using Supervised Physics-Informed Data-Driven Modeling**

**Technical Presentation Only:** SHTC2023-112322

**Farhin Tabassum** - *Stevens Institute of Technology,* **Shima Hajimirza** - *Stevens Institute of Technology*

**Selecting Bases for Reduced Order Spectral Representations of Transient Temperature Profiles**

**Technical Presentation Only:** SHTC2023-113758

**Jakob Bates** - *Brigham Young University,* **Matthew R. Jones** - *Brigham Young University,* **Christopher R. Dillon** - *Brigham Young University,* **John Tencer** - *Sandia National Laboratories*

**Modeling the Influences of Particle Size Distributions and Temperature-Dependent Thermophysical Properties for Granular Flows**

**Technical Presentation Only:** SHTC2023-114930

**Bingjia Li** - *University of Michigan,* **Zijie Chen** - *University of Michigan,* **Sisir Sanagala** - *University of Michigan,* **Rohini Bala Chandran** - *University of Michigan*

**Modeling to Predict Optical Properties From Reflectance Measurements in Particulate Media**

**Technical Presentation Only:** SHTC2023-114950

**Zijie Chen** - *University of Michigan-Ann Arbor,* **Bingjia Li** - *University of Michigan-Ann Arbor,* **Mike Mayer** - *University of Michigan-Ann Arbor,* **Rohini Bala Chandran** - *University of Michigan-Ann Arbor*

## K8-04 - FUNDAMENTALS OF CONDUCTION HEAT TRANSFER

**3:45PM–5:15PM** **HAMILTON B**

Chair: **Joe Feser** - *University of Delaware*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **Thedorian Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

**Significant Phonon Drag Effect in Wide Bandgap GaN and AlN**

**Technical Presentation Only:** SHTC2023-115246

**Yujie Quan** - *University of California, Santa Barbara,* **Yubi Chen** - *University of California, Santa Barbara,* **Bolin Liao** - *University of California, Santa Barbara*

**A Steady-State Laser Heating Technique to Measure the Thermal Conductivity of Ceramics at Ultrahigh Temperatures and in Their Molten State**

**Technical Presentation Only:** SHTC2023-107604

**Patrick Hopkins** - *University of Virginia*

**Thermal Conductivity Extraction From Frequency Domain Thermo-Reflectance Experiments Using the Phonon Boltzmann Transport Equation**

**Technical Paper Publication:** SHTC2023-106992

**Siddharth Saurav** - *The Ohio State University,* **Sandip Mazumder** - *The Ohio State University*

**Lattice Dynamics and Thermal Transport in Semiconductors With Antibonding Valence Bands**

**Technical Presentation Only:** SHTC2023-115263

**Jiaoyue Yuan** - *University of California, Santa Barbara,* **Bolin Liao** - *University of California, Santa Barbara,* **Yubi Chen** - *University of California, Santa Barbara*

**Hot Zone-Center Optical Phonons in Laser-Irradiated Molybdenum Disulfide Predicted by a Semiconductor Multitemperature Model**

**Technical Presentation Only:** SHTC2023-115289

**Zherui Han** - *Purdue University, Peter Sokalski - The University of Texas at Austin,* **Li Shi** - *The University of Texas at Austin,* **Xiulin Ruan** - *Purdue University*

## K9-04 - TUNABLE THERMAL TRANSPORT

**3:45PM–5:15PM** **HAMILTON A**

Chair: **Xiaojia Wang** - *University of Minnesota*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Tengfei Luo** - *University of Notre Dame*
Co-Chair: **Edward Kinzel** - *University of Notre Dame*

**Invited: Thermal Behavior Transition of Graphite Under High Pressure**

**Technical Presentation Only:** SHTC2023-116541

**Yaguo Wang** - *The University of Texas at Austin,* **Zefang Ye** - *The University of Texas at Austin*

**Wide-Range Continuous Tuning of the Thermal Conductivity of Lsco Films via Room-Temperature Ion-Gel Gating**

**Technical Presentation Only:** SHTC2023-107054

**Yingying Zhang** - *University of Minnesota Twin Cities,* **William Postiglione** - *University of Minnesota Twin Cities,* **Rui Xie** - *The University of Utah,* **Chi Zhang** - *University of Minnesota Twin Cities,* **Vipul Chaturvedi** - *University of Minnesota Twin Cities,* **Kei Heltemes** - *Univeristy of Minnesota Twin Cities,* **Hua Zhou** - *Argonne National Laboratory,* **Tianli Feng** - *The University of Utah,* **Chris Leighton** - *Univeristy of Minnesota Twin Cities,* **Xiaojia Wang** - *University of Minnesota Twin Cities*

**The Thermal Conductance Switch Ratio of a Nanocomposite Consisting of a Crosslinked Gel and Polar Nanoparticles Like Silicon Dioxide**

**Technical Paper Publication:** SHTC2023-107463

**James Hammonds** - *Manhattan College,* **Kimani Stancil** - *U.S. Merchant Marine Academy*

**Molecular-Level Understanding of Efficient Thermal Transport Across the Silica–Water Interface**

**Technical Presentation Only:** SHTC2023-112309

**Zhihao Xu** - *University of Notre Dame,* **Tengfei Luo** - *University of Notre Dame*

## K16-03 - HEAT TRANSFER IN ELECTRONIC EQUIPMENT III
## 3:45PM–5:15PM - MONTPELIER B

Chair: **Chirag Kharangate** - *Case Western Reserve University*
Co-Chair: **Amanie Abdelmessih** - *California Baptist University*
Co-Chair: **Tiwei Wei** - *Purdue University*

**Numerical Study of Thermal Management Systems Using Phase Change Materials Integrated With Heat Sink for Wireless Super-Fast Charging Stations of EVs in Constant Heat Flux Condition**

**Technical Paper Publication:** SHTC2023-107128

**Mahdi Ghorbani** - *Utah State University,* **Hailei Wang** - *Utah State University,* **Nicholas Roberts** - *Utah State University*

**Heterogenous Liquid Metal - Silver - Polymer Composites for Thermal Interface Materials**

**Technical Presentation Only:** SHTC2023-114562

**Aastha Uppal** - *Arizona State University,* **Wilson Kong** - *Arizona State University,* **Ashish Rana** - *Arizona State University,* **Jae Sang Lee** - *Arizona State University,* **Matthew Green** - *Arizona State University,* **Konrad Rykaczewski** - *Arizona State University,* **Robert Wang** - *Arizona State University*

**Gallium Composite Thermal Buffers for Transient Thermal Management**

**Technical Presentation Only:** SHTC2023-116628

**Rachel McAfee** - *U.S. Army Research Laboratory,* **Michael Fish** - *U.S. Army Research Laboratory,* **Adam Wilson** - *U.S. Army Research Laboratory,* **Harvey Tsang** - *U.S. Army Research Laboratory,* **Jonathan Boltersdorf** - *U.S. Army Research Laboratory*

**High Power and Capacity Thermal Buffering Modules From 3D-Printed Shape Memory Nickel Titanium Porous Cubes**

**Technical Presentation Only:** SHTC2023-116685

**Adam Wilson** - *U.S. Army Research Laboratory,* **Mustafa Ozsipahi** - *National Academy of Sciences,* **Darin Sharar** - *TauMat LLC,* **Andrew Bayba** - *U.S. Army Research Laboratory,* **Michael Fish** - *U.S. Army Research Laboratory,* **Rachel McAfee** - *U.S. Army Research Laboratory,* **Ibrahim Karaman** - *Texas A&M University*

## K6-04 - HEAT TRANSFER IN ENERGY SYSTEMS - BATTERIES
## 3:45PM–5:15PM CONSTITUTION B

Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Dong Liu** - *University of Houston*
Co-Chair: **Leitao Chen** – *Tennessee State University*
Co-Chair: **Rydge Mulford** - *University of Dayton*

**Inside-Out Cooling of High Energy-Density Lithium-Ion Batteries**

**Technical Presentation Only:** SHTC2023-111466

**Mohammed Jubair Dipto** - *University of Illinois at Urbana-Champaign,* **Kazi Fazle Rabbi** - *University of Illinois at Urbana-Champaign,* **Zheng Liu** - *University of Illinois at Urbana-Champaign,* **Yashraj Gurumukhi** - *University of Illinois at Urbana-Champaign,* **Jarom Sederholm** - *University of Illinois at Urbana-Champaign,* **Paul V. Braun** - *University of Illinois at Urbana-Champaign,* **Pingfeng Wang** - *University of Illinois at Urbana-Champaign,* **Nicola Helen Perry** - *University of Illinois at Urbana-Champaign,* **Marta Hatzell** - *Georgia Institute of Technology,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**The Role of Non-Uniform Convective Cooling Conditions on Inhomogeneous Degradation in Lithium-Ion Batteries Under Fast Charging Operations**

**Technical Presentation Only:** SHTC2023-114973

**Avijit Karmakar** - *Purdue University,* **Avinash Bairwa** - *Purdue University,* **Partha P. Mukherjee** - *Purdue University,* **Justin A. Weibel** - *Purdue University*

**Effect of Particle Size on Electrochemical Performance and Heat Generation of Lithium-Ion Battery Electrodes**

**Technical Presentation Only:** SHTC2023-116944

**Yucheng Zhou** - *University of California, Los Angeles,* **Sun Woong Baek** - *University of California, Los Angeles,* **Laurent Pilon** - *University of California, Los Angeles*

**Estimation of Heat Flux From Gases Released During Thermal Runaway of Lithium-Ion Batteries**

**Technical Paper Publication:** SHTC2023-106993

**Ala' Qatramez** - *The University of Memphis,* **Andrew Kurzawski** - *Sandia National Laboratories,* **John Hewson** - *Sandia National Laboratories,* **Daniel Foti** - *The University of Memphis,* **Alexander Headley** - *The University of Memphis*

**Performance Comparison of Thermal Management Systems for Battery Packs Based on Numerical Simulation**

**Technical Paper Publication:** SHTC2023-107575

**Sowmya Raghu** - *University of South Carolina,* **Roya Rajabi** - *University of South Carolina,* **Robin James** - *General Motors Research and Development,* **Kevin Huang** - *University of South Carolina,* **Jamil Khan** - *University of South Carolina*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-04: THERMAL RADIATION IN ENERGY SYSTEMS

**3:45PM–5:15PM** **MONTPELIER A**

Chair: **Abdulmajeed Mohamad** - *University of Calgary*
Co-Chair: **Liping Wang** - *Arizona State University*

**Invited: Big Data, Artificial Neural Networks, Machine Learning, and Augmented Intelligence in Heat Transfer in Combustion**

**Technical Presentation Only:** SHTC2023-119010

**Jay Gore** - *Purdue University*

**Invited: The Atmospheric Greenhouse Effect and Global Warming**

**Technical Presentation Only:** SHTC2023-114522

**Sandip Mazumder** - *The Ohio State University*

**Ambient- and High-Temperature Optical Characterisation of Alumina–Silica-Based Materials for Solar Particle Receiver Applications**

**Technical Presentation Only:** SHTC2023-116315

**Jingjing Chen** - *The University of Hong Kong,* **Apurv Kumar** - *Federation University,* **Joe Coventry** - *The Australian National University,* **Wojciech Lipiński** - *Independent Researcher*

**An Enthalpy-Porosity Model for Phase-Change Applied to Plug and Abandonment of Oil Wells**

**Technical Paper Publication:** SHTC2023-106738

**Marcelo De Lemos** - *Instituto Tecnológico de Aeronáutica*

## K13-04 - SPRAY COOLING

**3:45PM–5:15PM** **CONSTITUTION A**

Chair: **Dion S. Antao** - *Texas A&M University*
Co-Chair: **Chanwoo Park** - *University of Missouri*
Co-Chair: **Vinod Srinivasan** - *University of Minnesota*

**Numerical Simulation of Particle Evolution in Spray Drying Using Droplet Drying Kinetics**

**Technical Paper Publication:** SHTC2023-106946

**Anurag Bhattacharjee** - *Worcester Polytechnic Institute,* **Aswin Gnanaskandan** - *Worcester Polytechnic Institute*

**Spray Overlap and Heat Transfer Coefficient Uniformity in the Continuous Casting**

**Technical Paper Publication:** SHTC2023-107467

**Ninad Patil** - *Purdue University Northwest,* **Rashed Al Manasir** - *Purdue University Northwest,* **Armin K. Silaen** - *Purdue University Northwest,* **Nicholas Walla** - *Purdue University Northwest,* **Chenn Zhou** - *Purdue University Northwest*

**Experimental and Numerical Study on Wet Steam Flow Metering Overreading Characteristics in Venturi Tube**

**Technical Paper Publication:** SHTC2023-106763

**Fang Wu** - *Shandong Nuclear Power Co., Ltd.,* **Zhaokai Xing** - *State Nuclear Electric Power Planning Design & Research Institute Co., Ltd.,* **Yuanhua Ma** - *Shandong Nuclear Power Co., Ltd.,* **Hongjun Xie** - *State Nuclear Electric Power Planning Design & Research Institute Co., Ltd.,* **Zhao Cheng** - *Shandong Nuclear Power Co., Ltd.*

**Experimental Study on Flashing in Vertical Water Columns**

**Technical Paper Publication:** SHTC2023-108009

**Sarvjeet Singh** - *Indian Institute of Technology, Jodhpur,* **Prodyut Chakraborty** - *Indian Institute of Technology, Jodhpur,* **Hardik Kothadia** - *Indian Institute of Technology, Jodhpur*

**Probing the Transient Local Heat Transfer During Droplet Impact on Heated Surfaces**

**Technical Presentation Only:** SHTC2023-112124

**Patricia Weisensee** - *Washington University in St. Louis*

## TUESDAY, JULY 11, 2023

**PLENARY SPEAKER**
**8:00AM–9:00AM** **DOLLEY MADISON BALLROOM**

Chair: **Sandra Boetcher** - *Embry Riddle Aeronautical University*
Co-Chair: **Subramanyaravi Annapragada** - *Carrier Corporation*

**Invited: Energy Storage for Sustainable Buildings**

**Judith C. Vidal, Ph.D.,** *National Renewable Energy Laboratory (NREL)*

**K8/K9-05 - FUNDAMENTALS OF RADIATIVE HEAT TRANSFER**
**9:00AM–10:30AM** **HAMILTON A**

Chair: **Darshan Pahinkar** - *Florida Institute of Technology*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Vaibhav Bahadur** - *The University of Texas at Austin*

**Quadrature Point Selection in the Full-Spectrum K-Distribution Method for Nongray Radiation in Combustion Gases**

**Technical Paper Publication:** SHTC2023-106894

**Nehal Jajal** - *The Ohio State University,* **Sandip Mazumder** - *The Ohio State University*

**Dependent Scattering and Plasmonic Coupling Enhance Spectral Absorption of Nanoparticle Suspensions**

**Technical Presentation Only:** SHTC2023-116946

**Ricardo Martinez** - *University of California, Los Angeles,* **Abhinav Bhanawat** - *University of California, Los Angeles,* **Refet Yalcin** - *Université de Poitiers,* **Laurent Pilon** - *University of California, Los Angeles*

**Enhancing Far-Field Thermal Radiation Using Dense Arrays of Silicon-Carbide Nanopillars**

**Technical Presentation Only:** SHTC2023-106830

**Ramin Pouria** - *University of Maine,* **Philippe Chow** - *Columbia University,* **Tom Tiwald** - *J.A. Woollam Company,* **Saman Zare** - *University of Maine,* **Sheila Edalatpour** - *University of Maine*

**Investigating Radiative Thermal Transport With MXenes**

**Technical Presentation Only:** SHTC2023-114843

**Sean Murray** - *University of Nebraska-Lincoln,* **Mohammad Ghashami** - *University of Nebraska-Lincoln*

**Switchable Plasmonic Zero-Contrast Grating Using Thermochromic and Electrochromic Oxides**

**Technical Presentation Only:** SHTC2023-119547

**Richard Zhang** - *University of North Texas*

**K9-05 - RADIATIVE COOLING AND RADIATIVE PROPERTIES OF NANOMATERIALS**
**9:00AM–10:30AM** **HAMILTON B**

Chair: **Sheila Edalatpour** - *University of Maine*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Bo Zhao** - *University of Houston*

**Invited: Ultrawhite Paints for Sub-Ambient Radiative Cooling: Materials, Physics, and Climate Crisis Mitigation**

**Technical Presentation Only:** SHTC2023-116779

**Xiulin Ruan** - *Purdue University*

**Demonstration of Simultaneous Sub-Ambient Radiative Cooling and Solar Energy Harvesting**

**Technical Presentation Only:** SHTC2023-112183

**Linxiao Zhu** - *The Pennsylvania State University,* **Xinsheng Wei** - *The Pennsylvania State University,* **Pramit Ghosh** - *The Pennsylvania State University*

**Designing High-Performance Smart Windows by Quantum Computing**

**Technical Presentation Only:** SHTC2023-116711

**Wenjie Shang** - *University of Notre Dame,* **Seongmin Kim** - *University of Notre Dame,* **Tengfei Luo** - *University of Notre Dame*

**Intelligent Radiative Thermostat Induced by Near-Field Radiative Thermal Diode**

**Technical Presentation Only:** SHTC2023-115146

**Yang Liu** - *Northeastern University,* **Yi Zheng** - *Northeastern University*

## K6-05 - HEAT TRANSFER IN ENERGY SYSTEMS - HEAT PUMP

**9:00AM–10:30AM** **MOUNT VERNON B**

Chair: **Rydge Mulford** - *University of Dayton*
Co-Chair: **Dong Liu** - *University of Houston*
Co-Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Leitao Chen** – *Tennessee State University*

**Barocaloric Cooling: From Material to Device**

**Technical Presentation Only:** SHTC2023-116807

**Naveen Weerasekera** - *University of Louisville,* **Bikram Bhatia** - *University of Louisville*

**Enhancing Heat and Mass Transfer in Adsorption Heat Pump Systems With an Aerogel-Based Adsorption Structure**

**Technical Presentation Only:** SHTC2023-116385

**Shaik Subhani** - *Gyeongsang National University,* **Gyuyeong Jeong** - *Gyeongsang National University,* **Duckjong Kim** - *Gyeongsang National University*

**Experimental Investigation of a Desiccant Heat Pump Clothes Dryer Utilizing an Ionic Liquid**

**Technical Presentation Only:** SHTC2023-117085

**Behnam Ahmadi** - *North Carolina State University,* **Masoud Ahmadi** - *North Carolina State University,* **Kashif Nawaz** - *Oak Ridge National Laboratory,* **Kyle R. Gluesenkamp** - *Oak Ridge National Laboratory,* **Sajjad Bigham** - *North Carolina State University*

**Construction and Validation of a Pumped Loop Cycle for Characterizing Heat Transfer of Refrigerants and Alcohols Near Supercritical Points**

**Technical Paper Publication:** SHTC2023-106392

**Benjamin Pepper** - *Utah State University,* **Aiden Meek** - *Utah State University,* **Mahdi Ghorbani** - *Utah State University,* **Hailei Wang** - *Utah State University*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-05: THERMAL MANAGEMENT

**9:00AM–10:30AM** **MOUNT VERNON A**

Chair: **Tiwei Wei** - *Purdue University*

**Invited: Single Phase Immersion Cooling for Hyper Scale Data Centers: Challenges and Opportunities**

**Technical Paper Publication:** SHTC2023-107598

**Dereje Agonafer** - *The University of Texas at Arlington,* **Pratik Bansode** - *The University of Texas at Arlington,* **Satyam Saini** - *Intel Corporation, Jessica Gullbrand - Intel Corporation,* **Ashish Gupta** - *Intel Corporation*

**Invited: Advances in Additive Manufacturing Leading to Applications in Convective Heat Transfer**

**Technical Presentation Only:** SHTC2023-109441

**Karen Thole** - *The Pennsylvania State University*

**Invited: Modeling of Urban Thermal Environments**

**Technical Presentation Only:** SHTC2023-115102

**Yogendra Joshi** - *Georgia Institute of Technology,* **Shuvajit Dey** - *Georgia Institute of Technology*

## K13-05 - PHASE-CHANGE FROM ENHANCED SURFACES

**9:00AM–10:30AM** **CONSTITUTION A**

Chair: **Chanwoo Park** - *University of Missouri*
Co-Chair: **Vinod Srinivasan** - *University of Minnesota*

**Experimental Analysis of Single Evaporation Tube Utilizing Sintered Copper Particle Wicking Structures**

**Technical Paper Publication:** SHTC2023-107426

**Jeremy Spitzenberger** - *University of Missouri,* **James Hoelle** - *University of Missouri,* **Ramy Mohammed** - *University of Missouri,* **Laith Ismael** - *University of Missouri,* **Hongbin Ma** - *University of Missouri,* **Pengtao Wang** - *Oak Ridge National Laboratory,* **Stephen Kowalski** - *Oak Ridge National Laboratory,* **Kashif Nawaz** - *Oak Ridge National Laboratory*

**Fundamental Mechanisms of Refrigerant Flow Boiling Heat Transfer Enhancement on Scalable Micro- and Nanostructured Metal Surfaces**

**Technical Presentation Only:** SHTC2023-105238

**Mohammad Jalal Inanlu** - *University of Illinois Urbana-Champaign,* **Nithin Vinod Upot** - *UIUC,* **Jiaqi Li** - *UIUC,* **Kazi Fazle Rabbi** - *UIUC,* **Chi Wang** - *UIUC*, **Alireza Bakhshi** - *UIUC,* **Pouya Kabirzadeh** - *UIUC,* **Zan Suo** - *UIUC,* **Wichapon Ponsawat** - *UIUC,* **Edwin Siuda** - *UIUC,* **Nenad Miljkovic** - *University of Illinois Urbana-Champaign*

**Experimental Study on the Flow Boiling Heat Transfer in Horizontal Tubes With Composite Structure**

**Technical Paper Publication:** SHTC2023-107505

**Yuhao Lin** - *Zhejiang University,* **Jacheng Wang** - *SINOPEC Catalyst Qilu Division,* **Xu Wang** - *Inner Mongolia Agricultural University,* **Wei Li** - *Zhejiang University,* **S.A. Sherif** - *University of Florida*

**Anomalous Adverse Effect of Mass Velocity on Convective Flow Boiling in Small-Diameter Microfin Tubes**

**Technical Presentation Only:** SHTC2023-114867

**Lingnan Lin** - *National Institute of Standards and Technology,* **Mark Kedzierski** - *National Institute of Standards and Technology*

**Durability of Structured Surfaces for Refrigerant-Side Heat Transfer Enhancement in Metal Tubes**

**Technical Presentation Only:** SHTC2023-105944

**Tarandeep Singh Thukral** - *University of Illinois at Urbana-Champaign,* **Nithin Vinod Upot** - *University of Illinois at Urbana-Champaign,* **Mohammad Jalal Inanlu** - *University of Illinois at Urbana-Champaign,* **Advay Sudarshan** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

## K8/K17 - WORKSHOP ON SCANNING THERMAL MICROSCOPY (STHM) AND APPLICATIONS

**9:00AM–10:30AM** **CONSTITUTION B**

Chair: **Devashish Shrivastava** - *FDA*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

**Workshop on Scanning Thermal Microscopy (SThM) and Applications**

**Workshop:** SHTC2023-119149

**Theodorian Borca-Tasciuc** - *Rensselaer Polytechnic Institute,* **Angelo Gaitas** - *Icahn School of Medicine at Mount Sinai*

## K13-06 - HEAT TRANSFER IN MULTI-PHASE FLOW

**11:00AM–12:30PM** **CONSTITUTION B**

Chair: **Vinod Srinivasan** - *University of Minnesota*
Co-Chair: **Chanwoo Park** - *University of Missouri*
Co-Chair: **Dion S. Antao** - *Texas A&M University*
Co-Chair: **Michael Manahan** - *Penn State University*

**Study on the Effects of Temperature Distribution and Liquid Volume on the Growth of a Deuterium-Deuterium Ice in the Cryogenic Target**

**Technical Paper Publication:** SHTC2023-107016

**Kewei Wu** - *Tsinghua University,* **Yina Yao** - *Tsinghua University,* **Hui Zhang** - *Tsinghua Unviersity,* **Lili Zheng** - *Tsinghua University*

**Thermal Brine Concentration Using Air-Gap Diffusion Distillation: A Coupled Heat and Mass Transport Model**

**Technical Paper Publication:** SHTC2023-107977

**Walter Parker** - *Georgia Institute of Technology,* **Akanksha Menon** - *Georgia Institute of Technology*

**Prediction and Flow Visualization of Critical Heat Flux of Pf-5060 Within a Horizontal Rectangular Channel With Single Sided Heating**

**Technical Paper Publication:** SHTC2023-107389

**Chinmay Shingote** - *Case Western Reserve University,* **Chirag Kharangate** - *Case Western Reserve University,* **Cho-Ning Huang** - *Case Western Resrve University*

**Prediction of Chf During Flow Across a Cylinder**

**Technical Presentation Only:** SHTC2023-115063

**Mirza Mohammed SHAH** - *Engineering Research Associates*

## K17 - HEAT AND MASS TRANSFER IN BIOTECHNOLOGY

**11:00AM–12:30PM** **HAMILTON B**

Chair: **Angelo Gaitas** - *Mount Sinai School of Medicine*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **Thedorian Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

**Monitoring Perfusion-Based Convection in Cancer Tumor Tissue Undergoing Nanoparticle Heating by Analyzing Temperature Responses to Transient Pulsed Heating**

**Technical Paper Publication:** SHTC2023-105470

**Hayden Carlton** - *Johns Hopkins University School of Medicine,* **Preethi Korangath -** *Johns Hopkins University School of Medicine,* **Nageshwar Arepally** - *Penn State Harrisburg,* **Anilchandra Attaluri** - *Penn State Harrisburg,* **Robert Ivkov** - *Johns Hopkins University School of Medicine*

**The Effect of Immersion in Water on Internal Body Temperature Post-Mortem**

**Technical Paper Publication:** SHTC2023-106651

**Athena Devashish** - *In Vivo Temperatures,* **Devashish Shrivastava -** *In Vivo Temperatures*

**A Computational Assessment of Thermal Damage in Perfused Tissue Due to Laser Irradiation**

**Technical Paper Publication:** SHTC2023-106652

**Rahul Goyal** - *In Vivo Temperatures, Devashish Shrivastava - In Vivo Temperatures*

**Optimal Magnetic Particle Imaging Resolution for In-Silico Hyperthermia Simulations**

**Technical Presentation Only:** SHTC2023-107383

**Nageshwar Arepally** - *Penn State Harrisburg, Joshua Vanname - Penn State Harrisburg, Anilchandra Attaluri - Penn State Harrisburg,* **Hayden Carlton** - *Johns Hopkins University School of Medicine,* **Robert Ivkov** - *Johns Hopkins University School of Medicine*

**Nanowatt-Resolution Biological Calorimetry**

**Technical Presentation Only:** SHTC2023-111971

**Kanishka Panda** - *University of Michigan,* **Rohith Mittapally** - *Massachusetts Institute of Technology,* **Pramod Sangi Reddy** - *University of Michigan,* **Swathi Yadlapalli** - *University of Michiga,* **Edgar Meyhofer** - *University of Michigan*

## K9-06 - RADIATIVE THERMAL ENERGY CONVERSION WITH NANOSTRUCTURES

**11:00AM–12:30PM** **CONSTITUTION A**

Chair: **Linxiao Zhu** - *Penn State University*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Sheila Edalatpour** - *University of Maine*

**Invited: Nonreciprocal Solar Thermophotovoltaics**

**Technical Presentation Only:** SHTC2023-115210

**Sina Jafari Ghalekohneh** - *University of Houston*, **Bo Zhao** - *University of Houston*

**Investigation of Functionalized Emitters for TPV Application**

**Technical Presentation Only:** SHTC2023-116664

**Zahra Kamali Khanghah** - *University of Nebraska-Lincoln,* **Mohammad Ghashami** - *University of Nebraska-Lincoln*

**Spectrally Selective Solar Reflectance Control With Graphene-Based Nanostructure**

**Technical Presentation Only:** SHTC2023-114477

**Mikyung Lim** - *Korea Institute of Machinery & Materials,* **Kwang-Seop Kim** - *Korea Institute of Machinery & Materials,* **Jaeman Song** - *Kyung Hee University,* **Hyeon-Don Kim** - *Korea Institute of Machinery & Materials,* **Seong-Jae Jeon** - *Korea Institute of Machinery & Materials,* **Suwan Jeon** - *Korea Institute of Machinery & Materials,* **Jae-Hyun Kim** - *Korea Institute of Machinery & Materials*

**Thermionic Emission Enhancement via Nano-Protrusions**

**Technical Presentation Only:** SHTC2023-116656

**Chace Franey** - *University of Nebraska-Lincoln,* **Bakir Al-Ameri** - *University of Nebraska-Lincoln,* **Mohammad Ghashami** - *University of Nebraska-Lincoln*

## K9 – PANEL - NANOSCALE HEAT TRANSFER EDUCATION

**11:00AM–12:30PM** **MOUNT VERNON B**

Chair: **Zhuomin Zhang** - *Georgia Institute of Technology*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Patrick Hopkins** - *University of Virginia*

**Textbooks and Monographs in Nanoscale Thermal Transport**

**Panel:** SHTC2023-109996

**Zhuomin Zhang** - *Georgia Institute of Technology*

**Modern, Interactive Programming Tools for Enhanced Learning and Assessment**

**Panel:** SHTC2023-112627

**Timothy S. Fisher** - *University of California, Los Angeles*

**Onsite and Online Delivery of Nanoscale Thermal Transport Curriculum**

**Panel:** SHTC2023-116787

**Xiulin Ruan** - *Purdue*

**Hands-on Experimental-Based Module for Nanoscale Thermal Conductivity Measurements**

**Panel:** SHTC2023-117570

**Patrick Hopkins** - *University of Virginia*

**Lessons Learned From Delivering Project-Based Course**

**Panel:** SHTC2023-112635

**Jun Liu** - *North Carolina State University*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-06: THERMAL MANAGEMENT AND PHASE CHANGE

**11:00AM–12:30PM** **MOUNT VERNON A**

Chair: **Solomon Adera** - *University of Michigan*
Co-Chair: **Ying Sun** - *University of Cincinnati*

**Molecular Dynamics Simulations of Water Evaporation and Condensation in Membrane and Hydrogel**

**Technical Presentation Only:** SHTC2023-105986

**Jun Liu** - *North Carolina State University,* **Saqlain Raza** - *North Carolina State University*

**Invited: Advances in Impingement Heat Transfer- a Review and Some Recent Results**

**Technical Presentation Only:** SHTC2023-108428

**Sumanta Acharya** - *Illinois Institute of Technology,* **Chen Tang** - *Illinois Institute of Technology*

**Invited: Enhancing Phase Change Processes Using Engineered Interfaces**

**Technical Presentation Only:** SHTC2023-117257

**Kripa Varanasi** - *Massachusetts Institute of Technology*

**Intensification of Mass and Heat Transfer for Hydrates-Based Giga scale Seabed Sequestration of Carbon Dioxide**

**Technical Presentation Only:** SHTC2023-106685

**Vaibhav Bahadur** - *The University of Texas at Austin,* **Awan Bhati** - *The University of Texas at Austin*

## K6-06 - HEAT TRANSFER IN ENERGY SYSTEMS - HEAT EXCHANGERS

**11:00AM–12:30PM** **HAMILTON A**

Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Leitao Chen** – *Tennessee State University*
Co-Chair: **Rydge Mulford** - *University of Dayton*
Co-Chair: **Dong Liu** - *University of Houston*

### Nusselt Number and Friction Factor Correlations for Heat Exchanger Plates With Twisted S-Shaped Fins

**Technical Presentation Only:** SHTC2023-116604

**Aaron Feinauer** - *Michigan State University,* **Sai Jakkala** - *Michigan State University,* **Andre Benard** - *Michigan State University,* **Joerg Petrasch** - *RedoxBlox Corporation*

### A Numerical Study on Shape Dependence of Natural Convective Heat Transfer From Thin Plates in Turbulent Flow

**Technical Paper Publication:** SHTC2023-108260

**Koustav Bandyopadhyay** - *Queen's University,* **Patrick Oosthuizen** - *Queen's University,* **Qingguo Li** - *Queen's University*

### Thermal and Flow Characteristics in a Tube with Helical Ridges

**Technical Paper Publication:** SHTC2023-106453

**Tailian Chen** - *Gonzaga University*

### Pool Boiling of Low-GWP R1336mzz(e) Refrigerant on Plain and Surface Structured Tubes

**Technical Presentation Only:** SHTC2023-105491

**Wuchen Fu** - *University of Illinois at Urbana-Champaign,* **Yiyang Chen** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

### Scalable Internal and External Corrosion-Mitigation Coatings for Thermal Applications

**Technical Presentation Only:** SHTC2023-105989

**Tarandeep Singh Thukral** - *University of Illinois at Urbana-Champaign,* **Kazi Fazle Rabbi** - *University of Illinois at Urbana-Champaign,* **Siavash Khodakarami** - *University of Illinois at Urbana-Champaign,* **Advay Sudarshan** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

## K11 - FIRE AND COMBUSTION

**1:45PM–3:15PM** **HAMILTON B**

Chair: **Taria Shamim** – *Northern Illinois University*
Co-Chair: **Songtao Guo** - *Cornell University*
Co-Chair: **Omid Askari** - *West Virginia University*

### Investigation of the on Road and Driving Cycle Fuel Economy of an Urban Public Utility Jeepney Using Micro Trip Method

**Technical Paper Publication:** SHTC2023-105893

**Robert Michael Corpus** - *Polytechnic University of the Philippines,* **Peter Vasquez** - *Polytechnic University of the Philippines,* **Robert James Lomotan** - *Colegio de Muntinlupa*

### Study on Ensemble Kalman Filter Based Building Fire Prediction and Dynamic Situation Awareness for Emergency Response

**Technical Paper Publication**: SHTC2023-106757

**Luyao Kou** - *Tsinghua University, Pei Wang - Tsinghua University,* **Rui Ba** - *People's Public Security University of China,* **Jiaming Liu** - *Tsinghua University, Qing Deng - University of Science and Technology Beijing,* **Hui Zhang** - *Tsinghua University*

### Drive Cycle Generated Using Microtrip Method on Public Vehicles in Metro Manila

**Technical Paper Publication:** SHTC2023-107495

**Robert Michael Corpus** - *Polytechnic University of the Philippines,* **Peter Vasquez** - *Polytechnic University of the Philippines,* **Robert James** *Lomotan - Colegio De Muntinlupa*

### Experiments and Simulations of Droplet Burning of Isobutanol Mixed With a Tier Ii Gasoline Certification Fuel and Its Surrogate

**Technical Presentation Only:** SHTC2023-115267

**Songtao Guo** - *Cornell University,* **Yujie Wang** - *Cornell University,* **Alberto Cuoci** - *Politecnico di Milano,* **Liang Ji** - *University of California, San Diego,* **C. Thomas Avedisian** - *Cornell University, Shreyas Kotian - Cornell University, Kalyanasundaram Seshadri - University of California, San Diego,* **Alessio Frassoldati** - *Politecnico di Milano*

## K18 - HEAT TRANSFER UNDER EXTREME CONDITIONS
**1:45PM–3:15PM** **CONSTITUTION B**

Chair: **Qiang Liao** - *Chongqing University*

**How Many Frosting and Defrosting Cycles Can a Structured Anti-Frosting Surface Take: A Durability Study**

**Technical Presentation Only:** SHTC2023-106560

**Muhammad Jahidul Hoque** - *University of Illinois at Urbana-Champaign,* **Xiao Yan** - *University of Illinois at Urbana-Champaign,* **Haoyun Qiu** - *University of Illinois at Urbana-Champaign,* **Xuzhi Du** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**Research on the Nucleation and Growth Models of Non-Azeotropic and Immiscible Mixtures During the Condensation Process**

**Technical Paper Publication:** SHTC2023-107011

**Yuxuan Chen** - *Chongqing University*

**Supercooled Droplet Icing and Self-Jumping on Micro/Nanostructured Surfaces**

**Technical Presentation Only:** SHTC2023-112218

**Shuhuai Yao** - *Hong Kong University of Science and Technology,* **Xiao Yan** - *Hong Kong University of Science and Technology,* **Samuel C.Y. Au** - *Hong Kong University of Science and Technology*

## K9-07- SURFACE-ENHANCED PHASE CHANGE HEAT TRANSFER 1
**1:45PM–3:15PM** **CONSTITUTION A**

Chair: **Ming-Chang Lu** - *National Taiwan University*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Tengfei Luo** - *University of Notre Dame*

**Invited: Rethinking Evaporation: Thermal and Optical Evaporation From Pure Water and Hydrogels**

**Technical Presentation Only:** SHTC2023-115008

**Gang Chen** - *Massachusetts Institute of Technology*

**Thermal and Mass Transfer Resistance at a Liquid-Gas Interface of an Evaporating Droplet: A Molecular Dynamics Study**

**Technical Presentation Only:** SHTC2023-114860

**Zhi Liang** - *Missouri University of Science and Technology,* **Eric Bird** - *Missouri University of Science and Technology*

**Adsorbed Layer Dynamics in Thin Film Evaporation From Nanoconfinements**

**Technical Presentation Only:** SHTC2023-114931

**Ali Beskok** - *Southern Methodist University,* **Mustafa Ozsipahi** - *Southern Methodist University*

**Nanoplastics Detection in Water Using Shrinking Surface Bubble Deposition**

**Technical Presentation Only:** SHTC2023-116753

**Renzheng Zhang** - *University of Notre Dame,* **Seunghyun Moon** - *University of Notre Dame,* **Qiushi Zhang** - *University of Notre Dame,* **Amartya Mandal** - *University of Notre Dame,* **Tengfei Luo** - *University of Notre Dame*

## SHTC/ES PANEL: FUNDING OPPORTUNITIES
**1:45PM–3:15PM** **POTOMAC A**

Chair: **Sandra Boetcher** - *Embry Riddle Aeronautical Univ*

**Thermal Transport Processes Program at the National Science Foundation- Perspectives and Research Opportunities**

**Panel:** SHTC2023-119434

**Sumanta Acharya** - *National Science Foundation*

**The Office of Naval Research – Science and Technology in Support of the US Navy and Marine Corps**

**Panel:** SHTC2023-119185

**Mark Spector** - *Office of Naval Research*

**Funding From the Advanced Research Projects Agency - Energy**

**Panel:** SHTC2023-119191

**Laurent Pilon** - *Advanced Research Projects Agency - Energy*

**ARPA-E If It Works, Will It Matter - Funding Transformational Research**

**Panel:** SHTC2023-119180

**Peter de Bock** - *U.S. Department of Energy*

## K8 WORKSHOP: USE OF MACHINE LEARNING TOOLS FOR THERMOPHYSICS AND HEAT TRANSFER RESEARCH AND ENERGY TECHNOLOGY DEVELOPMENT

**1:45PM–3:15PM** **HAMILTON A**

Chair: **Joe Feser** - *University of Delaware*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

**Use of Machine Learning Tools for Thermophysics and Heat Transfer Research and Energy Technology Development**

**Workshop:** SHTC2023-119161

*Van Carey - University of California, Berkeley*

## DARRELL PEPPER MEMORIAL SYMPOSIUM

**3:15PM–5:15PM** **CONSTITUTION A**

Chair: **Shima Hajimirza** – *Stevens Institute of Technology*
Co-Chair: **John Tencer** - *Sandia National Laboratories*

**Application of Adaptive Finite Element Method in Solving Convective Heat Transfer Problems**

**Technical Presentation Only:** SHTC2023-107752

**Xiuling Wang** - *Purdue University Northwest,* **Dave Carrington** - *Los Alamos National Laboratory*

**Progress and Challenges in Large-Scale Computation of the Phonon Boltzmann Transport Equation for Submicron Heat Conduction**

**Technical Presentation Only:** SHTC2023-111328

**Sandip Mazumder** - *Ohio State University*

**CFD Modeling for Solar Reactor Design Optimization: A Case Study for Efficient Hydrogen Production**

**Technical Presentation Only:** SHTC2023-112417

**Nesrin Ozalp** - *Purdue University Northwest*

## K8 INDUSTRY PANE L- FUNDAMENTALS ON THERMAL MANAGEMENT OF ELECTRONICS

**3:45PM–5:15PM** **MOUNT VERNON A**

Chair: *Amitabh Narain - Michigan Technological University*
Co-Chair: **Diana-Andra Borca-Tasciuc** - *Rensselaer Polytechnic Institute*
Co-Chair: **An Zou** - *Advanced Cooling Technologies*

**Fundamentals on Thermal Management of Electronics**

**Panel:** SHTC2023-118724

**Amitabh Narain** - *Michigan Technological University,* **Richard Bonner** - *Accelsius Technology,* **Nahshon Eadelson** - *Zutacor Corporation,* **Sukhvinder Kang** - *Aavid, Thermal Division of Boyd Corporation,* **Jeff Zahnd** - *APC International Ltd.,* **Reza Shaeri** - *Advanced Cooling Technologies, Inc.,* **An Zou** - *Advanced Cooling Technologies, Inc.,* **Gilbert Moreno** - *National Renewable Energy Laboratory,* **Navid Gougol** - *Yektasonics, Inc.*

## K9-08 - SURFACE-ENHANCED PHASE CHANGE HEAT TRANSFER 2

**3:45PM–5:15PM** **CONSTITUTION B**

Chair: **Xianmin Dai** - *The University of Texas at Dallas*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Tengfei Luo** - *University of Notre Dame*
Co-Chair: **Zhi Liang** - *Missouri University of Science and Technology*

**Invited: Enhanced Phase-Change Heat Transfer Using Micro/ Nanostructures**

**Technical Presentation Only:** SHTC2023-112225

**Ming-Chang Lu** - *National Taiwan University,* **Chung-Te Huang** - *National Taiwan University,* **Ching-Wen Lo** - *National Chung-Hsing University*

**Measurement of Temperature Driven Knudsen Forces on Functionalized Surfaces**

**Technical Presentation Only:** SHTC2023-116516

**Greg Acosta** - *University of Nebraska-Lincoln,* **Malachi Hood** - *University of Nebraska-Lincoln, Mohammad Ghashami - University of Nebraska-Lincoln*

**Time-Dependent Solution of Unsteady Flow Equations for Nanoscale Heat and Mass Transfer, Advanced Fluidics, and High Energy Blast Propagations**

**Technical Paper Publication:** SHTC2023-105962

**Ramlala Sinha** - *Applied Engineering Consultants*

**Moisture Adsorption and Desorption Characterization After Surface Modification of Hollow Silica Particles**

**Technical Presentation Only:** SHTC2023-117168

**Kashif Nawaz** - *Oak Ridge National Laboratory,* **Jaswinder Sharma** - *Oak Ridge National Laboratory*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-07: HEAT CONDUCTION

**3:45PM–5:15PM** **HAMILTON A**

Chair: **Geoff Wehmeyer** - *Rice University*
Co-Chair: **Tengfei Luo** - *University of Notre Dame*

**Invited: Anisotropic Specific Heat and Temperature in Van Der Waals Crystals**

**Technical Presentation Only:** SHTC2023-106133

**Xinwei Wang** - *Iowa State University*

**Invited: Recent Studies of Ultrahigh-Thermal Conductivity Materials**

**Technical Presentation Only:** SHTC2023-117238

**Li Shi** - *The University of Texas at Austin*

**Measurement of the Thermal Diffusivity of Glass at High Temperatures**

**Technical Paper Publication:** SHTC2023-106978

**Nicholas Capps** - *University of Notre Dame,* **Fiyinfolouwa Abioye** - *University of Notre Dame,* **Edward Kinzel** - *University of Notre Dame*

**Is Thermal Conductivity of Graphene Divergent and Higher Than Diamond?**

**Technical Presentation Only:** SHTC2023-115274

**Zherui Han** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

## K6-07 - HEAT TRANSFER IN ENERGY SYSTEMS - GENERAL

**3:45PM–5:15PM** **HAMILTON B**

Chair: **Nesrin Ozalp** – *Purdue Northwest*
Co-Chair: **Hohyun Lee** - *Santa Clara University*
Co-Chair: **Rydge Mulford** - *University of Dayton*
Co-Chair: **Dong Liu** - *University of Houston*

**Experimental Study on the Effect of Uneven Heat Load on the Airflow Uniformity and Thermal Performance in a Small-Scale Data Center**

**Technical Paper Publication:** SHTC2023-105700

**Ze-Wen Chang** - *National Yang Ming Chiao Tung University,* **Chi-Chuan Wang** - *National Yang Ming Chiao Tung University*

**Experimental Performance of a Nonlinear Control Strategy to Regulate Temperature of a High Temperature Solar Reactor**

**Technical Paper Publication:** SHTC2023-105840

**Assaad Alsahlani** - *Al-Furat Al–Awsat Technical University,* **Nesrin Ozalp** - *Purdue University Northwest*

**Integrated Greenhouse for Food and Water Production**

**Technical Paper Publication:** SHTC2023-106914

**Mahyar Abedi** - *Michigan State University,* **Xu Tan** - *Michigan State University,* **James Klausner** - *Michigan State University,* **Andre Benard** - *Michigan State University*

**Numerical Investigation of the Thrust Vectoring Performance of a Bypass Dual Throat Nozzle**

**Technical Paper Publication:** SHTC2023-107440

**Saadia Afridi** - *University of Sciences and Technology,* **Tariq Amin Khan** - *University of Sciences and Technology,* **Wei Li** - *Zhejiang University,* **S.A. Sherif** - *University of Florida*

**Characterization of a Stacked Modular Thermoelectric System for Variable Heat Rate and High COP Hydronics**

**Technical Presentation Only:** SHTC2023-116889

**Amogh Wasti** - *Rensselaer Polytechnic Institute,* **Md. Rashef Mahbub** - *Rensselaer Polytechnic Institute, Berardo Matalucci - MIMiC Systems Inc.,* **Daniel Walczyk** - *Rensselaer Polytechnic Institute,* **Theodorian Borca-Tasciuc** - *Rensselaer Polytechnic Institute*

## WEDNESDAY, JULY 12, 2023

### JAMES V. BECK MEMORIAL SYMPOSIUM-01: INVERSE PROBLEMS, PARAMETER ESTIMATION AND HEAT CONDUCTION

**9:00AM–10:30AM** **HAMILTON B**

Chair: **Hamidreza Najafi** - *Florida Institute of Technology*

**Invited: In Memory of Professor James V. Beck: A Legacy to Remember**

**Technical Presentation Only:** SHTC2023-116591

**Keith Woodbury** - *University of Alabama,* **Hamidreza Najafi** - *Florida Institute of Technology,* **Filippo De Monte** - *University of L'Aquila,* **Kevin Dowding** - *Sandia National Laboratories,* **Robert Mcmaster** - *Virginia Military Institute,* **Kevin Cole** - *University of Nebraska–Lincoln,* **Neil Wright** - *Michigan State University*

**Construction of Short-Time Solutions in Heat Conduction**

**Technical Paper Publication:** SHTC2023-105505

**Filippo de Monte** - *Universisty of L'Aquila,* **Keith Woodbury** - *The University of Alabama,* **Hamidreza Najafi** - *Florida Institute of Technology*

**Calibration of a One-Dimensional Thermal Model for Metal Additive Manufacturing**

**Technical Presentation Only:** SHTC2023-111296

**Kevin D. Cole** - *University of Nebraska-Lincoln,* **Prahalada Rao** - *Virginia Polytechnic Institute and State University,* **Alex Riensche** - *Virginia Polytechnic Institute and State University*

### K9-09 - THERMAL EMISSION CONTROL WITH NANOSTRUCTURES

**9:00AM–10:30AM** **CONSTITUTION B**

Chair: **Bo Zhao** - *University of Houston*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Linxiao Zhu** - *Pennsylvania State University*

**Invited: Probing the Spectral Tunability of Near-Field Thermal Radiation Using Silicon Carbide Nanopillars**

**Talk:** SHTC2023-116645

**Sheila Edalatpour** - *University of Maine*

**Control Bandwidth and Contrast Between Emissivity and Absorptivity for Multilayer Broadband Nonreciprocal Emitters**

**Technical Presentation Only:** SHTC2023-116318

**Changkang Du** - *University of Houston,* **Bo Zhao** - *University of Houston*

**Full-Stokes Thermal Emission Control by Twisted Grating Structure**

**Technical Presentation Only:** SHTC2023-112463

**Chiyu Yang** - *Georgia Institute of Technology,* **Zhuomin Zhang** - *Georgia Institute of Technology,* **Wenshan Cai** - *Georgia Institute of Technology*

**Observation of Nonvanishing Optical Helicity in Thermal Radiation With Symmetry-Broken Metasurfaces**

**Technical Presentation Only:** SHTC2023-116702

**Xueji Wang** - *Purdue University,* **Tyler Sentz** - *Purdue Univeristy,* **Sathwik Bharadwaj** - *Purdue Univerisity,* **Subir Ray** - *Purdue Univerisity,* **Yifan Wang** - *Purdue University,* **Dan Jiao** - *Purdue University,* **Limei Qi** - *Beijing University of Posts and Telecommunications,* **Zubin Jacob** - *Purdue University*

### K10-01 - HEAT TRANSFER EQUIPMENT I

**9:00AM–10:30AM** **CONSTITUTION A**

Chair: **Prashant Singh** - *The University of Tennessee*

**Electrostatically-Driven Refrigerant/oil Separation for Heat Transfer Enhancement in HVAC&R**

**Technical Presentation Only:** SHTC2023-101792

**Vivek Garimella** - *University of Illinois at Urbana-Champaign,* **Tarek Gebrael** - *University of Illinois at Urbana-Champaign,* **Sugun Tej Inampudi** - *University of at Illinois Urbana-Champaign,* **Stefan Elbel** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**Pool Boiling Heat Transfer Characteristics of Low-Gwp Refrigerants on Laser-Treated Surfaces**

**Technical Presentation Only:** SHTC2023-107533

**Muneeshwaran Murugan** - *Oak Ridge National Laboratory,* **Cheng-Min Yang** - *Oak Ridge National Laboratory,* **Pengtao Wang** - *Oak Ridge National Laboratory,* **Kashif Nawaz** - *Oak Ridge National Laboratory*

**Analysis and Experimental Validation of Additively Manufactured Heat Exchangers**

**Technical Presentation Only:** SHTC2023-107848

**Venkateswara K.S. Reddy** - *Boeing Research & Technology,* **Arun Muley** - *The Boeing Aircraft Company,* **Vyas Duggirala** - *Boeing India Private Limited,* **Michael Stoia** - *The Boeing Aircraft Company*

**Development of Novel Boiling-Based Cooling Device With Non-Wettable Porous Membrane**

**Technical Presentation Only:** SHTC2023-110207

**Seyeon Hwang** - *Gyeongsang National University,* **Dahoon Jeong** - *Gyeongsang National University,* **Hyewon Kim** - *Gyeongsang National University,* **Hyungmo Kim** - *Gyeongsang National University*

**Performance Evaluation of Surfaces for Enhanced Condensation of Steam**

**Technical Presentation Only:** SHTC2023-117194

**Kashif Nawaz** - *Oak Ridge National Laboratory*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-08: ENERGY SYSTEMS

**9:00AM–10:30AM** **HAMILTON A**

Chair: **Sandip Mazumder** - *Ohio State University*
Co-Chair: **Tae-Ho Song** - *Korea Advanced Institute of Science and Technology*

**Invited: Heat/Mass Transfer Challenges and Opportunities in Decarbonization/Electrification of Energy Systems**

**Technical Presentation Only:** SHTC2023-117468

**Michael Ohadi** - *University of Maryland*

**Invited: The Key Role of Heat Transfer Analysis in Energy Systems Research**

**Technical Presentation Only:** SHTC2023-106402

**Srinath Ekkad** - *North Carolina State University*

**Invited: Optimized Design and Control of a Multi-Temperature, Multi-Module Thermal Energy Storage Ensemble**

**Technical Paper Publication:** SHTC2023-107406

**Alanna Cooney** - *University of California, Berkeley,* **Van Carey** - *University of California, Berkeley*

## K12-01 - AEROSPACE HEAT TRANSFER I

**9:00AM–10:30AM** **MOUNT VERNON B**

Chair: **Ryo Amano** - *University of Wisconsin-Milwaukee*
Co-Chair: **Ashwani Gupta** - *University of Maryland*

**Design and Analysis of Thermal Control System of a 3U CubeSat**

**Technical Paper Publication:** SHTC2023-102577

**Ram Naresh Mahato** - *BMS College of Engineering,* **Rohit Subhash** - *BMS College of Engineering,* **Thejas N. Kanakuppe** - *BMS College of Engineering,* **Adithya Sayee Ganesh** - *BMS College of Engineering,* **Chandana G** - *BMS College of Engineering,* **Brijesh N** - *BMS College of Engineering,* **Sreekar Peram** - *BMS College of Engineering*

**Flow and Heat Transfer Research on a Water-Fuel Airfoil Printed-Circuit Heat Exchanger (PCHE) in Aero-Engine: An Experimental Study**

**Technical Paper Publication:** SHTC2023-108251

**Han Qi** - *Beihang University,* **Weitong Liu** - *Beihang University,* **Ruoyv Wang** - *Beihang University,* **Yanchen Fu** - *Beihang University*

**Extreme Boiling Heat Transfer in the Cryogenic Zone**

**Technical Presentation Only:** SHTC2023-108867

**Charles Janeke** - *Constellation Dynamics*

**The Design and Development of a Smart Multilayer Coating With Variable Emissivity Capability for Space Vehicle Thermal Control Systems**

**Technical Presentation Only:** SHTC2023-109168

**Juvani Downer** - *University of the District of Columbia,* **Jiajun Xu** - *University of the District of Columbia,* **Mehdi Kabir** - *University of the District of Columbia*

## K9-10 - NANOTHERMAL METROLOGY

**11:00AM–12:30PM** **CONSTITUTION B**

Chair: **Edward Kinzel** - *University of Notre Dame*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Geoff Wehmeyer** - *Rice University*

**Invited: Ultrafast Infrared Pump-Probe Measurements for Time Domain Measurements of Electron, Phonon and Polaritonic (Plasmon and Phonon) Relaxation**

**Technical Presentation Only:** SHTC2023-107608

**Patrick Hopkins** - *University of Virginia*

**A Nanoscale Thermocouple on a Micromachined Cantilever for Intracellular Temperature**

**Technical Presentation Only:** SHTC2023-116333

**Angelo Gaitas** - *Icahn School of Medicine at Mt Sinai*

**Experimental Mapping of Relaxation and Diffusion of Energy Carriers in Optically Excited Silicon**

**Technical Presentation Only:** SHTC2023-116823

**Mauricio Segovia** - *Purdue University,* **Xianfan Xu** - *Purdue University*

## K10-02 - HEAT TRANSFER EQUIPMENT II

**11:00AM–12:30PM** **CONSTITUTION A**

Chair: **Prashant Singh** - *The University of Tennessee*

**Large-Scale Biphilic Surface Fabrication**

**Technical Presentation Only:** SHTC2023-111628

**Majid Linjawi** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign,* **George Penn** - *University of Illinois at Urbana-Champaign,* **Tarandeep Thukral** - *University of Illinois at Urbana-Champaign,* **Jahidul Hoque** - *University of Illinois at Urbana-Champaign*

**Exploring the Two-Phase Flow and Heat Transfer Performance of Metal Foam-Enhanced Tube Bundles**

**Technical Presentation Only:** SHTC2023-116858

**Cheng-Min Yang** - *Oak Ridge National Laboratory,* **Muneeshwaran Murugan** - *Oak Ridge National Laboratory,* **Kashif Nawaz** - *Oak Ridge National Laboratory*

**A Numerical Model of a Desiccant-Enhanced Evaporative (DEVap) Air Conditioner Driven by Difference Liquid Desiccant Concentration**

**Technical Presentation Only:** SHTC2023-116671

**Yi Zeng** - *National Renewable Energy Laboratory, Eric Kozubal - National Renewable Energy Laboratory,* **Jason Woods** - *National Renewable Energy Laboratory*

**Experimental and Numerical Thermal Investigation of Electric Radiant Heater Components for Vehicles**

**Technical Presentation Only:** SHTC2023-114906

**Nicholas Jih Yih Liew** - *Kookmin University,* **Hyun Jin Lee** - *Kookmin University*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-09: PHASE CHANGE IN MATERIALS PROCESSING

**11:00AM–12:30PM** **HAMILTON A**

Chair: **Chirag Kharangate** - *Case Western Reserve University*
Co-Chair: **Vaibhav Bahadur** - *University of Texas Austin*

**Invited: Understanding Transport Phenomena in Additive Manufacturing**

**Technical Presentation Only:** SHTC2023-117364

**Ying Sun** - *University of Cincinnati*

**Invited: Buoyancy Effects in Materials Processing: Impact of Professor Raymond Viskanta's Work**

**Technical Presentation Only:** SHTC2023-110024

**Yogesh Jaluria** - *Rutgers University*

**Invited: Solidification of Al-Cu Alloys in Microgravity and Terrestrial Environments**

**Technical Presentation Only:** SHTC2023-106907

**Thomas Williams** - *The University of Iowa,* **Christoph Beckermann** - *The University of Iowa*

## JAMES V. BECK MEMORIAL SYMPOSIUM-02: INVERSE PROBLEMS, PARAMETER ESTIMATION AND HEAT CONDUCTION

**11:00AM–12:30PM** **HAMILTON B**

Chair: **Hamidreza Najafi** - *Florida Institute of Technology*

**A Novel Approach for Solving Inverse Heat Conduction Problems Using Genetic Algorithm**

**Technical Paper Publication:** SHTC2023-108259

**Dominic Allard** - *Florida Institute of Technology,* **Hamidreza Najafi** - *Florida Institute of Technology*

**A Bayesian Spatio-Temporal Modeling Approach to the Inverse Heat Conduction Problem**

**Technical Paper Publication:** SHTC2023-107671

**Ridwan Olabiyi** - *Arizona State University,* **Hari Pandey** - *University of Arkansas,* **Han Hu** - *University of Arkansas,* **Ashif Iquebal** - *Arizona State University*

**Heat Flux Characterization From a Band Heater to Pipe Using Inverse Heat Conduction Problem Method**

**Technical Paper Publication:** SHTC2023-107361

**Ramon Peruchi Pacheco da Silva** - *The University of Alabama,* **Keith Woodbury** - *The University of Alabama,* **Forooza Samadi** - *The University of Alabama,* **Joseph Carpenter** - *The University of Alabama*

**Use of Artificial Intelligence Techniques, Correlation of Thermal Images and the Concept of Thermal Impedance Aiming to Estimate the Location and Size of Breast Tumours**

**Technical Paper Publication:** SHTC2023-107545

**Jefferson Nascimento** - *Federal Uniersity of Uberlandia,* **Gabriela Menegaz** - *Federal University of Uberlandia,* **Gilmar Guimaraes** - *Federal university of Uberlãndia*

## K12-02 - AEROSPACE HEAT TRANSFER II

**11:00AM–12:30PM** **MOUNT VERNON B**

Chair: **Ryo Amano** - *University of Wisconsin-Milwaukee*
Co-Chair: **Ashwani Gupta** - *University of Maryland*

**3D-Printable Gyroid Heat Exchangers**

**Technical Presentation Only:** SHTC2023-109586

**Imran Qureshi** - *University of Leeds*

**Extreme (Zero.K) Blackbulb Couple in the Cryogenic Zone**

**Technical Presentation Only:** SHTC2023-105704

**Charles Janeke** - *Constellation Dynamics*

**A Hybrid Single/Two Phase Cooling Approach Enabling Power Dense Electric Motors for Next Generation All-Electric Aircraft**

**Technical Presentation Only:** SHTC2023-114340

**Shiyu Zhang** - *Texas A&M University,* **Sourav Chakravarty** - *Texas A&M University,* **Deokgeun Park** - *Texas A&M University,* **Nathan Malone** - *Texas A&M University,* **Yida Wang** - *Texas A&M University,* **Ethan Iverson** - *Texas A&M University,* **Sri Vignesh Sankarraman** - *The University of Texas at Dallas,* **Dorsa Talebi** - *Texas A&M University,* **S. Mehdi Seyedi** - *Texas A&M University,* **Hamid Toliyat** - *Texas A&M University,* **Matthew Gardner** - *The University of Texas at Dallas,* **Jaime Grunlan** - *Texas A&M University,* **Jonathan Felts** - *Texas A&M University,* **Bryan Rasmussen** - *Texas A&M University,* **Patrick Shamberger** - *Texas A&M University,* **Dion Antao** - *Texas A&M University*

**Heat Transfer Characteristics Over Supersonic and Hypersonic Flow Over an Airfoil**

**Technical Presentation Only:** SHTC2023-111724

**Bakhtier Farouk** - *Drexel University,* **Hussein Bassindowa** - *Drexel University*

## K15-01 - TRANSPORT PHENOMENA IN MANUFACTURING AND MATERIALS PROCESSING

**1:45PM–3:15PM** **MOUNT VERNON B**

Chair: **Heng Pan** - *Texas A&M University*
Co-Chair: **Stephen Akwaboa** - *Southern University and A&M College*

**Effects of Natural Convection Mass Transfer on Drying Aerogels With Supercritical Carbon Dioxide**

**Technical Paper Publication:** SHTC2023-105770

**Friday Abolorunke** - *Tufts University,* **Hy Dinh** - *Tufts University,* **Georgios Karamanis** - *Tufts University,* **Karthik Remella** - *ANSYS, Inc.,* **Marc Hodes** - *Tufts University*

**Hot-Zone Design of Carbon/Carbon-Metal Sandwich Structure Composite Using CVI/CVD Material Processing**

**Technical Paper Publication:** SHTC2023-106577

**Xiaoqing Huang** - *Tsinghua University,* **Hui Zhang** - *Tsinghua University*

**A Lattice Boltzmann Model for Low-Temperature Plasma Dynamics**

**Technical Paper Publication:** SHTC2023-106998

**Leitao Chen** - *Tennessee State University*

**A Co-Flow Millifluidic Device for Nanoparticle Synthesis**

**Technical Paper Publication:** SHTC2023-107080

**Ruibo Yang** - *Northeastern University,* **Hongwei Sun** - *Northeastern University*

**A Semi-Analytical Model to Predict Hemiwicking Dynamics in Micropillar Arrays**

**Technical Presentation Only:** SHTC2023-115168

**Shiyu Zhang** - *Texas A&M University,* **Ruisong Wang** - *Texas A&M University,* **Jiahui Guo** - *Texas A&M University,* **Yida Wang** - *Texas A&M University,* **Dion Antao** - *Texas A&M University*

## RAYMOND VISKANTA MEMORIAL SYMPOSIUM-10: PHASE CHANGE HEAT TRANSFER

**1:45PM–3:15PM** **HAMILTON A**

Chair: **Jay Gore** - *Purdue University*
Co-Chair: **Andrei Fedorov** - *Georgia Institute of Technology*
Co-Chair: *Brent Webb - Brigham Young University*
Co-Chair: **Mehmet Pınar Mengüç** - *Ozyegin University*
Co-Chair: **Theodore Bergman** - *University of Kansas*
Co-Chair: **Laurent Pilon** - *University of California, Los Angeles*
Co-Chair: **Marcus Bianchi** - *National Renewable Energy Laboratory*
Co-Chair: **Abdulmajeed Mohamad** - *University of Calgary*
Co-Chair: **T.H. Song** - *Korea Advanced Institute of Science and Technology*

**Investigation of Universal Consolidated Database for Heat Transfer Coefficient in Flow Condensation and Machine Learning Modelling**

**Technical Paper Publication:** SHTC2023-107311

**Logan Pirnstill** - *Case Western Reserve University,* **Yue Qiu** - *Case Western Reserve University,* **Chirag Kharangate** - *Case Western Reserve University*

**Pulse Electro-Thermal Interfacial Defrosting and Deicing of Finned Heat Exchangers**

**Technical Presentation Only:** SHTC2023-107340

**Siavash Khodakarami** - *University of Illinois at Urbana-Champaign,* **Pouya Kabirzadeh** - *University of Illinois at Urbana-Champaign,* **Ayush Tiwary** - *University of Illinois at Urbana Champaign,* **Muhammad Jahidul Hoque** - *University of Illinois at Urbana-Champaign,* **Wentao Yang** - *University of Illinois at Urbana-Champaign,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**Remote Thermal Measurements With Regression of Acoustic Emissions**

**Technical Paper Publication:** SHTC2023-106939

**Christy Dunlap** - *University of Arkansas,* **Hari Pandey** - *University of Arkansas,* **Jackson Marsh** - *University of Arkansas,* **Ethan Weems** - *University of Arkansas,* **Han Hu** - *University of Arkansas*

**Line Chilldown and Flow Boiling Heat Transfer Characteristics of Stainless-Steel Tubes**

**Technical Paper Publication:** SHTC2023-106318

**Jayachandran Narayanan** - *Case Western Reserve University,* **Chinmay Shingote** - *Case Western Reserve University,* **Yue Qiu** - *Case Western Reserve University,* **Jason Hartwig** - *NASA Glenn Research Center,* **Jeffrey Mackey** - *HX5, LLC,* **Mohammad Kassemi** - *Case Western Reserve University,* **Chirag Kharangate** - *Case Western Reserve University*

**Single-Phase and Two-Phase Liquid Immersion Cooling of Data Center Power Supply Units for Heat Capture**

**Technical Presentation Only:** SHTC2023-103340

**Haoyun Qiu** - *University of Illinois at Urbana-Champaign,* **Pouya Kabirzadeh** - *University of Illinois at Urbana-Champaign,* **Todd Salamon** - *Nokia Bell Labs,* **Nenad Miljkovic** - *University of Illinois at Urbana-Champaign*

**Multimodal Characterization of Steady-State and Transient Boiling Heat Transfer**

**Technical Paper Publication:** SHTC2023-106015

**Hari Pandey** - *University of Arkansas,* **Christy Dunlap** - *University of Arkansas,* **Amanda Williams** - *University of Arkansas,* **Jackson Marsh** - *University of Arkansas,* **Han Hu** - *University of Arkansas*

## K10-03 - HEAT TRANSFER EQUIPMENT III

**1:45PM–3:15PM** **CONSTITUTION A**

Chair: **Prashant Singh** - *The University of Tennessee*
Co-Chair: **Kashif Nawaz** - *Oak Ridge National Laboratory*

**Thermal Buoyancy Effect on Wake-Induced Vibration of a Cylinder Submerged in the Wake of a Stationary Cylinder**

**Technical Paper Publication:** SHTC2023-106912

**Hamid H. Khan** - *Khalifa University of Science and Technology,* **Md. Islam** - *Khalifa University of Science and Technology,* **Isam Janajreh** - *Khalifa University of Science and Technology*

**Flow Interference Between Tandem Cylinder With Forced Convection in Staggered Position**

**Technical Paper Publication:** SHTC2023-106964

**Yuvraj Sarout** - *Khalifa University of Science and Technology,* **Md. Islam** - *Khalifa University of Science and Technology,* **Yap Fatt** - *Khalifa University of Science and Technology,* **Isam Janajreh** - *Khalifa University of Science and Technology*

**Thermal and Hydrodynamic Behavior of Metal Foams: Contrasting Compressed and Uncompressed Foams**

**Technical Paper Publication:** SHTC2023-107409

**Chaitanya Prasad Nanda** - *University of Cincinnati,* **Metodi Zlatinov** - *ERG Aerospace Corporation,* **Raj Manglik** - *University of Cincinnati*

**Effect of Inner Fin Tube Structure on Comprehensive Performance of Supercritical Carbon Dioxide and Lead Bismuth Eutectic Heat Exchanger**

**Technical Paper Publication:** SHTC2023-107565

**Shuhan Liu** - *Xi'an Jiaotong University,* **Ji'an Liu** - *Xi'an Jiaotong University,* **Qingjiang Liu** - *Xi'an Jiaotong University,* **Xianliang Lei** - *Xi'an Jiaotong University*

**Prediction of the Inter-Tube Flow Mode Transitions in the Evaporators of Multi-Effect Thermal Desalination Plants**

**Technical Paper Publication:** SHTC2023-108403

**Mina Mikhaeel** - *University of Illinois at Urbana-Champaign,* **Anthony Jacobi** - *University of Illinois at Urbana-Champaign*

## K9-11 - PHONON MODELING AND MACHINE LEARNING FOR THERMAL TRANSPORT

**1:45PM–3:15PM** **CONSTITUTION B**

Chair: **Tengfei Luo** - *University of Notre Dame*
Co-Chair: **Ashutosh Giri** – *University of Rhode Island*
Co-Chair: **Liping Wang** – *Arizona State University*

**Invited: Phonon Scattering and Vibrational Localization for Dense 3D Nanoparticle Composites**

**Technical Presentation Only:** SHTC2023-108246

**Joseph Feser** - *University of Delaware,* **Ongira Chowdhury** - *University of Delaware*

**Physics-Informed Deep Learning for Modeling Multi-Scale Thermal Transport Using Boltzmann Transport Equation**

**Technical Presentation Only:** SHTC2023-114697

**Jiahang Zhou** - *University of Notre Dame,* **Ruiyang Li** - *University of Notre Dame,* **Tengfei Luo** - *University of Notre Dame*

**Fast and Accurate Machine Learning Prediction of Phonon Scattering Rates and Lattice Thermal Conductivity**

**Technical Presentation Only:** SHTC2023-117206

**Ziqi Guo** - *Purdue University,* **Zherui Han** - *Purdue University,* **Yixuan Sun** - *Purdue University,* **Dudong Feng** - *Purdue University,* **Guang Lin** , **Xiulin Ruan** - *Purdue University*

**Phonon Ray Tracing Calculations of Ballistic Temperature and Heat Flux Profiles in Nanostructures**

**Technical Presentation Only:** SHTC2023-114839

**Yingru Song** - *Rice University,* **Geoff Wehmeyer** - *Rice University*

## JAMES V. BECK MEMORIAL SYMPOSIUM-03: INVERSE PROBLEMS, PARAMETER ESTIMATION AND HEAT CONDUCTION

**1:45PM–3:15PM** **HAMILTON B**

Chair: **Hamidreza Najafi** - *Florida Institute of Technology*

**Estimation of Multiple Contact Conductance's in a Silicon-Indium-Silicon Stack**

**Technical Presentation Only:** SHTC2023-116934

**Keith Woodbury** - *The University of Alabama,* **Grant Cutler** - *Lawrence Berkeley National Laboratory,* **Hamidreza Najafi** - *Florida Institute of Technology,* **Maya Kota** - *Lawrence Berkeley National Laboratory*

**Integrating Simulations With Experiments – Connecting Inverse Problems and V&V/UA – James V. Beck Memorial Symposium**

**Technical Presentation Only:** SHTC2023-115177

**Kevin Dowding** - *Sandia National Laboratories*

**Study of Inclusion Detection Using Bayesian Inference for an Application in Breast Tumors**

**Technical Paper Publication:** SHTC2023-107530

**Gabriela Menegaz** - *Federal University of Uberlandia,* **Cleudmar Araujo** - *Federal University of Uberlandia,* **Gilmar Guimaraes** - *Federal university of Uberlândia*

**Improving the Accuracy of Experimentally Inferred Heat Transfer Coefficients for Hot Stamping**

**Technical Paper Publication:** SHTC2023-107822

**Arpan Raj Singh** - *University of Waterloo,* **Cliff Butcher** - *University of Waterloo,* **Kyle Daun** - *University of Waterloo*

**Transient Thermal Spreading From a Circular Heat Source in Polygonal Flux Channels**

**Technical Paper Publication:** SHTC2023-106961

**Sahar Goudarzi** - *Memorial University of Newfoundland,* **Lisa Steigerwalt Lam** - *Memorial University of Newfoundland,* **Yuri Muzychka** - *Memorial University of Newfoundland,* **Greg F. Naterer** – *University of Prince Edward Island*

## K12/K14-03 AEROSPACE HEAT TRANSFER/GAS TURBINE HEAT TRANSFER

**3:45PM–5:15PM** **MOUNT VERNON B**

Chair: **Ryo Amano** - *University of Wisconsin-Milwaukee*
Co-Chair: **Ashwani Gupta** - *University of Maryland*

**Phase Change Materials for Absorbing Peak Heat Loads in Aircraft: An Effectiveness-NTU Model for Predicting the Performance of Compact Heat Exchanger**

**Technical Paper Publication:** SHTC2023-106867

**Julie Frank** - *University of Leeds,* **Duncan Borman** - *University of Leeds,* **Evaldas Greiciunas** - *EG Fluids Ltd.,* **Amirul Khan** - *University of Leeds,* **Jon Summers** - *University of Leeds*

**Numerical Predictions of the Flow and Heat Transfer Characteristics in the Film Boiling Regime During Tube Quenching**

**Technical Paper Publication:** SHTC2023-107451

**Jayachandran Narayanan** - *Case Western Reserve University,* **Sonya Hylton** - *NASA Glenn Research Center*

**Mohammad Kassemi** - *Case Western Reserve University,* **Jason Hartwig** - *NASA Glenn Research Center,* **Jeffrey Mackey** - *HX5, LLC,* **Chirag Kharangate** - *Case Western Reserve University*

**Heat Transfer Characteristics According to Inner Pipe in a Gas Turbine Vane Internal Passage**

**Technical Paper Publication:** SHTC2023-107155

**Jeonghun Heo** - *Yonsei University,* **Hee Jae Lee** - *Yonsei University,* **Taehyun Kim** - *Yonsei University,* **Gyeongryun Kim** - *Yonsei University,* **Changyong Lee** - *Doosan Enerbility,* **Hyung Hee Cho** - *Yonsei University*

**Flow and Heat Transfer Characteristics of Aerothermodynamic Loading on a Double Cone at Mach 12**

**Technical Paper Publication:** SHTC2023-106391

**Jacob Gamertsfelder** - *Oak Ridge Associated Universities,* **Jeremy Redding** - *University of Cincinnati, Luis Bravo - DEVCOM Army Research Laboratory,* **Prashant Khare** - *University of Cincinnati*

## K19/K22/K23 - ENVIRONMENTAL HEAT TRANSFER/HEAT TRANSFER EDUCATION/DIVERSITY, EQUITY AND INCLUSION IN HEAT TRANSFER COMMUNITY

**3:45PM–5:15PM** **HAMILTON A**

Chair: **Kashif Nawaz** - *Oak Ridge National Laboratory*
Co-Chair: **Subramanyaravi Annapragada** - *Carrier Corporation*

**Offsetting Global Warming by Using Novel Radiative Cooling Structures to Decrease Radiative Forcing**

**Technical Presentation Only:** SHTC2023-108533

**Atousa Pirvaram** - *York University,* **Nima Talebzadeh** - *York University,* **Siu Ning Leung** - *York University,* **Paul O'Brien** - *York University*

**Using Radiant Heating System to Prevent Bridge Freezing**

**Technical Paper Publication:** SHTC2023-105739

**Hussein Abaza** - *Kennesaw State University,* **Amaal Shenawa** - *Kennesaw State University,* **Scott Semmelink** - *Kennesaw state University*

**Heat Transfer Workshops Using the Personal Engineering Platform**

**Technical Paper Publication:** SHTC2023-107407

**Thomas Diller** - *Virginia Tech,* **Diana Bairaktarova** - *Virginia Tech*

**Thermofluid Sciences for Elementary School Students via Flow Visualization Using Smartphones and Tablets**

**Technical Presentation Only:** SHTC2023-107055

**Colby Putman** - *The University of Alabama,* **Jale Ercan Dursun** - *The University of Alabama,* **Jee Kyung Suh** - *The University of Alabama,* **Celestia Morgan** - *The University of Alabama,* **Hyun Jin Kim** - *The University of Alabama*

## K15-02 - TRANSPORT PHENOMENA IN ADDITIVE MANUFACTURING

**3:45PM–5:15PM** **CONSTITUTION A**

Chair: **Stephen Akwaboa** - *Southern University and A&M College*
Co-Chair: **Heng Pan** - Texas A&M University

**Volumetric Additive Manufacturing With 3D Point Cloud Projection and Single-Photon Nonlinear Polymerization**

**Technical Paper Publication:** SHTC2023-107127

**Aravind Jakkinapalli** - *Texas A&M University,* **Sy-Bor Wen** - *Texas A&M University*

**In-Situ Bottom-Up Temperature Measurements for Laser Powder Bed Fusion Metal Additive Manufacturing**

**Technical Paper Publication:** SHTC2023-107419

**Mason Pratt** - *The University of Utah,* **Tim Ameel** - *The University of Utah,* **Sameer Rao** - *The University of Utah*

**Thermal and Non-Thermal Transport Phenomena in Laser Sintering of Metal Nanoparticles**

**Technical Presentation Only:** SHTC2023-107595

**Heng Pan** - *Texas A&M University,* **Kai Chang** - *Texas A&M University,* **Kai Wei** - *Texas A&M University,* **Chinmoy Podder** - *Texas A&M University,* **Xiangtao Gong** - *Texas A&M University*

**Thermal Transport in Digital Glass Forming**

**Technical Presentation Only:** SHTC2023-106976

**Nicholas Capps** - *University of Notre Dame,* **John Bernardin** - *Los Alamos National Laboratory,* **Robert Landers** - *University Notre Dame,* **Edward Kinzel** - *University of Notre Dame*

## K9-12 - NANOSCALE THERMAL TRANSPORT MODELING AND MACHINE LEARNING

**3:45PM–5:15PM** **HAMILTON B**

Chair: **Calvin Li** – *Villanova University*
Co-Chair: **Liping Wang** - *Arizona State University*
Co-Chair: **Tengfei Luo** - *University of Notre Dame*
Co-Chair: **Jun Liu** - *North Carolina State University*

### Active Learning Exploration of Thermally Conductive Strained Polymers

**Technical Presentation Only:** SHTC2023-116771

**Renzheng Zhang** - *University of Notre Dame,* **Jiaxin X** - *University of Notre Dame,* **Hanfeng Zhang** - *University of Notre Dame,* **Tengfei Luo** - *University of Notre Dame*

### Accelerated Prediction of Thermal and Mid-IR Optical Properties Through Maximum Likelihood Approximation of Phonon Scattering Rates

**Technical Presentation Only:** SHTC2023-117230

**Ziqi Guo** - *Purdue University,* **Zherui Han** - *Purdue University,* **Dudong Feng** - *Purdue University,* **Guang Lin** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

### Thermal Transport in Thermoelectric Coupled Nanoantennas

**Technical Paper Publication:** SHTC2023-107511

**Edward Kinzel** - *University of Notre Dame,* **Collin Finnan** - *University of Notre Dame,* **Chao Dong** - *University of Notre Dame,* **David Burghoff** - University of Notre Dame, **Stephen White** - *AFRL Space Vehicles Directorate,* **Hadrian Aquino** - *University of Notre Dame,* **Alexei Orlov** - *University of Notre Dame,* **Wolfgang Porod** - *Notre Dame,* **Gary Bernstein** - *University of Notre Dame,* **Gergo Szakmany** - *University of Notre Dame*

### Magnesium Doping Enhances the Thermal Conductivity of Polymerized Fullerene Crystals

**Technical Presentation Only:** SHTC2023-108190

**Jaymes Dionne** - *University of Rhode Island,* **Ashutosh Giri** - *University of Rhode Island*

### True Benefits of Multiple Nanoparticle Sizes in Radiative Cooling Paints Identified With Machine Learning

**Technical Presentation Only:** SHTC2023-113570

**Daniel Carne** - *Purdue University,* **Joseph Peoples** - *Purdue University,* **Fredrik Arentz** - *Purdue University,* **Xiulin Ruan** - *Purdue University*

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| Abdelmessih | Amanie | 107153 | Variable Properties via Excel: Numerical and Computational Heat Transfer Methods | K20-03 Computational Methods | 7/10/2023, 1:45PM–3:15PM | Adams B |
| Abedi | Mahyar | 106914 | Integrated Greenhouse for Food and Water Production | K6-07 Heat Transfer in Energy Systems - General | 7/11/2023, 3:45PM–5:15PM | Hamilton B |
| Abioye | Fiyinfolouwa | 106978 | Measurement of the Thermal Diffusivity of Glass at High Temperatures | Raymond Viskanta Memorial Symposium-07: Heat Conduction | 7/11/2023, 3:45PM–5:15PM | Hamilton A |
| Abolorunke | Friday | 105770 | Effects of Natural Convection Mass Transfer on Drying Aerogels With Supercritical Carbon Dioxide | K15-01 Transport Phenomena in Manufacturing and Materials Processing | 7/12/2023, 1:45PM–3:15PM | Mount Vernon B |
| Acharya | Sumanta | 108428 | Advances in Impingement Heat Transfer- a Review and Some Recent Results | Raymond Viskanta Memorial Symposium-06: Thermal Management and Phase Change | 7/11/2023, 11:00AM–12:30PM | Mount Vernon A |
| Acharya | Sumanta | 119434 | Thermal Transport Processes Program at the National Science Foundation- Perspectives and Research Opportunities | SHTC/ES Panel: Funding Opportunities | 7/11/2023, 1:45PM–3:15PM | Potomac A |
| Acosta | Greg | 116516 | Measurement of Temperature Driven Knudsen Forces on Functionalized Surfaces | K9-08 Surface-Enhanced Phase Change Heat Transfer 2 | 7/11/2023, 3:45PM–5:15PM | Constitution B |
| Adesina | Oreoluwa | 115250 | Effect of Interface Curvature at the Axial Junction in Silicon-Germanium (Si-Ge) Nanowires | K9-02 Thermal Transport in Nanomaterials/ across Interfaces 2 | 7/10/2023, 11:00AM–12:30PM | Hamilton A |

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| Agonafer | Dereje | 107598 | Single Phase Immersion Cooling for Hyper Scale Data Centers: Challenges and Opportunities | Raymond Viskanta Memorial Symposium-05: Thermal Management | 7/11/2023, 9:00AM–10:30AM | Mount Vernon A |
| Ahmadi | Behnam | 117085 | Experimental Investigation of a Desiccant Heat Pump Clothes Dryer Utilizing an Ionic Liquid | K6-05 Heat Transfer in Energy Systems - Heat Pump | 7/11/2023, 9:00AM–10:30AM | Mount Vernon B |
| Ahmed | Pranzal | 105751 | Heat Transfer of Supercritical CO2 Near the Critical Condition Inside a Microchannel | K16-01 Heat Transfer in Electronic Equipment I | 7/10/2023, 11:00AM–12:30PM | Montpelier B |
| Alexis | Liam | 116324 | Development of Polytetrafluoroethylene - Boron Nitride Composite Processing Methods for Enhanced Thermal Conductivity | K7 Thermophysical and Radiative Properties of Materials | 7/10/2023, 9:00AM–10:30AM | Montpelier B |
| Ali | Mohamed | 111671 | Pure Water Dehumidifier Based on 3d Printed Tpms Architecture Compact Condenser | K13-01 Enhanced Condensation and Anti-Fouling Studies | 7/10/2023, 9:00AM–10:30AM | Constitution A |
| Ali | Mohamed Ibrahim | 114882 | Waste Heat Recovery, Sources, Techniques, and Transport Challenges in Heavy Industries: Feasibility Study Based on Temperature Grade | K6-03 Heat Transfer in Energy Systems - Waste Heat | 7/10/2023, 1:45PM–3:15PM | Constitution B |
| Allard | Dominic | 108259 | A Novel Approach for Solving Inverse Heat Conduction Problems Using Genetic Algorithm | James V. Beck Memorial Symposium-02: Inverse Problems, Parameter Estimation and Heat Conduction | 7/12/2023, 11:00AM–12:30PM | Hamilton B |
| Alsahlani | Assaad | 105840 | Experimental Performance of a Nonlinear Control Strategy to Regulate Temperature of a High Temperature Solar Reactor | K6-07 Heat Transfer in Energy Systems - General | 7/11/2023, 3:45PM–5:15PM | Hamilton B |
| Alvarez | Gustavo | 111652 | Thermal Conductivity of Aluminum Scandium Nitride Grown by Molecular Beam Epitaxy | K9-01 Thermal Transport in Nanomaterials/ across Interfaces 1 | 7/10/2023, 9:00AM–10:30AM | Hamilton A |

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| Bahadur | Vaibhav | 106685 | Intensification of Mass and Heat Transfer for Hydrates-Based Gigascale Seabed Sequestration of Carbon Dioxide | Raymond Viskanta Memorial Symposium-06: Thermal Management and Phase Change | 7/11/2023, 11:00AM–12:30PM | Mount Vernon A |
| Bandyopadhyay | Koustav | 108260 | A Numerical Study on Shape Dependence of Natural Convective Heat Transfer From Thin Plates in Turbulent Flow | K6-06 Heat Transfer in Energy Systems - Heat Exchangers | 7/11/2023, 11:00AM–12:30PM | Hamilton A |
| Barber | Emily | 114820 | Efficient, Hydrophobic, and Weather-Resistant Radiative Cooling Paints Based on Mp-101 Binder | K6-01 Heat Transfer in Energy Systems - Solar | 7/10/2023, 9:00AM–10:30AM | Constitution B |
| Barber | Emily | 114829 | A Comprehensive Analysis of Radiative Cooling Paints as a Deterrent Against Climate Change | K6-01 Heat Transfer in Energy Systems - Solar | 7/10/2023, 9:00AM–10:30AM | Constitution B |
| Bates | Jakob | 113758 | Selecting Bases for Reduced Order Spectral Representations of Transient Temperature Profiles | K20-04 Machine Learning and Modeling for Heat Transfer Problems | 7/10/2023, 3:45PM–5:15PM | Adams B |
| Beckermann | Christoph | 106907 | Solidification of Al-Cu Alloys in Microgravity and Terrestrial Environments | Raymond Viskanta Memorial Symposium-09: Phase Change in Materials Processing | 7/12/2023, 11:00AM–12:30PM | Hamilton A |
| Bellur | Kishan | 107376 | Resolving Discrepancy in Accommodation Coefficients: Rethinking Local Equilibrium Constructs in Evaporation Modeling | K8-02 Fundamentals of Boiling/ Condensation Including Micro/ Nano-scale Effects (Includes molecular level simulation of phase change) II | 7/10/2023, 11:00AM–12:30PM | Hamilton B |

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| Berrouk | Abdallah | 110056 | Heat Transport Study of Ternary Hybrid Nanofluid Flow Under Magnetic Dipole Together With Nonlinear Thermal Radiation | K6-01 Heat Transfer in Energy Systems - Solar | 7/10/2023, 9:00AM–10:30AM | Constitution B |
| Beskok | Ali | 114931 | Adsorbed Layer Dynamics in Thin Film Evaporation From Nanoconfinements | K9-07 Surface-Enhanced Phase Change Heat Transfer 1 | 7/11/2023, 1:45PM–3:15PM | Constitution A |
| Bhanawat | Abhinav | 117232 | Effect of Gas Bubbles on Light Transfer During Photoelectrochemical Water Splitting | Raymond Viskanta Memorial Symposium-01: Thermal Radiation in Energy Systems | 7/10/2023, 9:00AM–10:30AM | Montpelier A |
| Bhatia | Bikram | 116807 | Barocaloric Cooling: From Material to Device | K6-05 Heat Transfer in Energy Systems - Heat Pump | 7/11/2023, 9:00AM–10:30AM | Mount Vernon B |
| Bhattacharjee | Anurag | 106946 | Numerical Simulation of Particle Evolution in Spray Drying Using Droplet Drying Kinetics | K13-04 Spray Cooling | 7/10/2023, 3:45PM–5:15PM | Constitution A |
| Borca-Tasciuc | Theodorian | 119149 | Workshop on Scanning Thermal Microscopy (Sthm) and Applications | K8(/K17) Workshop on Scanning Thermal Microscopy (SThM) and Applications | 7/11/2023, 9:00AM–10:30AM | Constitution B |
| Capps | Nicholas | 106976 | Thermal Transport in Digital Glass Forming | K15-02 Transport Phenomena in Additive Manufacturing | 7/12/2023, 3:45PM–5:15PM | Constitution A |
| Carey | Van | 107406 | Optimized Design and Control of a Multi-Temperature, Multi-Module Thermal Energy Storage Ensemble | Raymond Viskanta Memorial Symposium-08: Energy Systems | 7/12/2023, 9:00AM–10:30AM | Hamilton A |
| Carey | Van | 119161 | Use of Machine Learning Tools for Thermophysics and Heat Transfer Research and Energy Technology Development | K8 Workshop: Use of Machine Learning Tools for Thermophysics and Heat Transfer Research and Energy Technology Development | 7/11/2023, 1:45PM–3:15PM | Hamilton A |

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| Carlton | Hayden | 107383 | Optimal Magnetic Particle Imaging Resolution for In-Silico Hyperthermia Simulations | K17 Heat and Mass Transfer in Biotechnology | 7/11/2023, 11:00AM–12:30PM | Hamilton B |
| Carne | Daniel | 113570 | True Benefits of Multiple Nanoparticle Sizes in Radiative Cooling Paints Identified With Machine Learning | K9-12 Nanoscale Thermal Transport Modeling and Machine Learning | 7/12/2023, 3:45PM–5:15PM | Hamilton B |
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| Chen | Tailian | 106453 | Thermal and Flow Characteristics in a Tube with Helical Ridges | K6-06 Heat Transfer in Energy Systems - Heat Exchangers | 7/11/2023, 11:00AM–12:30PM | Hamilton A |
| Chen | Yu-Bin | 106983 | Retrieval of Infrared Optical Constants of a Thin Film From Thermal Emittance | K7 Thermophysical and Radiative Properties of Materials | 7/10/2023, 9:00AM–10:30AM | Montpelier B |

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| Chen | Leitao | 106998 | A Lattice Boltzmann Model for Low-Temperature Plasma Dynamics | K15-01 Transport Phenomena in Manufacturing and Materials Processing | 7/12/2023, 1:45PM–3:15PM | Mount Vernon B |
| Chen | Yikang | 107878 | Greatly Enhanced Radiative Heat Transfer in Hyperbolic Materials | Raymond Viskanta Memorial Symposium-02: Nanoscale Thermal Radiation | 7/10/2023, 11:00AM–12:30PM | Montpelier A |
| Chen | Zijie | 114950 | Modeling to Predict Optical Properties From Reflectance Measurements in Particulate Media | K20-04 Machine Learning and Modeling for Heat Transfer Problems | 7/10/2023, 3:45PM–5:15PM | Adams B |
| Chen | Gang | 115006 | Interfacial Absorption and Generalized Boundary Conditions for Maxwell Equations | Raymond Viskanta Memorial Symposium-02: Nanoscale Thermal Radiation | 7/10/2023, 11:00AM–12:30PM | Montpelier A |
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| Chen | Jingjing | 115300 | Heat Transfer in Directly-Irradiated High-Temperature Particle–gas Flows for Solar Particle Receiver Applications | Raymond Viskanta Memorial Symposium-03: Thermal Radiation in Manufacturing and Energy | 7/10/2023, 1:45PM–3:15PM | Montpelier A |
| Chen | Jingjing | 116315 | Ambient- and High-Temperature Optical Characterisation of Alumina–silica-Based Materials for Solar Particle Receiver Applications | Raymond Viskanta Memorial Symposium-04: Thermal Radiation in Energy Systems | 7/10/2023, 3:45PM–5:15PM | Montpelier A |

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| Chowdhury | Ongira | 106801 | Phonon Scattering and Vibrational Localization in Embedded Nanoparticle Composites | K9-01 Thermal Transport in Nanomaterials/ across Interfaces 1 | 7/10/2023, 9:00AM–10:30AM | Hamilton A |
| Cole | Kevin D. | 111296 | Calibration of a One-Dimensional Thermal Model for Metal Additive Manufacturing | James V. Beck Memorial Symposium-01: Inverse Problems, Parameter Estimation and Heat Conduction | 7/12/2023, 9:00AM–10:30AM | Hamilton B |
| Corpus | Robert Michael | 105893 | Investigation of the on Road and Driving Cycle Fuel Economy of an Urban Public Utility Jeepney Using Micro Trip Method | K11 Fire and Combustion | 7/11/2023, 1:45PM–3:15PM | Hamilton B |
| Corpus | Robert Michael | 107495 | Drive Cycle Generated Using Microtrip Method on Public Vehicles in Metro Manila | K11 Fire and Combustion | 7/11/2023, 1:45PM–3:15PM | Hamilton B |
| Dai | Xianming | 106741 | Hydrophilic Reentrant Slips Enabled Flow Separation for Rapid Water Harvesting | K8-03 Fundamentals of Single Phase Heat Transfer and Melting and Solidification | 7/10/2023, 1:45PM–3:15PM | Hamilton B |
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| de Bock | Peter | 119180 | Arpa-E if It Works, Will It Matter - Funding Transformational Research | SHTC/ES Panel: Funding Opportunities | 7/11/2023, 1:45PM–3:15PM | Potomac A |
| De Lemos | Marcelo | 106738 | An Enthalpy-Porosity Model for Phase-Change Applied to Plug and Abandonment of Oil Wells | Raymond Viskanta Memorial Symposium-04: Thermal Radiation in Energy Systems | 7/10/2023, 3:45PM–5:15PM | Montpelier A |

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| Diller | Thomas | 107407 | Heat Transfer Workshops Using the Personal Engineering Platform | K19/K22/ K23 Enviromental Heat Transfer/Heat Transfer Education/ Diversity, Equity and Inclusion in Heat Transfer Community | 7/12/2023, 3:45PM–5:15PM | Hamilton A |
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| Dipto | Mohammed Jubair | 111466 | Inside-Out Cooling of High Energy-Density Lithium-Ion Batteries | K6-04 Heat Transfer in Energy Systems - Batteries | 7/10/2023, 3:45PM–5:15PM | Constitution B |
| Dowding | Kevin | 115177 | Integrating Simulations With Experiments – Connecting Inverse Problems and V&v/uq – James v. Beck Memorial Symposium* | James V. Beck Memorial Symposium-03: Inverse Problems, Parameter Estimation and Heat Conduction | 7/12/2023, 1:45PM–3:15PM | Hamilton B |

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| Fakhrulrezza | Mohammad | 115109 | Analysis of Solar Radiation Effects on Skin Temperature of Driver Inside a Vehicle | K20-01 Applications of Computational Heat Transfer I | 7/10/2023, 9:00AM–10:30AM | Adams B |
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| Fisher | Dr. Timothy S. | 106085 | Coupled Thermal Radiation Processes in Solar-Thermal Synthesis of High-Yield Flake Graphite and Hydrogen via Methane Decomposition | Raymond Viskanta Memorial Symposium-01: Thermal Radiation in Energy Systems | 7/10/2023, 9:00AM–10:30AM | Montpelier A |
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| Fu | Wuchen | 105491 | Pool Boiling of Low-Gwp R1336mzz(e) Refrigerant on Plain and Surface Structured Tubes | K6-06 Heat Transfer in Energy Systems - Heat Exchangers | 7/11/2023, 11:00AM–12:30PM | Hamilton A |
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| Guinan | Eoin | 108110 | The Effect of Bending on Sintered Wicked Heat Pipes for Multiple Component Cooling | K16-01 Heat Transfer in Electronic Equipment I | 7/10/2023, 11:00AM–12:30PM | Montpelier B |
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| Liu | Jun | 105986 | Molecular Dynamics Simulations of Water Evaporation and Condensation in Membrane and Hydrogel | Raymond Viskanta Memorial Symposium-06: Thermal Management and Phase Change | 7/11/2023, 11:00AM–12:30PM | Mount Vernon A |
| Liu | Qihang | 106763 | Experimental and Numerical Study on Wet Steam Flow Metering Overreading Characteristics in Venturi Tube | K13-04 Spray Cooling | 7/10/2023, 3:45PM–5:15PM | Constitution A |

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| Liu | Qingjiang | 107597 | Experimental Study on Heat Transfer Characteristics of Carbon Dioxide Under Subcritical Pressures | K13-02 Pool Boiling Fundamentals | 7/10/2023, 11:00AM–12:30PM | Constitution A |
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| Liu | Yang | 115151 | Oil-Paper-Umbrella-Inspired Passive Radiative Cooling Using Recycled Packaging Foam | K7 Thermophysical and Radiative Properties of Materials | 7/10/2023, 9:00AM–10:30AM | Montpelier B |
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| M | Muneeshwaran | 107533 | Pool Boiling Heat Transfer Characteristics of Low-Gwp Refrigerants on Laser-Treated Surfaces | K10-01 Heat transfer equipment I | 7/12/2023, 9:00AM–10:30AM | Constitution A |
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| Martinez | Ricardo | 116946 | Dependent Scattering and Plasmonic Coupling Enhance Spectral Absorption of Nanoparticle Suspensions | K8(/K9)-05 Fundamentals of Radiative Heat Transfer | 7/11/2023, 9:00AM–10:30AM | Hamilton A |
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| Muzychka | Yuri | 106961 | Transient Thermal Spreading From a Circular Heat Source in Polygonal Flux Channels | James V. Beck Memorial Symposium-03: Inverse Problems, Parameter Estimation and Heat Conduction | 7/12/2023, 1:45PM–3:15PM | Hamilton B |
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| Plomitallo | Renato Elpidio | 107330 | Composite Phase Change Material With Metal Foam in Shell and Convergent Tube Thermal Energy Storage Systems | K6-02 Heat Transfer in Energy Systems - Energy Storage | 7/10/2023, 11:00AM–12:30PM | Constitution B |
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| Qatramez | Ala' | 106993 | Estimation of Heat Flux From Gases Released During Thermal Runaway of Lithium-Ion Batteries | K6-04 Heat Transfer in Energy Systems - Batteries | 7/10/2023, 3:45PM–5:15PM | Constitution B |
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| Wang | Xinwei | 106133 | Anisotropic Specific Heat and Temperature in Van Der Waals Crystals | Raymond Viskanta Memorial Symposium-07: Heat Conduction | 7/11/2023, 3:45PM–5:15PM | Hamilton A |
| Wang | Xiuling | 107752 | Application of Adaptive Finite Element Method in Solving Convective Heat Transfer Problems | Darrell Pepper Memorial Symposium | 7/11/2023, 3:45PM–5:15PM | Constitution A |
| Wang | Robert | 112673 | Thermochemical Heat Pipes for District Heating and Long Distance Thermal Transport | K6-03 Heat Transfer in Energy Systems - Waste Heat | 7/10/2023, 1:45PM–3:15PM | Constitution B |
| Wang | Robert | 114562 | Heterogenous Liquid Metal - Silver - Polymer Composites for Thermal Interface Materials | K16-03 Heat Transfer in Electronic Equipment III | 7/10/2023, 3:45PM–5:15PM | Montpelier B |
| Wang | Yaguo | 116541 | Thermal Behavior Transition of Graphite Under High Pressure | K9-04 Tunable Thermal Transport | 7/10/2023, 3:45PM–5:15PM | Hamilton A |
| Wang | Xueji | 116702 | Observation of Nonvanishing Optical Helicity in Thermal Radiation With Symmetry-Broken Metasurfaces | K9-09 Thermal Emission Control with Nanostructures | 7/12/2023, 9:00AM–10:30AM | Constitution B |
| Wasti | Amogh | 116889 | Characterization of a Stacked Modular Thermoelectric System for Variable Heat Rate and High Cop Hydronics | K6-07 Heat Transfer in Energy Systems - General | 7/11/2023, 3:45PM–5:15PM | Hamilton B |
| Weems | Ethan | 106819 | Development and Evaluation of High-Performance Air-Cooled Heat Sinks With Generative Design Algorithms | K16-02 Heat Transfer in Electronic Equipment II | 7/10/2023, 1:45PM–3:15PM | Montpelier B |
| Wei | Xinsheng | 112183 | Demonstration of Simultaneous Sub-Ambient Radiative Cooling and Solar Energy Harvesting | K9-05 Radiative Cooling and Radiative Properties of Nanomaterials | 7/11/2023, 9:00AM–10:30AM | Hamilton B |

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| Whitaker | Trevor | 107272 | Experimental Investigation of Orientation Effects on Pseudocritical Transition Dynamics in Heated Microchannel With Side-View Schlieren Imaging | K16-01 Heat Transfer in Electronic Equipment I | 7/10/2023, 11:00AM–12:30PM | Montpelier B |
| Wilson | Adam | 116685 | High Power and Capacity Thermal Buffering Modules From 3d-Printed Shape Memory Nickel Titanium Porous Cubes | K16-03 Heat Transfer in Electronic Equipment III | 7/10/2023, 3:45PM–5:15PM | Montpelier B |
| Woodbury | Keith | 116591 | In Memory of Professor James v. Beck: A Legacy to Remember | James V. Beck Memorial Symposium-01: Inverse Problems, Parameter Estimation and Heat Conduction | 7/12/2023, 9:00AM–10:30AM | Hamilton B |
| Woodbury | Keith | 116934 | Estimation of Multiple Contact Conductances in a Silicon-Indium-Silicon Stack | James V. Beck Memorial Symposium-03: Inverse Problems, Parameter Estimation and Heat Conduction | 7/12/2023, 1:45PM–3:15PM | Hamilton B |
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| Yang | Dr. Cheng-Min | 116858 | Exploring the Two-Phase Flow and Heat Transfer Performance of Metal Foam-Enhanced Tube Bundles | K10-02 Heat transfer equipment II | 7/12/2023, 11:00AM–12:30PM | Constitution A |
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| Zare | Saman | 116645 | Probing the Spectral Tunability of Near-Field Thermal Radiation Using Silicon Carbide Nanopillars | K9-09 Thermal Emission Control with Nanostructures | 7/12/2023, 9:00AM–10:30AM | Constitution B |
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| Zeng | Yi | 115237 | An Experimental and Numerical Study of Heat and Mass of Srcl2-Based Thermochemical Materials for Thermal Energy Storage | K6-02 Heat Transfer in Energy Systems - Energy Storage | 7/10/2023, 11:00AM–12:30PM | Constitution B |
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| James V. Beck Memorial Symposium: Inverse Problems, Parameter Estimation and Heat Conduction | Hamidreza Najafi | Florida Institute of Technology |
| Symposium in Memory of Professor Raymond Viskanta | Xiulin Ruan<br>Xianfan Xu<br>Jay Gore<br>Laurent Pilon<br>Ted Bergman<br>Marcus Bianchi<br>Andrei Fedorov<br>Pinar Mengüç<br>Abdulmajeed Mohamad,<br>Tae-Ho Song<br>Brent Webb | Purdue University<br>Purdue University<br>Purdue University<br>University of California, Los Angeles<br>University of Kansas<br>National Renewable Energy Laboratory<br>Georgia Institute of Technology<br>Ozyegin University<br>University of Calgary<br>Korea Advanced Institute of Science and Technology (emeritus)<br>Brigham Young University |
| Symposium in Memory of Professor Darrell Pepper | Shima Hajimirza | Steven Institute of Technology |
| K6 Heat Transfer in Energy Systems | Leitao Chen | Tennessee State University |
| K7 Thermophysical Properties | Xinwei Wang | Iowa State University |
| K8 Theory and Fundamental Research | Diana-Andra Borca-Tasciuc | Rensselaer Polytechnic Institute |
| K9 Nanoscale Thermal Transport | Liping Wang<br>Tengfei Luo<br>Geoff Wehmeyer | Arizona State University<br>University of Notre Dame<br>Rice University |
| K10 Heat Transfer Equipment | Kashif Nawaz<br>Prashant Singh | Oak Ridge National Laboratory<br>The University of Tennessee Knoxville |
| K11 Fire and Combustion | Tariq Shamim | Northern Illinois University |
| K12 Aerospace Heat Transfer | Ryo Amano<br>Ashwani Gupta | University of Wisconsin-Milwaukee<br>University of Maryland |
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| K14 Gas Turbine Heat Transfer | Atul Kohli | Pratt & Whitney |
| K15 Transport Phenomena in Manufacturing and Materials Processing | Stephen Akwaboa<br>Heng Pan | Southern University and A&M College<br>Texas A&M University |
| K16 Heat Transfer in Electronic Equipment | Amanie Abdelmessih<br>Chirag Kharangate<br>Tiwei Wei | California Baptist University<br>Case Western Reserve University<br>Purdue University |
| K17 Heat and Mass Transfer in Biotechnology | Bumsoo Han | Purdue University |
| K 18 Heat Transfer under Extreme Conditions | Qiang Liao | Institute of Engineering Thermophysics, Chongqing University |
| K19 Environmental Heat Transfer | Kashif Nawaz | Oak Ridge National Laboratory |
| K20 Computational Heat Transfer | Mohamed Abdelhady<br>John Tencer | University of Calgary, Canada<br>Sandia National Laboratories |
| K22 Heat Transfer Visualization | Nenand Miljkovic | University of Illinois at Urbana-Champaign |
| K23 -Diversity and Inclusion Committee | Leslie Phinney | Sandia National Laboratories |

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|---|---|---|---|
| K6-01 - Heat Transfer in Energy Systems - Solar | Myeongsub "Mike"<br>Dong<br>Rydge<br>Hohyun<br>Leitao | Kim<br>Liu<br>Mulford<br>Lee<br>Chen | Florida Atlantic University<br>University of Houston<br>University of Dayton<br>Santa Clara University<br>Tennessee State University |
| K6-02 - Heat Transfer in Energy Systems - Energy Storage | Rydge<br>Dong<br>Hohyun<br>Leitao | Mulford<br>Liu<br>Lee<br>Chen | University of Dayton<br>University of Houston<br>Santa Clara University<br>Tennessee State University |
| K6-03 - Heat Transfer in Energy Systems - Waste Heat | Myeongsub "Mike"<br>Dong<br>Rydge<br>Hohyun<br>Leitao | Kim<br>Liu<br>Mulford<br>Lee<br>Chen | Florida Atlantic University<br>University of Houston<br>University of Dayton<br>Santa Clara University<br>Tennessee State University |
| K6-04 - Heat Transfer in Energy Systems - Batteries | Hohyun<br>Dong<br>Rydge<br>Leitao | Lee<br>Liu<br>Mulford<br>Chen | Santa Clara University<br>University of Houston<br>University of Dayton<br>Tennessee State University |
| K6-05 - Heat Transfer in Energy Systems - Heat Pump | Rydge<br>Dong<br>Hohyun<br>Leitao | Mulford<br>Liu<br>Lee<br>Chen | University of Dayton<br>University of Houston<br>Santa Clara University<br>Tennessee State University |
| K6-06 - Heat Transfer in Energy Systems - Heat Exchangers | Hohyun<br>Dong<br>Rydge<br>Leitao | Lee<br>Liu<br>Mulford<br>Chen | Santa Clara University<br>University of Houston<br>University of Dayton<br>Tennessee State University |
| K6-07 - Heat Transfer in Energy Systems - General | Nesrin<br>Dong<br>Rydge<br>Hohyun<br>Leitao | Ozalp<br>Liu<br>Mulford<br>Lee<br>Chen | Purdue Northwest<br>University of Houston<br>University of Dayton<br>Santa Clara University<br>Tennessee State University |
| K7 - Thermophysical and Radiative Properties of Materials | Xinwei | Wang | Iowa State University |
| K8 Industry Panel - Fundamentals on Thermal Management of Electronics | Amitabh<br>An<br>Diana-Andra | Narain<br>Zou<br>Borca-Tasciuc | Michigan Technological University<br>Advanced Cooling Technologies<br>Rensselaer Polytechnic Institute |
| K8 Workshop: Use of Machine Learning Tools for Thermophysics and Heat Transfer Research and Energy Technology Development | Joe<br>Diana-Andra | Feser<br>Borca-Tasciuc | University of Delaware<br>Rensselaer Polytechnic Institute |
| K8-01 - Fundamentals of Boiling/Condensation Including Micro/Nano-scale Effects (Includes Molecular Level Simulation of Phase Changee) I | Navdeep Singh<br>An<br>Diana-Andra | Dhillon<br>Zou<br>Borca-Tasciuc | California State University, Long Beach<br>Advanced Cooling Technologies<br>Rensselaer Polytechnic Institute |

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| K8-02 - Fundamentals of Boiling/Condensation Including Micro/Nano-scale Effects (Includes Molecular Level Simulation of Phase Change) II | An<br>Navdeep Singh<br>Diana-Andra | Zou<br>Dhillon<br>Borca-Tasciuc | Advanced Cooling Technologies<br>California State University, Long Beach<br>Rensselaer Polytechnic Institute |
| K8-03 - Fundamentals of Single Phase Heat Transfer and Melting and Solidification | Navdeep Singh<br>An<br>Diana-Andra | Dhillon<br>Zou<br>Borca-Tasciuc | California State University, Long Beach<br>Advanced Cooling Technologies<br>Rensselaer Polytechnic Institute |
| K8-04 - Fundamentals of Conduction Heat Transfer | Joe<br>Thedorian<br>Diana-Andra | Feser<br>Borca-Tasciuc<br>Borca-Tasciuc | University of Delaware<br>Rensselaer Polytechnic Institute<br>Rensselaer Polytechnic Institute |
| K8/K17 - Workshop on Scanning Thermal Microscopy (SThM) and Applications | Devashish<br>Diana-Andra | Shrivastava<br>Borca-Tasciuc | FDA<br>Rensselaer Polytechnic Institute |
| K8/K9-05 - Fundamentals of Radiative Heat Transfer | Darshan<br>Liping<br>Vaibhav<br>Diana-Andra | Pahinkar<br>Wang<br>Bahadur<br>Borca-Tasciuc | Florida Institute of Technology<br>Arizona State University<br>University of Texas Austin<br>Rensselaer Polytechnic Institute |
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| K9-02 - Thermal Transport in Nanomaterials/across Interfaces 2 | Geoff<br>Ashutosh<br>Liping | Wehmeyer<br>Giri<br>Wang | Rice University<br>University of Rhode Island<br>Arizona State University |
| K9-03 - Thermal Transport in Nanomaterials/across Interfaces 3 | Yaguo<br>Mona<br>Geoff<br>Liping | Wang<br>Zebarjadi<br>Wehmeyer<br>Wang | The University of Texas at Austin<br>University of Virginia<br>Rice University<br>Arizona State University |
| K9-04 - Tunable Thermal Transport | Xiaojia<br>Tengfei<br>Edward<br>Liping | Wang<br>Luo<br>Kinzel<br>Wang | University of Minnesota<br>University of Notre Dame<br>University of Notre Dame<br>Arizona State University |
| K9-05 - Radiative Cooling and Radiative Properties of Nanomaterials | Sheila<br>Bo<br>Liping | Edalatpour<br>Zhao<br>Wang | University of Maine<br>University of Houston<br>Arizona State University |
| K9-06 - Radiative Thermal Energy Conversion with Nanostructures | Linxiao<br>Sheila<br>Liping | Zhu<br>Edalatpour<br>Wang | Pennsylvania State University<br>University of Maine<br>Arizona State University |
| K9-07 - Surface-Enhanced Phase Change Heat Transfer 1 | Ming-Chang<br>Tengfei<br>Liping | Lu<br>Luo<br>Wang | National Taiwan University<br>University of Notre Dame<br>Arizona State University |

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| K9-09 - Thermal Emission Control with Nanostructures | Bo<br>Linxiao<br>Liping | Zhao<br>Zhu<br>Wang | University of Houston<br>Pennsylvania State University<br>Arizona State University |
| K9-10 - Nanothermal Metrology | Edward<br>Geoff<br>Liping | Kinzel<br>Wehmeyer<br>Wang | University of Notre Dame<br>Rice University<br>Arizona State University |
| K9-11 - Phonon Modeling and Machine Learning for Thermal Transport | Tengfei<br>Ashutosh<br>Liping | Luo<br>Giri<br>Wang | University of Notre Dame<br>University of Rhode Island<br>Arizona State University |
| K9-12 - Nanoscale Thermal Transport Modeling and Machine Learning | Calvin<br>Tengfei<br>Jun<br>Liping | Li<br>Luo<br>Liu<br>Wang | Villanova University<br>University of Notre Dame<br>North Carolina State University<br>Arizona State University |
| K10-01 - Heat transfer Equipment I | Prashant | Singh | University of Tennessee |
| K10-02 - Heat transfer Equipment II | Prashant | Singh | University of Tennessee |
| K10-03 - Heat Transfer Equipment III | Prashant<br>Kashif | Singh<br>Nawaz | University of Tennessee<br>Oak Ridge National Laboratory |
| K11 - Fire and Combustion | Tariq<br>Songtao<br>Omid | Shamim<br>Guo<br>Askari | Northern Illinois University<br>Cornell University<br>West Virginia University |
| K12/K14 -03 - Aerospace Heat Transfer/Gas Turbine Heat Transfer | Ryo<br>Ashwani | Amano<br>Gupta | University of Wisconsin-Milwaukee<br>University of Maryland |
| K12-01 - Aerospace Heat Transfer I | Ryo<br>Ashwani | Amano<br>Gupta | University of Wisconsin-Milwaukee<br>University of Maryland |
| K12-02 - Aerospace Heat Transfer II | Ryo<br>Ashwani | Amano<br>Gupta | University of Wisconsin-Milwaukee<br>University of Maryland |
| K13-01 - Enhanced Condensation and Anti-Fouling Studies | Vinod<br>Chanwoo | Srinivasan<br>Park | University of Minnesota<br>University of Missouri |
| K13-02 - Pool Boiling Fundamentals | Vinod<br>Chanwoo | Srinivasan<br>Park | University of Minnesota<br>University of Missouri |
| K13-03 - Flow Boiling Fundamentals | Chanwoo<br>Vinod | Park<br>Srinivasan | University of Missouri<br>University of Minnesota |
| K13-04 - Spray Cooling | Vinod<br>Chanwoo | Srinivasan<br>Park | University of Minnesota<br>University of Missouri |
| K13-05 - Phase-Change from Enhanced Surfaces | Chanwoo<br>Vinod | Park<br>Srinivasan | University of Missouri<br>University of Minnesota |

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| K15-01 - Transport Phenomena in Manufacturing and Materials Processing | Heng<br>Stephen | Pan<br>Akwaboa | Texas A&M University<br>Southern University and A&M College |
| K15-02 - Transport Phenomena in Additive Manufacturing | Stephen<br>Heng | Akwaboa<br>Pan | Southern University and A&M College<br>Texas A&M University |
| K16-01 - Heat Transfer in Electronic Equipment I | Amanie<br>Amy<br>Tiwei<br>Chirag<br>Ankur<br>Baris | Abdelmessih<br>Marconnet<br>Wei<br>Kharangate<br>Jain<br>Dogrouz | California Baptist University<br>Purdue University<br>Purdue University<br>Case Western Reserve Univerisity<br>The University of Texas at Arlington<br>Maxar |
| K16-02 - Heat Transfer in Electronic Equipment II | Amanie<br>Tiwei<br>Chirag | Abdelmessih<br>Wei<br>Kharangate | California Baptist University<br>Purdue University<br>Case Western Reserve Univerisity |
| K16-03 - Heat Transfer in Electronic Equipment III | Amanie<br>Tiwei<br>Chirag | Abdelmessih<br>Wei<br>Kharangate | California Baptist University<br>Purdue University<br>Case Western Reserve Univerisity |
| K17 - Heat and Mass Transfer in Biotechnology | Angelo<br>Thedorian<br>Diana-Andra | Gaitas<br>Borca-Tasciuc<br>Borca-Tasciuc | Mount Sinai School of Medicine<br>Rensselaer Polytechnic Institute<br>Rensselaer Polytechnic Institute |
| K18 - Heat Transfer under Extreme Conditions | Qiang | Liao | Chongqing University |
| K19/K22/ K23 - Enviromental Heat Transfer/Heat Transfer Education/Diversity, Equity and Inclusion in Heat Transfer Community | Kashif<br>Subramanyaravi | Nawaz<br>Annapragada | Oak Ridge National Laboratory<br>Carrier Corporation |
| K20-01 - Applications of Computational Heat Transfer I | Mohamed<br>John<br>Shima<br>Hamidreza | Abdelhady<br>Tencer<br>Hajimirza<br>Najafi | University of Calgary<br>Sandia National Laboratories<br>Stevens Institute of Technology<br>Florida Institute of Technology |
| K20-02 - Applications of Computational Heat Transfer II | Mohamed<br>Nehal<br>John<br>Shima | Abdelhady<br>Jajal<br>Tencer<br>Hajimirza | University of Calgary<br>Ohio State University<br>Sandia National Laboratories<br>Stevens |
| K20-03 - Computational Methods | Mohamed<br>John<br>Shima<br>Aaron | Abdelhady<br>Tencer<br>Hajimirza<br>Wemhoff | University of Calgary<br>Sandia National Laboratories<br>Stevens Institute of Technology<br>Villanova University |
| K20-04 - Machine Learning and Modeling for Heat Transfer Problems | Mohamed<br>John<br>Shima<br>Hamidreza | Abdelhady<br>Tencer<br>Hajimirza<br>Najafi | University of Calgary<br>Sandia National Laboratories<br>Stevens Institute of Technology<br>Florida Institute of Technology |

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| Donald Q. Kern Award Lecture | Sandra<br>Subramanyaravi | Boetcher<br>Annapragada | Embry Riddle Aeronautical Univ<br>Carrier Corporation |
| Energy Storage for Sustainable Building | Sandra<br>Subramanyaravi | Boetcher<br>Annapragada | Embry Riddle Aeronautical Univ<br>Carrier Corporation |
| James V. Beck Memorial Symposium-01: Inverse Problems, Parameter Estimation and Heat Conduction | Hamidreza | Najafi | Florida Institute of Technology |
| James V. Beck Memorial Symposium-02: Inverse Problems, Parameter Estimation and Heat Conduction | Hamidreza | Najafi | Florida Institute of Technology |
| James V. Beck Memorial Symposium-03: Inverse Problems, Parameter Estimation and Heat Conduction | Hamidreza | Najafi | Florida Institute of Technology |
| Max Jakob Memorial Award Lecture | Sandra<br>Subramanyaravi | Boetcher<br>Annapragada | Embry Riddle Aeronautical Univ<br>Carrier Corporation |
| Poster Session | Rydge | Mulford | University of Dayton |
| Raymond Viskanta Memorial Symposium-01: Thermal Radiation in Energy Systems | Xiulin<br>Laurent | Ruan<br>Pilon | Purdue University<br>University of California, Los Angeles |
| Raymond Viskanta Memorial Symposium-02: Nanoscale Thermal Radiation | Mehmet Pınar<br>Dudong | Mengüç<br>Feng | Ozyegin University<br>Purdue University |
| Raymond Viskanta Memorial Symposium-03: Thermal Radiation in Manufacturing and Energy | Mathieu<br>Xianfan | Francoeur<br>Xu | McGill University<br>Purdue University |
| Raymond Viskanta Memorial Symposium-04: Thermal Radiation in Energy Systems | Abdulmajeed<br>Liping | Mohamad<br>Wang | University of Calgary<br>Arizona State University |
| Raymond Viskanta Memorial Symposium-05: Thermal Management | Tiwei | Wei | Purdue University |
| Raymond Viskanta Memorial Symposium-06: Thermal Management and Phase Change | Solomon<br>Ying | Adera<br>Sun | University of Michigan<br>University of Cincinnati |
| Raymond Viskanta Memorial Symposium-07: Heat Conduction | Tengfei<br>Geoff | Luo<br>Wehmeyer | University of Notre Dame<br>Rice University |
| Raymond Viskanta Memorial Symposium-08: Energy Systems | Tae-Ho<br>Sandip | Song<br>Mazumder | Korea Advanced Institute of Science & Technology<br>Ohio State University |

# Session Organizers

| SESSION | SESSION CHAIR/ CO-CHAIR FIRST NAME | SESSION CHAIR/ CO-CHAIR LAST NAME | AFFILIATION |
|---|---|---|---|
| Raymond Viskanta Memorial Symposium-09: Phase Change in Materials Processing | Chirag<br>Vaibhav | Kharangate<br>Bahadur | Case Western Reserve University<br>University of Texas Austin |
| Raymond Viskanta Memorial Symposium-10: Phase Change Heat Transfer | Abdulmajeed<br>Marcus<br>Dr. T.H.<br>Laurent<br>Theodore<br>Mehmet Pınar<br>Andrei<br>Brent<br>Jay | Mohamad<br>Bianchi<br>Song<br>Pilon<br>Bergman<br>Mengüç<br>Fedorov<br>Webb<br>Gore | University of Calgary<br>National Renewable Energy Laboratory<br>Korea Advanced Institute of Science & Technology<br>University of California, Los Angeles<br>University of Kansas<br>Ozyegin University<br>Georgia Institute of Technology<br>Brigham Young University<br>Purdue University |
| SHTC/ES Panel - Funding Opportunities | Sandra | Boetcher | Embry Riddle Aeronautical University |

# ACKNOWLEDGMENTS

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**Ravi Annapragada, Ph.D.**
*Global Engineering Sustainability Leader*
*Carrier Corporation*

**BIOGRAPHY:** Dr. S. Ravi Annapragada is the Global Engineering Sustainability Leader at Carrier Corporation responsible for defining and driving engineering strategy and venture investments to meet Carrier's sustainability goals. He has authored more than 40 peer reviewed papers in the area of alternate heat pumps, solid-state cooling, and heat transfer and has filed >40 patents (11 granted so far). He also serves on the Industry Advisory Board Member of Embry Riddle University Department of Mechanical Engineering. He is an ASME fellow and is currently an Executive Member of the ASME Heat Transfer Division. He is a recipient of multiple awards including 2016 EPPD ASME Young Engineer Of The Year, 2008 ASME best paper award, 2009 InterPACK best poster award. He was previously an associate editor for the Journal of Electronics Packaging.

**Sandra Boetcher, Ph.D.**
*Professor of Mechanical Engineering and College of Engineering Research Fellow*
*Embry-Riddle Aeronautical University*

**BIOGRAPHY:** Sandra Boetcher is a Professor of Mechanical Engineering at Embry-Riddle Aeronautical University. She obtained her B.M.E., M.S., and Ph.D. in Mechanical Engineering from the University of Minnesota in 2001, 2003, and 2006, respectively. Prior to her appointment at Embry-Riddle, Professor Boetcher was a founding faculty member in the newly formed Department of Mechanical and Energy Engineering at the University of North Texas and worked for several companies including Honeywell, 3M, and Donaldson Company. She currently serves as an editor of Carbon Capture Science and Technology and has served as an associate or guest editor for a number of other journals, including Journal of Thermal Science and Applications, Journal of Fluids Engineering, and Journal of Heat Transfer. In 2019, she was appointed to the ASME Heat Transfer Division Executive Committee. She was awarded an ASHRAE Presidential Award of Excellence through the Space Coast Chapter for her participation as lead faculty member in Solar Decathlon 2017 and is a Fellow of ASME.

**Diana-Andra Borca-Tasciuc**
*Professor in Mechanical, Aerospace and Nuclear Engineering Department*
*Rensselaer Polytechnic Institute*

**BIOGRAPHY:** Diana-Andra Borca-Tasciuc is a professor in the Mechanical, Aerospace and Nuclear Engineering Department at Rensselaer Polytechnic Institute, which she joined in 2006. She received her B.S. in Physics from Bucharest University, and M.S. and PhD. in Mechanical Engineering from the University of California at Los Angeles. She is a 2008 NSF Career awardee and a 2013 Fulbright scholar. Her research interests are in the area of energy conversion and current projects include power harvesting MEMS, solar power harvesting building envelope and thermal processes at nanoscale. She has co-authored over 100 journal articles and conference proceedings and is a co-inventor on several patents and patent applications. She is serving as the Chair of the ASME K-8 Theory and Fundamental Research Technical Committee and is a member of the ASME K-6 Heat Transfer in Energy Systems Committee.

**Dong Liu**
*Professor and the Director of Graduate Studies in the Department of Mechanical Engineering*
*University of Houston*

**BIOGRAPHY:** Dr. Dong Liu is a Professor and the Director of Graduate Studies in the Department of Mechanical Engineering at the University of Houston (UH). Before joining UH, he was a post-doctoral research associate in the School of Mechanical Engineering at Purdue University, where he received his Ph.D. Dr. Liu obtained both his B.S. and M.S. from Tsinghua University, China. He has served as the Chair of ASME K-9 Committee on Nanoscale Thermal Transport. His research interests include micro/nanofluidics, phase change heat transfer, boiling and two-phase flow and light-matter interactions.

# Acknowledgments

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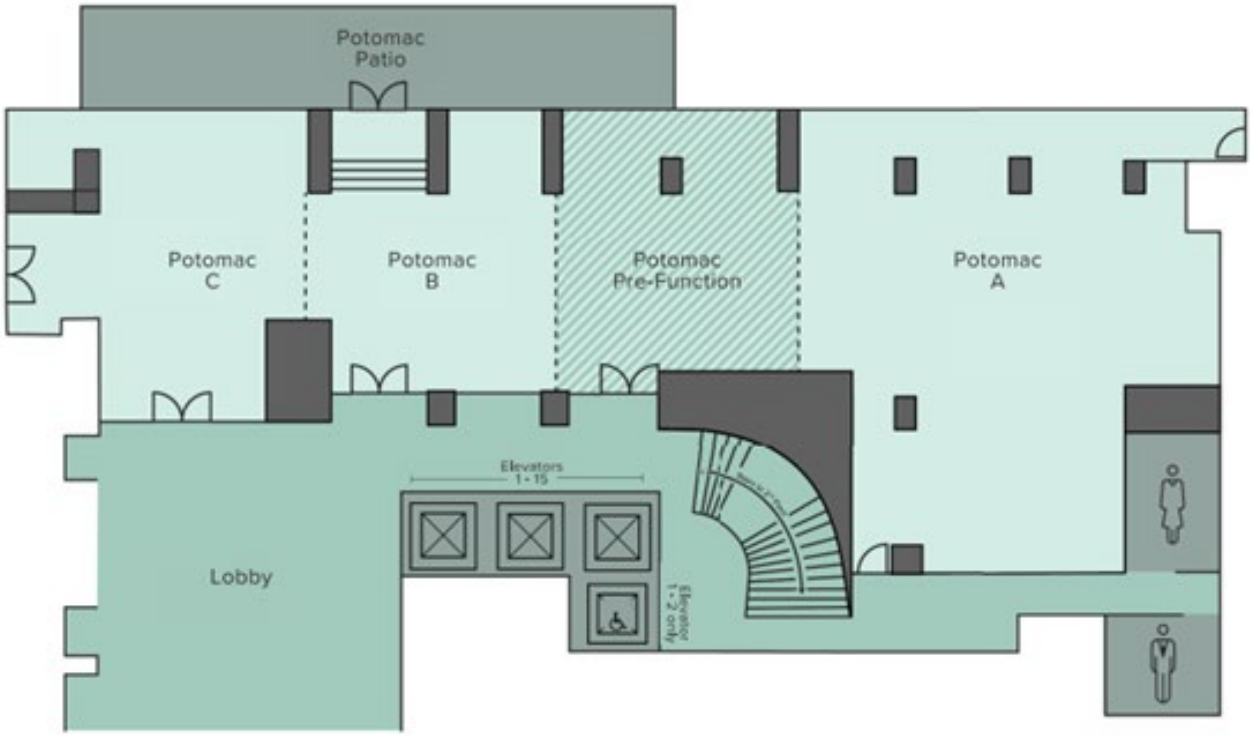
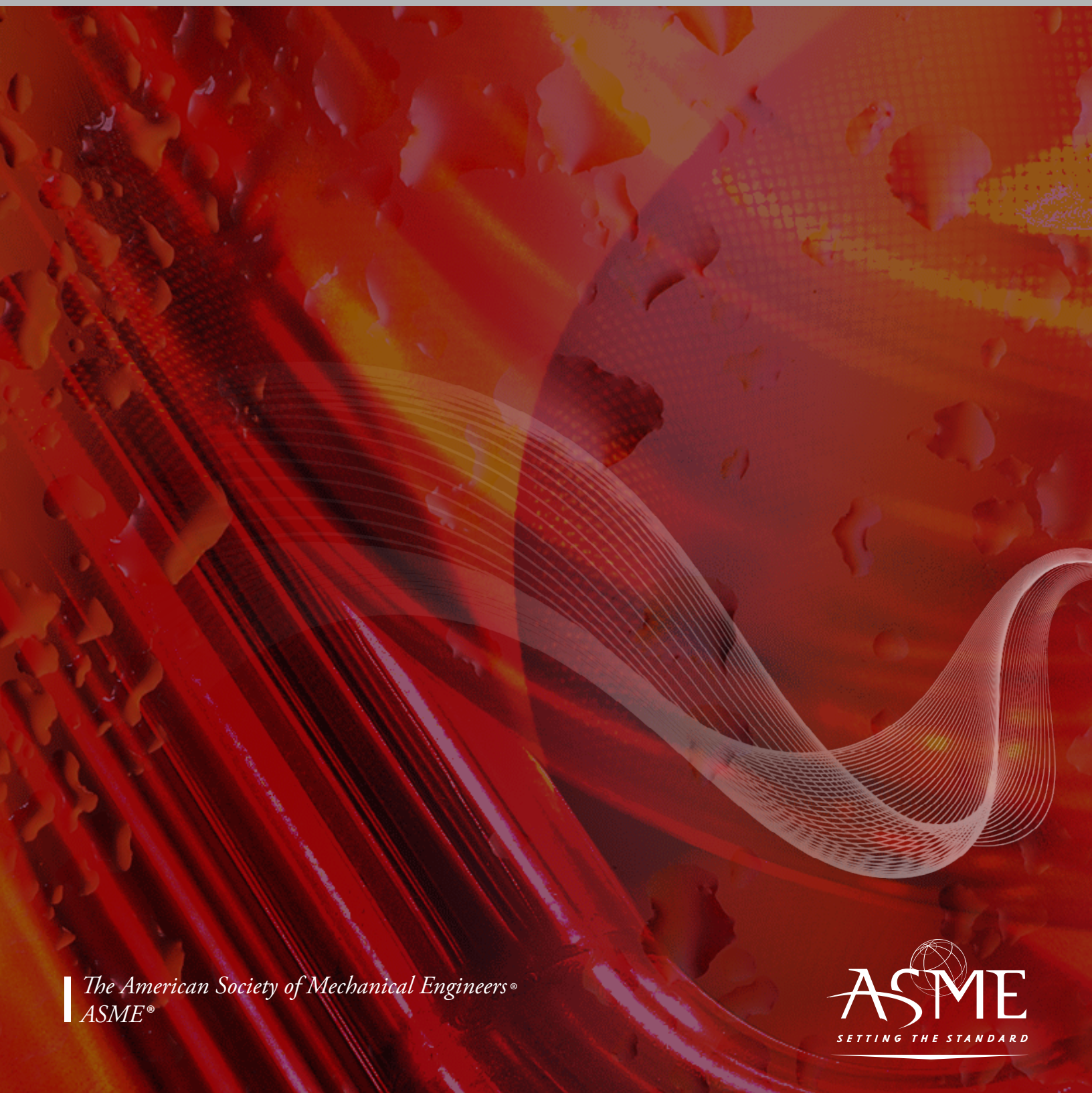
Second Level

# Hotel Floor Plans



# ASME 2023 SHTC

## Summer Heat Transfer Conference Co-Located with the 17th International Conference on Energy Sustainability



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