



ASME[®] 2019 MNHMT

6th ASME International Conference of
Micro/Nanoscale Heat and Mass Transfer

Program

CONFERENCE
July 8–10, 2019

Sweetland Hotel
Dalian, China

Welcome



HONGBIN MA
PROGRAM CHAIR



DONGQING LI
CONFERENCE CHAIR



YONGCHEN SONG
PROGRAM CO-CHAIR



XUEHU MA
PROGRAM CO-CHAIR



YUQING SUN
*LOCAL ORGANIZING
COMMITTEE CHAIR*

On behalf of the Organizing Committee, it is our great pleasure to welcome you to the 6th ASME Micro/Nanoscale Heat & Mass Transfer International Conference (MNHMT2019). The conference is held at Sweetland Hotel in Dalian, China from July 8 to 10, 2019. It is a follow-up conference to the first five conferences, which were held in Tainan (January 2008), Shanghai (December 2009), Atlanta (2012), Hong Kong (2013), and Singapore (2016). The Conference is sponsored by Dalian Maritime University and Dalian University of Technology.

This conference series is dedicated to the late Dr. Chang-Lin Tien (1935–2002), a world-renowned scholar and leader in higher education. His intellect and unique vision continue to inspire our efforts in expanding the frontiers of micro/nanoscale heat and mass transfer. Research and education on micro/nanoscale heat and mass transfer have advanced rapidly over the last two decades through many dedicated individuals and team efforts, with direct impact now extending into various fields in both science and engineering. This conference provides a forum for researchers, educators and practitioners around the world to exchange ideas on the state-of-the-art research and development and identify future research needs in this emerging interdisciplinary field. The technical program contains 331 presentations organized into 51 sessions. In addition, the conference features 18 exciting plenary/keynote talks, which span all core areas of interest to our research community. Selected papers will be published after further review in special issues of the *ASME Journal of Heat Transfer* and *ASME Journal of Thermal Science and Engineering Applications*.

We extend our deep gratitude to all of the volunteers whose hard work made this conference happen—most notably—the Conference Organizing Committee and the Local Organizing Committee. We thank the Technical Program Committee who set up the Technical Track Topics, as well as the Session Organizers and the MNHMT Advisory Committees. We look forward to hearing from the Plenary/Keynote Speakers and Invited Speakers, Technical Paper Authors, and “Technical Presentation Only” Speakers. Finally, we extend our gratitude to all the technical reviewers whose contributions ensured the quality of this conference. We offer special thanks to the generous sponsors of the conference: the Dalian Maritime University and Dalian University of Technology. We hope you enjoy the conference and the opportunities it brings to share and learn from others.

Wishing you the very best,

Hongbin Ma
Program Chair

Xuehu Ma
Program Co-Chair

Dongqing Li
Conference Chair

Yuqing Sun
*Local Organizing
Committee Chair*

Yongchen Song
Program Co-Chair

GENERAL INFORMATION.....4

SPECIAL EVENTS..... 5

SCHEDULE AT A GLANCE 6

PLENARY & KEYNOTE PRESENTATIONS.....8

TRACK ORGANIZERS26

BOARDS & COMMITTEES.....27

LEADERSHIP & STAFF28

TECHNICAL SESSIONS.....29

AUTHOR INDEX.....50

FLOOR PLANS.....61

General Information



REGISTRATION HOURS AND LOCATION

Registration hours are as follows:

Sunday July 7	1:00PM–5:00PM
Monday July 8	7:00AM–5:00PM
Tuesday July 9	7:00AM–5:00PM
Wednesday July 10	7:00AM–1:00PM

NAME BADGES

Please wear your name badge at all times. Admission to all conference functions will be by the badges only (unless noted otherwise). Your badge also provides a helpful introduction to other attendees.

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 arrange in advance to share.

TICKETED FUNCTIONS/ITEMS

Some conference functions will require a ticket for admittance. Please check with a conference representative if you have any questions regarding specific events. If you would like to bring a guest to the banquet, you must purchase a ticket on their behalf.

HAVE QUESTIONS ABOUT THE MEETING?

If you have any questions or need assistance, an ASME representative will be located in the registration area.

OPENING RECEPTION

GLOBAL VILLAGE FOOD PARK

The Opening Reception will be held on Sunday, July 7 from 5:30PM to 7:00PM. Enjoy socializing with attendees and take the time to meet the conference organizers. Tickets are required unless you are wearing a conference badge. Tickets are available for purchase (attendees = \$0 and guests = \$50.00).

BANQUET

MUDAN HALL, 3RD FLOOR

The Honors & Awards Banquet will be held on Tuesday, July 9 from 6:00PM to 8:00PM. Tickets are available for purchase (attendees = \$0 and guests = \$50.00).

Schedule at a Glance

		MONDAY, JULY 8		TUESDAY, JULY 9		WEDNESDAY, JULY 10		
		10:30AM – 12:00PM	3:35PM – 6:00PM	10:35AM – 12:00PM	3:35PM – 5:30PM	10:15AM – 12:00PM	1:00PM – 2:30PM	3:30PM – 5:10PM
Mudan Hall		11-1: Micro/Nano Scale Heat Transfer	Poster Presentations	11-3: Gas and Phase Change Flow and Heat Transfer at Small Scales				
Huaihua Hall #1		1-2: Droplets	1-3: Electrokinetics	4-6: Fundamentals of Boiling	4-7: Droplets and Surface Interactions	1-6: Cells	1-4: Particles	1-5: Flows
Huaihua Hall #2		3-1: Transport Phenomena on Solid-solid Interfaces	2-1: Simulation in Nano-fluid	15-1: Heat and Mass Transfer Photogallery	3-2: Droplet Dynamics	3-3: Thin Liquid Film Transport Phenomena	3-4: Transport Phenomena in Confine Domains	5-4: Near – Field Radiation
Huaihua Hall #3		4-1: New Surfaces for Phase Change -1	7-1: Micro/Nano-Thermal Manufacturing and Materials Processing	4-2: New Surfaces for Phase Change -2	4-3: Condensation	4-4: Condensation and Boiling	4-5: Flow Boiling	11-2: Liquid Flow and Heat Transfer at Small Scales
Bathe Hall #1		9-1: Thermal Transport in Nanowires and Nonofibers	6-1: Energy generation and storage devices and systems	9-3: Thermal Transport Through Thin Films and Interfaces	9-4: Molecular Dynamics and Monte Carlo Simulations of Nanoscale Conduction	10-3: Microscale Heat and Mass Transfer - 2	9-5: Theoretical and Numerical Analysis of Nanoscale Heat Conduction	9-6: Nanoscale Heat Conduction in Device Applications
Bathe Hall #2		14-1: Oscillating Heat and Mass Transfer in Capillaries	5-3: Radiation Related Heat/Cooling	5-1: Radiation-Structure Interaction	5-2: Radiation Properties/Measurement	2-2: Experimental Studies in Nanofluids	12-2: Micro/Miniature Two-Phase Devices/ Systems II	13-2: Micro/Nanoscale Transport in Cryopreservation
Bathe Hall #3		12-1: Micro/Miniature Two-Phase Devices/ Systems 1	10-1: Microscale Heat And Mass Transfer-1	10-2: New Methods In Microscale Study	13-1: Micro/Nanoscale Transport in Medical Applications: Physiology and Hyperthermia	6-2: Thermal Management in Energy Devices and Systems	11-5: Micro Heat Mass Transfer	11-4: Two-Phase and Multi-Phase Flow and Heat Transfer at Small Scales

PLENARY/KEYNOTES AND SPECIAL SESSIONS

SUNDAY, JULY 7	MONDAY, JULY 8	TUESDAY, JULY 9	WEDNESDAY, JULY 10
5:00PM–7:00PM (Global Village Food Park) Opening Reception	8:00AM–8:30AM (Mudan Hall) Welcome Session	8:00AM–8:35AM (Mudan Hall) Numerical Solutions of Nano/Micro Phenomena Coupled With Macroscopic Process by Li Chen and Wen-Quan Tao	8:00AM–8:35AM (Huaihua Hall 1-3) Synthesis and Solar Cell Applications of Single-Walled Carbon Nanotubes Co-Axially Wrapped With Mono- and Few-Layer Boron Nitride Nanotubes by Shigeo Maruyama
7:00PM–9:00PM (TBD) Organizing Committee Meeting	8:30AM–9:05AM (Mudan Hall) Tailoring Photons From the Sun and Terrestrial Sources With Nanostructured for Energy and Water Nexus by Gang Chen	8:35AM–9:10AM (Mudan Hall) Micro-Biotransport and Its Great Impact on the Survival of Living Cells and Tissues During the Cryopreservation Process by Dayong Gao	8:35AM–9:10AM (Huaihua Hall 1-3) Recent Advances in Nanoscale Thermal Radiation by Zhuomin Zhang
	9:05AM–9:40AM (Mudan Hall) Practice Your Scales! Thermal, Energy, and Bio Nanomaterials for Fast Processes by Timothy S. Fisher	9:10AM–9:45AM (Mudan Hall) Nano Liquid Metal as New Generation Electronic Cooling Materials by Jing Liu	9:10AM–9:45AM (Huaihua Hall 1-3) Nature inspired solutions help drive research progress – from heat transfer to downhole oil-water separation by Yuying Yan
	9:40AM–10:15AM (Mudan Hall) Adsorbents Related to Energy, Water and Air by Ruzhu Wang	9:45AM–10:20AM (Mudan Hall) Nano-Manufacturing for Enhanced Thermal Energy Storage, Cooling, and Sensing by Deb Banerjee	12:00PM–1:00PM (Global Village Food Park) Attendee Lunch
	12:00PM–1:00PM (Global Village Food Park) Attendee Lunch	12:00 pm–1:00PM (Global Village Food Park) Attendee Lunch	12:00PM–1:00PM (Global Village Food Park) Attendee Lunch
	1:00PM–1:35PM (Mudan Hall) Optimizing Complex Systems With AI Enabled PRS Platform by Chih-Ming Ho	1:00PM–1:35PM (Mudan Hall) Raman Spectroscopy Method for Measuring the Thermophysical Properties of Individual Nanoscale Materials by Xing Zhang	6:00PM–8:00PM (Global Village Food Park) Attendee Dinner
	1:35PM–2:10PM (Mudan Hall) Coupled Micro/Nanoscale Heat and Mass Transfer in Bio-Manufacture by Zhanfeng Cui	1:35PM–2:10PM (Mudan Hall) Nanoengineered Materials for Enhanced Liquid-Vapor Phase Change by Evelyn N. Wang	
	2:10PM–2:45PM (Mudan Hall) Transport Processes in the Deposition of Micro/Nanoscale Thin Films by Yogesh Jaluria	2:10PM–2:45PM (Mudan Hall) Development of Flexible Thermal Superconductors by Sung Jin Kim	
	2:45PM–3:20PM (Mudan Hall) Using Thermo-Fluid Science to Tackle the Energy Storage Challenge by T.S. Zhao	2:45PM–3:20PM (Mudan Hall) Microscopic Observation of Mass Transfer Obstruction During Gas Hydrate Formation and Decomposition by Yongchen Song	
	6:00PM–8:00PM (TBD) Technical Committee Meeting	6:00PM–8:00PM (Mudan Hall) Awards Banquet	
	6:00PM–8:00PM (Global Village Food Park) Attendee Dinner		

Plenary & Keynote Presentations

MONDAY, JULY 8
MUDAN HALL
8:30AM–9:05AM



Gang Chen

Massachusetts Institute of Technology
“Tailoring Photons From the Sun and
Terrestrial Sources With Nanostructures for
Energy and Water Nexus”

Abstract: Human history has very much depended on how we used heat from the sun and terrestrial sources. Over 90% of human society’s energy input is used by first converting it into heat, and yet only 40% of the total energy input is utilized, significantly lower than what the second law of thermodynamics allows. This presentation will give examples in engineering photons from the sun and terrestrial heat sources with nanostructured materials, aiming to address challenges in energy and water nexus. To lower the cost of solar energy to electricity conversion, we use nanostructures to reduce the thickness of crystalline silicon thin-film solar cells and optically-transparent and thermally-insulating aerogels to replace the vacuum-tube solar collectors in concentrated solar thermal systems. For terrestrial thermal systems, we show that by reflecting infrared radiation back to its emitting heat source, we can significantly improve the efficiency of converting thermally-radiated photons into electricity via thermophotovoltaic devices and the luminous efficiency of incandescent light bulbs. We also demonstrate the ability of boiling water, even generating superheated steam, under unconcentrated sunlight. With properly chosen polymer fiber diameters, we design fabrics so that they are opaque to visible light and yet allow thermal radiation from the human body to escape to environment for passively cooling. We conclude the presentation by exploiting the entropy-carrying ability of thermal radiation to convert heat into electricity using pn junctions. ng to mass-spectrometry becomes a big issue.

Biography: Prof. Gang Chen is currently the Carl Richard Soderberg Professor of Power Engineering at Massachusetts Institute of Technology (MIT). He served as the head of the Department of Mechanical Engineering at MIT from July 2013 to June 2018 and director of the “Solid-State Solar-Thermal Energy Conversion Center (S3TEC Center)” – an Energy Frontier Research Center funded by the US Department of Energy from 2009 to 2018. He obtained his PhD degree from the Mechanical Engineering Department, UC Berkeley. He was a faculty member at Duke University and UCLA, before joining MIT in 2001. He received an NSF Young Investigator Award, an R&D 100 award, an ASME Heat Transfer Memorial Award, a Nukiyama Memorial Award by the Japan Heat Transfer Society, a World Technology Network Award in Energy, an Eringen Medal from the Society of Engineering Science, and the Capers and Marion McDonald Award for Excellence in Mentoring and Advising from MIT. He is among Thomas Reuter’s highly cited researchers. He is a fellow of the American Academy of Arts and Sciences, an academician of Academia Sinica, and a member of the US National Academy of Engineering.

MONDAY, JULY 8
MUDAN HALL
9:05AM–9:40AM



Timothy S. Fisher

University of California, Los Angeles
“Practice Your Scales! Thermal, Energy, and
Bio Nanomaterials for Fast Processes”

Abstract: The theory of energy and charge transport is a century old, yet classical and quantum size effects have been exploited usefully in practical materials only for the past two decades, and often with a modest level of success in practice. Many of the remaining challenges involve problems of time and length scales- e.g., faster energy transport processes enabled by new materials that can be manufactured economically at human scales. Success in the large-scale adoption of nanomaterials, with their prevalence of interfaces, will likely depend on deeper fundamental understanding of both interfacial transport in assemblies of nanomaterials over wider time scales and high-throughput manufacturing processes over larger length scales in order to tune their performance and engineer them for desired properties in real applications. For example, individual carbon nanotubes possess extremely high axial thermal conductivity, yet when placed in a composite matrix, the effective thermal properties are quite ordinary. For high-performance cooling applications, single-phase convection is a limited option because of its inability to dissipate ultra-high thermal loads, thus constraining the performance of the host system. With these challenges in mind, this presentation will consider how nanomaterials can be exploited at appropriate engineering scales to improve the performance of realistic thermal and energy storage technologies, particularly those requiring rapid transient response. Carbon nanomaterials for use in fast-charging and discharging electrochemical energy storage devices offer particular promise as scalable, high-performance electrodes, and similar structures show outstanding sensitivity to biological analytes. Moreover, the microstructure of granular assemblies of battery cathode materials will be shown to have a profound effect on charge/discharge speed. As another example, a tunable cooling technology befitting fast transient thermal events will be described. In this system, the rapid depressurization of the working fluid triggers coincident flash boiling and desorption events, thereby achieving very high cooling rates for short periods of time. We anticipate that this technology, when properly controlled, will achieve instantaneous peak cooling efficiencies surpassing those other advanced cooling systems. The presentation will close with a discussion of opportunities to ‘practice our scales’ further in order to enable cost-effective, large-scale production of these technologies.

Biography: Prof. Timothy S. Fisher (PhD in Mechanical Engineering, 1998, Cornell) was born in Aurora, IL USA. He joined UCLA’s Department of Mechanical & Aerospace Engineering in 2017 after spending 15 years in Purdue’s School of Mechanical Engineering, and several previous years at Vanderbilt University. In 2018, he was named Department Chair and received the John P. and Claudia H. Schauerman Endowed Chair in Engineering. He is an Adjunct Professor in the International Centre for Materials Science at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) and co-directs the JNCASR-Purdue Joint Networked Centre on Nanomaterials for Energy. From 2009 to 2012, he served as a Research Scientist at the Air Force Research Laboratory’s newly formed Thermal Sciences and Materials Branch of the Materials and Manufacturing Directorate. He is active in service to the American Society of Mechanical Engineers through a variety of responsibilities and is a former Co-Editor of the journal *Energy Conversion & Management* and currently Specialty Chief Editor for Thermal and Mass Transport of the journal *Frontiers in Mechanical Engineering*.

Plenary & Keynote Presentations

MONDAY, JULY 8
MUDAN HALL
9:40AM–10:15AM



Ruzhu Wang

Shanghai Jiao Tong University
“Adsorbents Related to Energy, Water,
and Air”

Abstract: Adsorbent is usually in the form of solid with nanoscale porous structures. Adsorption is a rate-controlled process, related to nanoscale heat and mass transfer that highly depends on the boundary conditions. Highly porous adsorbents like silica gel, molecular sieve, activated carbon (fiber), alumina, and MOF could capture gas molecules and release sorption heat through physical adsorption, which promote their widely applications in thermal processes, such as cooling, heating, energy storage, air water harvesting, humidity control, air cleaning, and thermal treatment. However, the physical adsorbent is usually limited by its low adsorption capacity and weak adsorption kinetics. Thus it is essential to tailor the structural and thermal properties of the nanoscale pore adsorbent, and even use composite adsorbents, to adapt to real applications to achieve efficient sorption in handling with water vapor, ammonia, CO₂, and etc. Reasonable thermal design in the device level should be taken into consideration. Here, a strategy to synthesize efficient adsorbents and the principle to select optimal adsorbent-adsorbate working pairs for various adsorption technologies and their typical applications are introduced and discussed. This work shows that adsorbents are closely related to energy, water, and air; some promising applications could be realized.

Biography: Prof. Ruzhu Wang (R.Z. Wang), born in Dec. 1964, graduated from Shanghai Jiao Tong University (SJTU) in 1984, 1987, and 1990 for his bachelor's, master's and PhD degrees. He was promoted as associate professor in 1992 and full professor in 1994 in SJTU.

He has written 10 books and more than 500 co-authored SCI papers; his ISI h-index is 62. His contributions include sorption heat pumps, CCHPs, solar heating and cooling, and green building energy systems. He has won Chinese National Research Awards in 2010 and 2014 respectively. Due to his most noteworthy contribution to refrigeration globally, he was honored to receive the J & E Hall International Gold Medal from the Institute of Refrigeration (UK) in 2013, Asia Refrigeration Academic Award in 2017. Due to his outstanding contributions in the field of heat and mass transfer for refrigeration/cryogenics and energy systems, he was awarded the Nukiyama Memorial Award in 2018.

He had been appointed as the director of the Institute of Refrigeration and Cryogenics of SJTU since 1993. Currently he is also the Director- Engineering Research Center of Solar Energy, MOE China, Vice dean of SJTU Energy Institute. His research group has been awarded as Excellent Innovative Team of Energy Research from MOST China in 2014 and NSFC in 2015.

Prof. Wang is currently the vice president of the Chinese Association of Refrigeration, vice president of the Chinese Society of Heat and Mass Transfer, deputy editor-in-chief of *Energy*, and regional editor of *International Journal of Refrigeration*.

MONDAY, JULY 8
MUDAN HALL
1:00PM–1:35PM



Chih-Ming Ho

University of California
“Optimizing Complex Systems With AI
Enabled PRS Platform”

Abstract: A complex system composes of a large number of interacting components, which self organize into a non-linear dynamic system. New properties emerge from the complex system and are not directly linked to the property of the individual component. After long-time evolution, the complex system is usually adaptive and robust. Biological systems, synthesized functional materials, Internet, social activities, and turbulent flows, are examples of complex systems.

Searching for the optimal parameter combination in order to have best system performance is a common challenge in complex systems. For example, how do we guide a patient’s body by an efficacious combinatorial drug toward a desired phenotype for improving health? Selecting the molecular compositions and determining the concentrations for each composition in material synthesis is another challenge of home in the optimal condition of a complex system.

Assisted by artificial intelligence, we have discovered that the inputs for controlling the complex system are correlated with the endpoint outputs through a Parabolic Response Surface (PRS). With a few calibration tests to determine the coefficients of the quadratic algebraic equation governing the PRS, the PRS is able to dictate the globally optimized input control parameters. The artificial intelligence enabled Parabolic Response Surface (AI-PRS) platform can be applied to optimize almost all complex systems with large parameter space.

Biography: Prof. Chih-Ming Ho received his Ph.D. from The Johns Hopkins University. He held the Ben Rich-Lockheed Martin Chair Professor until he retired in 2016 and currently is a UCLA Distinguished Research Professor. He served as UCLA Associate Vice Chancellor for Research from 2001 to 2005. His research interests include personalized medicine, microfluidics, and control of turbulence. He is ranked by ISI as one of the top 250 most cited researchers worldwide in the entire engineering category (2000–2014). Dr. Ho was inducted as a member of the US National Academy of Engineering and an Academician of Academia Sinica. Dr. Ho received Doctor of Engineering Honoris Causa from Hong Kong University of Science and Technology. He holds ten honorary chair professorships including the Einstein Professorship from Chinese Academy of Science. Dr. Ho was elected Fellow of AAAS, APS, AIMBE, AIAA, and the 3M-Nano Society.

Plenary & Keynote Presentations

MONDAY, JULY 8
MUDAN HALL
1:35PM–2:10PM



Zhanfeng Cui

University of Oxford
“Coupled Micro/Nanoscale Heat and Mass
Transfer in Bio-Manufacture”

Abstract: Manufacture and processing of novel biological therapeutics becomes increasingly important as it does not only affect the costs of goods but decides the successful delivery to clinics and patients. The challenge is how to preserve the viability, potency, and functionality of these complex entities to meet the regulatory requirements using available supply chains. A key to the success is actually the understanding and control of the coupled heat and mass transfer at micro/nanoscales.

In this presentation, three case studies will be presented: (1) cryopreservation of human stem cells, where heat transfer with phase change, freeze concentration, and cell membrane transport are all coupled; (2) freeze drying of therapeutic proteins, where freeze concentration induced protein denaturation must be avoided; and (3) three-dimensional drying of vaccines, where evaporation, Marangoni flow, and vitrification are all important to the vaccine potency. One common challenge to bioprocessing is the lack of data, in particular, transport properties. The other is the missing link between physical processing parameters to biological outcome. Both need a multidisciplinary research effort on top of better understanding of micro/nanoscale heat and mass transfer.

Biography: Prof. Zhanfeng Cui is the Donald Pollock Professor of chemical engineering, University of Oxford since the Chair was established in 2000. He is the founding Director of the Oxford Centre for Tissue Engineering and Bioprocessing (OCTEB) and the Director of CRMI Technology Centre at the University of Oxford. He was educated in China and got his BSc degree from Inner Mongolia University of Technology (1982) and MSc (1984) and PhD (1987) from Dalian University of Technology. After a postdoctoral experience in Strathclyde University in Scotland, he joined Edinburgh University as a lecturer in chemical engineering (1991). He then held academic appointments at Oxford Engineering Science Department as University Lecturer (1994–1998) and Reader (1999–2000). He was a Visiting Professor of Georgia Institute of Technology, USA (1999), the Braun Intertec Visiting Professor to University of Minnesota, USA (2004), and a Chang-Jiang Visiting Professor to Dalian University of Technology, China (2005). He is a Chartered Engineer, a Chartered Scientist, a Fellow of the Institution of Chemical Engineers (FICHEM), and Fellow of the American Institute of Medical and Biological Engineering (AIMBE). In 2009, he was awarded a Doctor of Science (DSc) by Oxford University to recognize his research achievement. In 2013, he was elected to Fellow of the Royal Academy of Engineering (FREng). His research interests include tissue engineering and stem cell technologies, bioseparation and bioprocessing, as well as medical devices. He and his co-workers have published over 260 articles in refereed journal papers, and has founded two university spinout companies at Oxford.

MONDAY, JULY 8
MUDAN HALL
2:10PM–2:45PM



Yogesh Jaluria
Rutgers University
“Transport Processes in the Deposition of
Micro/Nanoscale Thin Films”

Abstract: Thin films are important in a wide range of practical applications and several techniques are available to obtain high quality films over relatively large regions. This paper focuses on the underlying basic transport processes in the Chemical Vapor Deposition (CVD) system, which is used for coating or for fabricating thin films for electronic and optical devices. The deposited film typically ranges from a few nanometers in thickness to a few microns. The quality of the film, as well as the rate of deposition, are strongly influenced by the transport processes that arise in the reactor. Several complexities are encountered in practical processes and systems, making the experimentation and modeling challenging and involved. These include property variations, complicated regions, combined transport mechanisms, chemical reactions, and intricate boundary conditions.

The chemical reactions and transport mechanisms involved in the deposition are quite different from those in the bulk flow. Thus, modeling has to be carried out at small length scales and then linked to the bulk convective transport. Coupling of the micro/nanoscale domain to the flow and heat transfer in the reactor yields the model that can be used for prediction, process control, and optimization. Different numerical models are needed in different domains and appropriate boundary conditions need to be imposed at the boundaries between the different domains. The basic mechanisms may also change from the region near the deposition surface to the flow far downstream, with buoyancy often dominating the flow in some regions and radiation effects dominating near the source. Experimental data, particularly on the chemical kinetics, are critical to the accuracy of the simulation.

The paper presents the fundamental considerations that may be used to accurately simulate these systems for the deposition of materials like silicon, graphene, titanium nitride, and gallium nitride. Validation of the numerical model is achieved by comparing with experimental and numerical results on similar systems in the literature. The changes in the material occur mainly at micro- and nanoscale levels, whereas the products being fabricated and the operating

conditions are usually at the macro- or engineering scale. Depending on the dimensions, different flow regimes arise, with different analysis and experimentation being needed at different scales. The overall modeling and simulation is employed to determine the quality of the fabricated product, the effect on the environment, process efficiency, and optimal conditions. The model is coupled with optimization, which is needed to minimize costs and improve product quality and system performance. Of particular interest are the achievement of high productivity, large percentage of area coverage for deposition, and high film thickness uniformity. Of particular interest is multi-objective optimization, since these systems involve several important objective functions, such as those mentioned here. The importance of these results to practical CVD processes for various materials is discussed.

Biography: Prof. Yogesh Jaluria is Board of Governors Professor and Distinguished Professor at Rutgers, the State University of New Jersey. His research work is in the field of thermal science and engineering, covering areas like convection, fires, materials processing, thermal management of electronics, energy, and optimization of thermal systems. He is the author/co-author of eight books and editor/coeditor of thirteen conference proceedings, eight books, and seven special issues of archival journals. He has contributed over 500 technical articles, including over 210 in archival journals and 20 book chapters. His work has been supported extensively by federal, state, and industrial agencies. He has received several awards and honors for his work, such as the prestigious 2007 Kern Award from AIChE, the 2003 Robert Henry Thurston Lecture Award from ASME, and the 2002 Max Jakob Memorial Award, the highest international recognition in heat transfer, from ASME and the AIChE. He received the 2000 Freeman Scholar Award, the 1999 Worcester Reed Warner Medal, and the 1995 Heat Transfer Memorial Award all from ASME. He has served as Department Chairman and as Dean of Engineering. He was the Editor of the *Journal of Heat Transfer* (2005–2010), and *Computational Mechanics* (2003–2005). He is on the Editorial Boards of several international journals. He has served as Conference Chairman for several conferences including the ASME Micro/Nano Heat and Mass Transfer Conference, Hong Kong, 2014, and the International Symposium on Advances in Computational Heat Transfer, New Jersey, in 2015 and in Naples, Italy, 2017. He has presented many invited Keynote and Plenary lectures and has served on various panel discussions at international conferences. He is an Honorary Member of ASME, a Fellow of AAAS and APS, an Associate Fellow of AIAA, and member of other professional societies.

Plenary & Keynote Presentations

MONDAY, JULY 8
MUDAN HALL
2:45PM–3:20PM



T.S. Zhao

Hong Kong University of Science and Technology

“Using Thermo-fluid Science to Tackle the Energy Storage Challenge”

Abstract: The combination of energy shortage and climate change is one of the most complex challenges the world, as a whole, has had to face. The next 50 years is a vital period for human civilization and it is imperative that we revolutionize the way we produce and store energy and incorporate renewables as our primary source of energy. This talk will provide a snapshot of the future of the sustainable energy landscape and identify several game-changing technologies that will facilitate the widespread deployment of renewables. In particular, we will highlight our recent advances in redox flow batteries, and lithium-axygen battery technologies achieved through an interdisciplinary approach that combines thermal-fluid science and electrochemistry. The scientific issues and practical challenges pertaining to this advanced battery will be discussed, with a particular emphasis on how the challenges can be addressed using thermos-fluid sciences.

Biography: Prof. T.S. Zhao is currently the Cheong Ying Chan Professor of Engineering and Environment, the Chair Professor of Mechanical & Aerospace Engineering at HKUST, the Director of the HKUST Energy Institute, and a Senior Fellow of the HKUST Institute for Advanced Study. He is an elected Fellow of the American Society Mechanical Engineers (ASME), Fellow of the Royal Society of Chemistry (RSC), and a Highly Cited Researcher by Thomson Reuters (2014, 2015, 2016, 2017, 2018). Professor Zhao combines his expertise in research and technological innovation with a commitment to creating clean energy production and storage devices for a sustainable future. He has made seminal contributions in the areas of fuel cells, advanced batteries, multi-scale multiphase heat and mass transport with electrochemical reactions, and computational modeling. In addition to 5 edited books, 9 book chapters, and over 70 keynote lectures at international conferences, he has published 331 papers in various prestigious journals. These papers have collectively received more than 13,000 citations and earned Prof. Zhao an h-index of 62 (Web of Science). In recognition of his research achievements, Prof Zhao has in recent years received many awards, including the 2014 Distinguished Research Excellence Award (HKUST), two State Natural Science Awards, Ho Leung Ho Lee Scientific and Technological Progress Award (2018), the Croucher Senior Fellowship award, the Overseas Distinguished Young Scholars Award (NSFC), and the Yangtze River Chair Professorship, among others. In the international community, Prof Zhao serves as Editor-in-Chief of *Applied Thermal Engineering*, Executive Editor of *Science Bulletin*, and Editor of RSC's *Energy & Environmental Science*. He has served as an editorial board member for *Energy & Environmental Science*, *Journal of Power Sources*, and other 10 prestigious international journals.

TUESDAY, JULY 9
MUDAN HALL
8:00AM–8:35AM



Wen-Quan Tao
Xi'an Jiaotong University
"Numerical Solutions of Nano/Micro
Phenomena Coupled With Macroscopic
Process"



Li Chen
Xi'an Jiaotong University

Abstract: Multiphase flow and reactive transport processes in porous media are widely encountered in energy and environment sciences. Typical examples include fuel cells, oil/gas exploitation, CO₂ sequestration, thermalchemical storage, etc. The reactive transport processes usually take place at the pore scale (inside the pores or at the interfaces between different constituents), the length scale of which is significantly lower than the length scale of the continuum models based on which transport processes in porous media are usually described. To fill the gap between the two distinct scales, a sets of intrinsic relationships or empirical models are heavily employed to close the continuum-scale models for porous media. However, the validation or accuracy of these relationships/models should be greatly improved to enhance the prediction capacity of the continuum-scale models. For the past 10 years, we devoted ourselves to studying at the pore-scale the transport processes in porous media. Advanced pore-scale tools have been developed including reconstruction of realistic porous structures and constituents of porous media, pore-scale numerical models based on the lattice Boltzmann method for multiphase reactive transport in porous media, and upscaling schemes of pore-scale results into continuum-scale models. The transport phenomena of each process at the pore-scale are investigated and the coupled mechanisms between different processes are revealed. Effects of porous structures, size, interface, and constituents on the multiphase flow and reactive transport processes inside the micro/nanosize pores are deeply explored. Based on the pore-scale numerical results and experimental results, it is revealed that some of the intrinsic relationships or empirical models widely adopted in the literature, predict not only quantitatively but also qualitatively wrong results. Based on the pore-scale results, either these relationships/-models are improved or completely new relationships/-models are proposed to enhance the predication capacity of current continuum-scale models for the transport processes in porous media.

Biography: Prof. Wen-Quan Tao is a Professor at Key Laboratory of Thermo-Fluids Science & Engineering of MOE, and Int. Joint Research Laboratory of Thermal Science & Engineering, Xi'an Jiaotong University, China. He graduated from Xi'an Jiaotong University in 1962 and received his graduate Diploma in 1966 under the supervision of Professor S.M. Yang. From 1980 to 1982 he worked with Professor E.M.Sparrow as a visiting scholar at the Heat Transfer Laboratory of University of Minnesota. He was selected as a member of Chinese Academy of Science in 2005. He has supervised more than 130 graduate students. His recent research interests include multiscale simulations of fluid flow and heat transfer problems, thermal management of fuel cell, cooling technique of data center, and enhancement of heat transfer.

Biography: Prof. Li Chen is a Professor at Xi'an Jiaotong University (XJTU) China and Guest Scientist of Los Alamos National Lab (LANL) USA. He obtained his PH.D in Engineering Thermophysics at XJTU in 2013, followed by a Director Postdoc at LANL from 2013.12 to 2015.12. He was the winner of Young Scientist Award of Asian Union of Thermal Science and Engineering. His research focuses on transport phenomena in porous media with background of fuel cell, flow battery, CO₂ storage and hydrocarbon resource exploitation. Particularly, he has developed an advanced pore-scale model based on the Lattice Boltzmann Method for coupled multiphase flow, heat and mass transfer, chemical reaction, solid precipitation-dissolution (melting-solidification) processes in porous media. Up to now, he has published 53 SCI papers in a variety of top journals, including Journal of Power Sources, Langmuir, International Journal of Hydrogen Energy, Journal of Computational Physics, Physical Review E, Fuel, Electrochimica Acta, Water Resources Research, International Journal of Heat and Mass Transfer. Among these SCI papers, one is selected as the "Top 100 International Journal Papers with Highest Influence, China, 2014", one is selected as Most cited Paper of International Journal of Heat and Mass Transfer, and five are selected as ESI paper. His publications have been cited over 1650 times, with personal H index as 25. Furthermore, his research has also resulted in over 40 conference presentations (including 6 invited talks), 2 patents and 3 software copyrights. He serves as expert reviewer of about 20 international journals. He was invited as guest editor of special issue "Advances in Modeling of Transport in Porous Media" on an international journal "Computation".

Plenary & Keynote Presentations

TUESDAY, JULY 9
MUDAN HALL
8:35AM–9:10AM



Dayong Gao

University of Washington, Seattle, USA
“Micro-Biotransport and Its Great Impact on the Survival of Living Cells and Tissues During the Cryopreservation Process”

Abstract: Low temperature has been utilized to keep living biosystems dormant but potential alive for cryopreservation with tremendous scientific and biomedical applications, including cellular-gene therapy, tissue engineering, regenerative medicine, organ transplantation, as well as the conservation of endangered species, etc. However, there is a critical contradiction between the concept of cryopreservation and the experimental findings that the living biosystems can be cryoinjured to death by the cryopreservation process itself. Contrary to popular belief, the challenge to cells during the cryopreservation is not their ability to endure storage at cryogenic temperatures (below -180 degrees); rather it is the lethality associated with micro-biotransport (heat and mass transfer with phase transitions) within an intermediate zone of low temperature (-15 to -60 degrees) that a cell must traverse twice, once during cooling and once during warming. The central theme of this presentation is to report the speaker’s most recent research work on: (1) micro-biotransport and its great impact on cryoinjury in living cells and tissues during the cryopreservation process; and (2) development of new optimal method, technology/instruments, and bio-MEMS to prevent the cryoinjury and to ensure the survival of living cells and tissues in cryopreservation.

Biography: Prof. Dayong Gao is currently the President of Society for Cryobiology (International Society for Low Temperature and Medicine). He is the Origincell Endowed Professor and Director of the Center for Cryo-biomedical Engineering and Artificial Organs, Department of Mechanical Engineering, University of Washington, Seattle, USA. Before joining the University of Washington in 2004, Dr. Gao was the Baxter Healthcare Corp Chair in Engineering and the UK Alumni Professor of Mechanical Engineering at University of Kentucky, USA. He is an Academician of the Washington State Academy of Sciences USA, and a Fellow in some international scientific societies. Professor Gao has been honored with numerous national and international awards, including Basil J. Luyet Medal, USA National Cancer Society Award, American Heart Association Award, Asian American Engineer of the Year Award (USA), Bill & Melinda Gates Foundation Award, Whitaker Foundation Award, Washington Foundation Award, etc. Currently, he serves, respectively, as the Editor-in-Chief, the Deputy Editor, and/or Editorial Board member of eight international scientific journals.

TUESDAY, JULY 9
MUDAN HALL
9:10AM–9:45AM



Jing Liu

Tsinghua University
“Nano Liquid Metal as New Generation
Electronic Cooling Materials”

Abstract: The newly emerging functional materials of room temperature liquid metal and its alloy were initially introduced for the advanced cooling of computer CPU, which later was extended into rather diverse areas such as general high flux or large power cooling, thermal interface material, waste heat recovery, kinetic energy harvesting, printed electronics, 3D printing, biomedical technologies, soft machines, etc. Facing that the thermal physical properties of the formerly developed liquid metals were still somewhat limited due to their inherent characteristics encountered, we have proposed a new conceptual strategy to revolutionize existing technologies which can be termed as nano liquid metal. Through suspending micro- or nanometer-sized particles or fillers into liquid metal, a group of very unconventional capabilities for the fabricated mediums can be enabled. The multi-mode performances of nano liquid metals lie in the outstanding properties of the base fluids of liquid metals, such as low melting point, large thermal and electrical conductivity, as well as tremendous desirable physical or chemical behaviors. Through taking full use of nanotechnologies, liquid metal can be molded into many outstanding advanced functional materials like highly conductive or compliant coolant, thermal interface grease and phase change soft material, etc. According to the specific needs and preparation process, such liquid or composites could exhibit superior fluidic, thermal, electrical, magnetic, chemical, mechanical, and biomedical properties which are much superior than that of conventional coolants or nano materials. This guarantees the versatile adaptabilities of nano liquid metal materials. The present talk presents the basic features of nano liquid metal, its typical fabrication strategies like field induced particle internalization effect, as well as scientific challenges. A group of successful practices and perspective applications of such materials in the thermal science area will be introduced. The fundamental micro-/nanoscale heat transfer mechanisms lying behind will be interpreted.

Biography: Prof. Jing Liu is a jointly appointed Professor of Tsinghua University (THU) and Technical Institute of Physics and Chemistry, Chinese Academy of Sciences (CAS). He simultaneously received his double B.S. degrees in Engineering and Physics in 1992, and Ph.D. in 1996, all from THU and has performed visiting research at Purdue University and MIT. Dr. Liu works intensively at the interdisciplinary areas among liquid metal, biomedical engineering, and thermal science and pioneered a group of very fundamental discoveries in the area. His endeavors on liquid metal chip cooling, printed electronics, biomaterials, and soft machines initiated many game changing technologies which were frequently featured by worldwide science news. Dr. Liu's inventions on hybrid freezing-heating tumor therapy machine and many mobile health care devices have led to diverse clinical uses. He is an author of ten popular books with one reprinted five times, over 500 journal articles with over 20 selected as a cover story, and holds more than 130 granted invention patents. Dr. Liu is a recipient of numerous awards like The William Begell Medal, R&D 100 Awards Finalist, 2010–2011 Best Paper of the Year Award from *ASME Journal of Electronic Packaging*, CCTV 2015 Top Ten Figures in Science and Technological Innovation, six times highest teaching award from CAS, etc.

Plenary & Keynote Presentations

TUESDAY, JULY 9
MUDAN HALL
9:45AM–10:20AM



Deb Banerjee

Texas A&M University

“Nano-Manufacturing for Enhanced Thermal Energy Storage, Cooling, and Sensing”

Abstract: At the Multi-Phase Flows and Heat Transfer Lab (MPFHLL) at Texas A&M University (TAMU), we are developing nanotechnology enabled platforms for enhancing cooling, sensing, and energy storage (involving both experimental and computational studies). Coupling of thermal and hydrodynamic features during phase change (boiling, condensation) causes spatio-temporal fluctuations of surface temperature at the micro/nano-scales, which are termed as “cold-spots” and can transmit over 60–90% of the total heat transfer. Using silicon nanofins, cooling was enhanced by ~120%. Using Carbon-Nanotube (CNT) nanocoatings, cooling was enhanced by 60~300% by leveraging cold-spots and the “nano-fin” effect (“nFE”, which arises due to a combination of enhanced surface area, surface adsorption of solvent molecules, Kapitza resistance/ interfacial thermal resistance and thermal inertia/ capacitance effects). Nano-thermocouples [thin film thermocouples (TFT)] and diode temperature nano-sensors (DTS) integrated with the nanocoatings enabled the study of thermal chaos and micro/nano-scale fractal structures in boiling (due to thermal-hydraulic coupling). We developed compact condensers with nanocoatings (enhanced heat flux by 100%). In addition, evaporation and condensation experiments performed in nanochannels (lab-on-chip apparatus) demonstrated a significant shift in phase transition temperatures [due to the “confined fluid” effect, e.g., in shale rocks for enhanced oil recovery (EOR)]. The reliability of Phase Change Materials (PCM) was demonstrated for 1000 cycles of repeated melting and solidification using additives (nucleation promoters).

Specific heat capacity was enhanced by 10~120% in solvents and solid matrices doped with minute concentration of nanoparticles (i.e., nanofluids and nanocomposites). Experiments for the flow of nanofluids in microchannels showed that the nanoparticle precipitates behaved either as nanofins (enhanced surface area at low concentrations) or caused fouling at high concentrations. These interfacial interactions were demonstrated to dominate the net heat transfer [termed as the “nanofin effect” (nFE)] for micro/nano-scale transport phenomena. The applications include: drug delivery, concentrated solar power/ CSP (thermal energy storage/ TES; thermo-chemical energy storage/ TCES), nuclear power, oil, and gas exploration (deep drilling, reservoir engineering, and management using nanotracers).

DPN™ (Dip Pen Nanolithography™) leverages Scanning Probe Microscopy using microfluidics. Commercial microfluidic devices called “Inkwells™” were developed earlier. The next generation microfluidic devices are being

developed for DPN (e.g., Fountain Pen Nanolithography, “centiwells”). The applications are in nano-catalysis, bio-nanotechnology, maskless-lithography and nano-sensors for homeland security, bio-security and using N/MEMS based nanocalorimeters for explosives detection (e.g., “nano-nose”/ “nano-tongue”). We invented a glassless process for synthesis of organic nanoparticles (e.g., CNT) under ambient conditions (i.e., in presence of air/ oxygen) and at synthesis temperature of 100°C ~ 300°C (US Patent 8470285, awarded in 2013).

Biography: Prof. Debjyoti (“Deb”) Banerjee received his Ph.D. in Mechanical Engineering from UCLA (with minor in MEMS). He received three M.S. degrees and was invited to four national honor societies. He attended the Indian Institute of Technology (IIT), Kharagpur for his Bachelor of Technology (Honors). Prior to TAMU, Dr. Banerjee worked as a Manager of the Advanced Research & Technology (ART) group at Applied Biosystems Inc. (ABI), CA, (currently merged into Life Technologies). Also as a Hiring Manager at ABI he hired ~ 30 PhDs in ~6 months and managed a group of 10 ~ 15 Ph.D. engineers/scientists. Previously in a singular capacity, he developed from concept to a commercial product at Nanolnk Inc. (called “InkWells™”, which are microfluidic platforms used for bio/nano-lithography of bio-molecules such as collagens/proteins, nucleic acids, etc.).

Prof. Banerjee received 14 US patents (and three patents currently pending), from his work at ABI, Ciphergen Biosystems, Nanolnk, Coventor Inc., and TAMU. He received the “Amlan Sen Best Mechanical Engineering Student Award (Endowment)” at the graduation convocation at IIT and the “J.C. Bose National Science Talent Scholarship” from the Govt. of India. He received the “Morris Foster Fellowship (2007–2008)” from Mechanical Engineering Department; L.T. Jordan Career Development Professor, “Dean’s Excellence Award (2018)” and the “TEES Select Young Faculty Fellowship (2008–2009)” from the D. Look College of Engineering. He received the “2001 Best Journal Paper Award” from the ASME Heat Transfer Division (HTD), the “New Investigator Award (2005)” from the Texas Space Grants Consortium (TSGC), “3M Non-Tenured Faculty” award (2009–2012), the “ASEE/ AFOSR Summer Faculty Fellowship (2006, 2007)” at the Air Force Research Labs (AFRL), the “ASEE/ ONR Summer Faculty Fellowship (2009)” at the Space and Naval Warfare Center (SPAWAR/SSC) and was elected as a Fellow of the ASME in 2016. He has chaired/ co-chaired the theses of 14 Ph.D. and 19 M.S. students.

Technology Commercialization: Thermascope Technologies Inc. (TTI) to commercialize his inventions. At the Texas New Ventures Competition (TNVC-2017), TTI won the 5th Prize (overall category), the “Amerra Visualization Prize,” and the “AM Center Innovation Center Prize.”

Also, he mentored a team of students at TAMU for designing, fabricating, assembling, and testing of a supplementary cooling system involving Phase Change Materials (PCM) integrated into a set of heat exchangers (manufactured by Additive Manufacturing/3-D Printing) as a Latent Heat Thermal Energy Storage System (LHTES). The TES provided a supplemental cooling system for thermal management of the control electronics of an autonomous vehicle (GM Bolt Electric Vehicle) retrofitted with a controller for making a self-driving car (autonomous vehicle).

TUESDAY, JULY 9
MUDAN HALL
1:00PM–1:35PM



Xing Zhang

Tsinghua University
“Raman Spectroscopy Method for Measuring
the Thermophysical Properties of Individual
Nanoscale Materials”

Abstract: The measurement of the thermophysical properties of nanomaterials has been an urgent and key issue of heat transfer research. Electrical methods have been applied to measure the thermal properties of nanowires. The contact methods have common difficulties in sample preparation and are not appropriate for two-dimensional material measurement. This talk will introduce the Raman spectroscopy method, as a non-contact method, which has been proved to be a more simple and effective method to measure the thermophysical properties of nanomaterials, both applicable for one-dimensional and two-dimensional materials. Characteristic Raman band shifts of many materials change linearly with temperature. And different materials have different Raman characteristic peaks. Hence, for supported nanomaterials, the temperature of the sample and its substrate can be determined simultaneously. Therefore, the Raman spectroscopy method can be used to determine the thermophysical properties of suspended/supported nanomaterials. We develop several steady-state Raman spectroscopy methods to determine the thermal conductivity and the thermal contact resistance of the nanomaterials. These steady-state methods have already been used to characterize the thermophysical properties as well as the corresponding size effects of carbon nanotube, graphene, and other nanomaterials. The steady-state Raman spectroscopy methods need electric heating or the measurement of laser absorptivity. To avoid them and also to characterize the thermal diffusivity, we propose an unsteady-state method, called the laser flash Raman spectroscopy method. The influence of the laser absorptivity can be eliminated by the nondimensionalized method. The laser flash Raman spectroscopy method has been used to determine the thermal diffusivity of the carbon nanotube, graphene, and other nanomaterials. Nevertheless, the temporal resolution of the laser flash Raman spectroscopy method is limited by the pulse width, which is ~ 10 ns, cannot match the requirement of supported nanomaterials. We further develop the dual-wavelength laser flash Raman

spectroscopy method, separating the heating and probing pulses and controlling the relative delay time. The probing pulse will detect the transient Raman signal of nanomaterials and substrate simultaneously at varied delay time. The temporal resolution can be within 100ps. The dual-wavelength laser flash Raman spectroscopy method has already be used to measure the thermophysical properties of silicon nanofiber.

Biography: Prof. Xing Zhang is the Director of the Institute of Engineering Thermophysics in the School of Aerospace Engineering at Tsinghua University, Beijing, China. He received his Ph.D. degree from Tsinghua University in 1988 and worked as a Lecturer at Southeast University after his graduation. From 1990 to 2006, he worked as a Research Associate, an Assistant Professor, and an Associate Professor at Kyushu University in Japan. He returned to Tsinghua University as a Professor in 2006. His current research interests include micro/nanoscale heat transfer, thermophysical properties of nanostructured materials, and the efficient use of wind/solar/hydrogen energy sources. He has published over 300 refereed journals and conference publications, and delivered more than 50 Plenary, Keynote, and Invited Lectures at major technical Conferences and Institutions. He serves as the President of Assembly for the International Heat Transfer Conference (AIHTC) and an Associate Editor of the *International Journal of Heat and Mass Transfer*. He received the “Significant Contribution Awards” from the 10th Asian Thermophysical Properties Conference in 2013, the “National Natural Science Award (Second Class)” from the State Council of the People’s Republic of China in 2011, and the “Best Paper Award” from the Heat Transfer Society of Japan in 2008.

Plenary & Keynote Presentations

TUESDAY, JULY 9
MUDAN HALL
1:35PM–2:10PM



Evelyn N. Wang

Massachusetts Institute of Technology
“Nanoengineered Materials for Enhanced
Liquid-Vapor Phase Change”

Abstract: Liquid-vapor phase change is essential in many thermal energy conversion applications. However, effectively utilizing these processes requires fine manipulation of interfacial transport. In the first part of the talk, we discuss evaporation from ultra-thin nanoporous membranes. Fundamental understanding during evaporation remains limited to date as it is generally challenging to characterize the heat and mass transfer at the interface, particularly when the heat flux is high ($>100\text{W}/\text{cm}^2$). We fabricated ultra-thin ($\approx 200\text{nm}$ thickness) nanoporous ($\approx 130\text{nm}$ pore diameter) membrane devices which reduced the thermal-fluidic transport resistance and accurately monitored the temperature of the liquid-vapor interface. At steady state, we demonstrated high heat fluxes across the interface ($\approx 500\text{W}/\text{cm}^2$) with pure evaporation into an air ambient and elucidated the importance of convective transport caused by evaporation itself. In the second part, we discuss condensation with low surface tension liquids. Low surface tension condensates pose a unique challenge since they often form a film, even on hydrophobic coatings. Lubricant infused surfaces (LIS) represent a potential solution, where a lubricant immiscible with the low surface tension condensate is infused into a rough structure on the condenser surface to repel the condensate. We used LIS to demonstrate a 5x improvement in heat transfer for low surface tension fluids compared to filmwise condensation. These works suggest the potential opportunities for significant energy savings in device thermal management, heating and cooling, and power generation.

Biography: Prof. Evelyn N. Wang is the Gail E. Kendall Professor and Department Head in the Mechanical Engineering Department at MIT. She received her BS from MIT, and MS and PhD from Stanford University in Mechanical Engineering. From 2006 to 2007, she was a postdoctoral researcher at Bell Laboratories. Her research interests include fundamental studies of micro/nanoscale heat and mass transport and the development of efficient thermal management, solar thermal energy conversion, and water harvesting systems. Her work has been honored with several awards including the 2012 ASME Bergles-Rohsenow Young Investigator Award, the 2016 ASME EPPD Women Engineer Award, and the 2017 ASME Gustus L. Larson Award. She is an ASME Fellow.

TUESDAY, JULY 9
MUDAN HALL
2:10PM–2:45PM



Sung Jin Kim

Korea Advanced Institute of Science and Technology
“Development of Flexible Thermal Superconductors”

Abstract: This talk is intended to provide a perspective and review of a journey toward a flexible thermal superconductor, which can be bent or twisted, to control heat transfer in heat generating devices of various shapes. The thermal superconductor exploits recent advances in micro pulsating heat pipes, which consists of a liquid-vapor slug-train unit oscillating within a microchannel. It will have a thermal conductivity of 1000W/mK, 2.5 times higher than copper, and 5000 times higher than current flexible materials, and a thickness of <1 mm. Compared to conventional pulsating heat pipes, micro pulsating heat pipes with hydraulic diameters of <1 mm have interesting features like orientation independent performance. In addition, several new ideas for thermal performance enhancement in the micro pulsating heat pipes will be presented. This talk will conclude with an overview of ongoing research activities associated with a prestigious nine-year grant by Korea’s Creative Research Initiative to develop Flexible and Thin Thermal Superconductors.

Biography: Prof. Sung Jin Kim is a Professor in the Department of Mechanical Engineering at the Korea Advanced Institute of Science and Technology (KAIST). He received a Ph.D. degree in Mechanical Engineering from the Ohio State University in 1989. Until joining KAIST in July 1997, he was a group leader of the Thermal Engineering Center at the IBM Tucson Laboratory for seven years. His research group at KAIST held National Research Lab status for five years from 2006. Recently, he was awarded a prestigious nine-year grant by Korea’s Creative Research Initiative to develop Flexible and Thin Thermal Superconductors.

He is a member of the Korean Academy of Science and Technology, and an ASME Fellow. He has received the Medal of Honor for Scientists from Korean Government, Scientific Achievement Award from KSME, Excellent Teaching Awards from KAIST, two Invention Achievement Awards, and five Author Recognition Awards from IBM. He edited a book entitled, *Air Cooling Technology for Electronic Equipment*.

Plenary & Keynote Presentations

TUESDAY, JULY 9
MUDAN HALL
2:45PM–3:20PM



Yongchen Song

Dalian University of Technology
“Microscopic Observation of Mass Transfer
Obstruction During Gas Hydrate Formation
and Decomposition”

Abstract: Gas hydrates are crystalline inclusion compounds, where light species molecules are trapped in water cages. Mass transfer during hydrate formation and decomposition plays an important role in gas hydrate production and hydrate flow assurance. Microfocus X-ray CT and synchrotron X-ray CT with sub-micrometer voxel size were used to study the time-resolved evolutions of gas hydrate microstructures during in-situ hydrate formation and decomposition. The full process of hydrate reaction at the phase interface is captured and followed, indicating the diffusion-limiting mechanism of hydrate phase transition. The initial formation of gas hydrate is found to occur at the gas-ice interface in directions of both inward and outward. Once a hydrate shell has formed across the interface, hydrate formation rate is limited by the mass transfer of gas across the hydrate shell. The resistance of mass transfer increases with hydrate shell thickening. The thickness range of hydrate shell at the end of the experiments is 40–60 μm , showing a positive correlation with temperature. A hydrate shell growth model on an ice sphere surface is developed. Using this model, the gas effective diffusion coefficient and reaction rate constant are obtained. Moreover, the in-situ hydrate decomposition is initiated at the gas-hydrate interface, with the hydrates close to the sand surface largely unchanged. Free water from decomposition gradually accumulates at the decomposing hydrate surface, isolating the hydrates from the gas phase. The very low solubility and diffusivity of gas molecules in water strongly limit the out-diffusion of released gas into the gas phase, resulting in a declining decomposition rate as the water layer thickens. A gradient of gas concentration in the water layer is directly observed, indicating a metastable enrichment of gas water. The resulting diffusion-limiting mechanism of in-situ gas hydrate decomposition is of importance for gas hydrate production by depressurization from marine sediments.

Biography: Prof. Yongchen Song is a currently Professor at Dalian University of Technology (DUT), the vice-president of DUT, and the director of the Key Laboratory of Ocean Energy Utilization and Energy Conservation of Ministry of Education. He received a doctorate from DLUT in 1992. After a lecturer in DUT, he went to Japan in 1996, and worked at Nagoya University as a visiting scholar from 1997 to 1998. In 2000, he served as a director researcher for Research Institute of Innovative Technology for the Earth (RITE). In 2005, he came back to DLUT as a professor. His current interests focus on the fundamental exploitation research of natural gas hydrate and the technical research of carbon dioxide capture and storage. He has published over 150 SCI papers on these topics. He developed an improved model to predict the methane hydrate equilibrium in the marine sediment environment and analyzed the mass transfer limitations of gas hydrate decomposition process in a gas-rich sedimentary matrix. In addition, he independently designed a novel apparatus for in situ measurement of thermal conductivity of hydrate-bearing sediments, and the model for effective thermal conductivity prediction he improved can suitably predict the measured data. He applies pore network models combined with X-ray computed tomography to investigating the index properties and percolation characteristics of porous media containing hydrates. The triaxial testing apparatus he developed is used to investigate the mechanical behaviors of marine methane hydrate-bearing sediments, demonstrating the effect of exploitation on the stability of hydrate-bearing sediments. His studies provide a basic knowledge for natural gas hydrate exploitation in the South China Sea.

WEDNESDAY, JULY 10
HUAIHUA HALL 1-3
8:00AM–8:35AM

**Shigeo Maruyama**

The University of Tokyo

“Synthesis and Solar Cell Applications of Single-Walled Carbon Nanotubes Co-Axially Wrapped With Mono- and Few-Layer Boron Nitride Nanotubes”

Abstract: We have synthesized a new coaxial nanotube structure, in which mono- or few-layer hexagonal boron nitride nanotube (BNNT) seamlessly wrap around a single-walled carbon nanotube (SWCNT), and results in an atomically smooth coaxial tube consisting of two different materials [1]. TEM-EELS clearly demonstrated the BNNT-SWCNT coaxial structure. We have tried various morphologies of SWCNTs as starting material, e.g., vertically aligned array, horizontally aligned array, suspended SWCNTs, and dry-deposited random network films. We can clearly observe the coaxial structure from originally isolated SWCNTs. Though TEM nano diffraction analysis, we found no correlation between chiral angle of inner SWCNT and outer BNNT for “double-walled” SWCNT-BNNT. We concluded that these are one-dimensional van der Waals heterostructures. From optical observations, such as absorption, Raman and photoluminescence, we can confirm that the SWCNT inside the BN nanotube retains the original optical properties of SWCNT. We have further developed the 1D coating CVD for transition dichalcogenide nanotubes, such as MoS₂ nanotube. We can grow MoS₂ nanotubes around relatively large diameter SWCNT or SWCNT @BNNT [1]. Applications of these 1D heterostructure materials in next generation solar cells [2–4] will be discussed.

Biography: Prof. Shigeo Maruyama received his Ph.D. from the School of Engineering at the University of Tokyo in 1988. He worked as a research associate from 1988, a lecturer from 1991, an associate professor from 1993, a full professor from 2004, and a distinguished professor from 2014 at the University of Tokyo. From April 2015, he was appointed as a cross-appointment fellow for Advanced Industrial science and technology (AIST). From 2016, he was also serving as guest professor at Peking University.

He has been serving as the president of “The Fullerenes, Nanotubes and Graphene Research Society” since 2011, and the co-chair of steering committee of Carbon Nanotube conferences (International Conference on Science and Application of Nanotubes and Low-Dimensional Materials) since 2016.

Current research topics are growth, optical characterization, thermal characterization, and solar cell application of carbon nanotubes and graphene. Recently, he has successfully grow boron-nitride nanotubes on single-walled carbon nanotubes. In addition, he can grow transition metal dichalcogenides nanotubes based on a SWCNT template. Now, he is proposing the one-dimensional heterojunction material.

Plenary & Keynote Presentations

WEDNESDAY, JULY 10
HUAIHUA HALL 1-3
8:35AM–9:10AM



Zhuomin Zhang

Georgia Institute of Technology
“Recent Advances in Nanoscale Thermal Radiation”

Abstract: Radiative heat transfer between closely spaced objects can be greatly enhanced at nanoscale separation due to photon tunneling and the enhanced density of states. Furthermore, the interaction of electromagnetic waves with micro/nanostructured materials can potentially modify their far-field radiative properties. Micro/nanoscale thermal radiation concerns both near-field radiative heat transfer between closely spaced objects and the interaction of electromagnetic waves with micro/nanostructured materials that could potentially modify the far-field radiative properties. Graphene and other two-dimensional materials offer possibility to further enhance near-field radiative heat transfer. Nanoscale thermal radiation has promising applications in advanced energy harvesting, nanomanufacturing, thermal control and management, and high-resolution thermal mapping. Significant developments have been made in recent years in the field of micro/nanoscale thermal radiation, both theoretically and experimentally. This presentation will give an overview of the advances and status of this exciting multidisciplinary field. Theoretical challenges and application potential will also be addressed.

Biography: Prof. Zhuomin Zhang earned a Ph.D. degree from MIT and worked at NIST and University of Florida prior to joining Georgia Tech in 2002. He received his B.S. and M.S. degrees from the University of Science and Technology of China (Hefei). His research interests are in micro/nanoscale heat transfer especially nanoscale thermal radiation for energy conversion and temperature measurement. He has written a book on *Nano/Microscale Heat Transfer* (McGraw-Hill, 2007), co-authored over 180 journal papers, and given over 380 invited and contributed presentations. A number of his former students have established independent careers at major universities or industry in the United States, China (mainland and Taiwan), and South Korea. In addition, he has supervised many visiting scholars, postdoctoral fellows, and undergraduate student researchers. Dr. Zhang currently serves as an associate editor of the *Journal of Thermophysics & Heat Transfer* and the *Journal of Quantitative Spectroscopy & Radiative Transfer*. He served as the Program Chair of the ASME 3rd Micro/Nanoscale Heat & Mass Transfer International Conference (Atlanta, March 2012), Chair of the 2nd International Workshop on Nano-Micro Thermal Radiation (Shanghai, June 2014), and General Chair for the ASME 5th Micro/Nanoscale Heat & Mass Transfer International Conference (Singapore, January 2016). Dr. Zhang is a Fellow of ASME, AAAS, and APS, and an Associate Fellow of AIAA. He was a recipient of the 1999 Presidential Early Career Award for Scientists and Engineers (PECASE) and the 2015 ASME Heat Transfer Memorial Award.

WEDNESDAY, JULY 10
HUAIHUA HALL 1-3
9:10AM–9:45AM



Yuying Yan

University of Nottingham

“Nature Inspired Solutions Help Drive
Research Progress — From Heat Transfer to
Downhole Oil-Water Separation”

Abstract: Nature always tends to act in the simplest way. In the nature world, plants and animals, which have evolved over time of millions of years to best adapt to the environment, do not waste but tend to save energy, and they are sustainable. To have a micro insight, plants or animals normally interact effectively with the surrounding environment by exchanging energy and mass across their cuticles of specific micro- or even nanoscale structures with functions to achieve perfect energy balance. The lecture tries to demonstrate that nature inspired solutions could help drive research progress. Examples or stories of heat transfer enhancement will be briefly introduced, and a recent study of downhole oil-water separation will be explored in details.

Biography: Prof. Yuying Yan was awarded his PhD in Mechanical Engineering at City University of London in 1996, and currently is Professor of Thermofluids Engineering, L.D.S. Chair Professor and Director of Fluids & Thermal Engineering Centre at University of Nottingham. He carries out wide range research in multiphase flow, heat transfer, and energy thermal management, as well as the cross-disciplinary subject of biomimetics in terms of nature-inspired solutions for flow and heat transfer. He was chair of the first International Symposium of Biomimetic Functional Surfaces and Fluids (BFSF) in 2009 and created the first UK-China joint laboratory of BFSF in 2009. He is also the director of Industrial Joint Laboratory of Thermal Management & Heat Transfer for Low Carbon Vehicles at University of Nottingham. His research has been sponsored by UK EPSRC, Royal Society, Royal Academy of Engineering, Innovate UK, APC, and European Commission, as well as many industrial companies including Siemens, etc. His recent five year research portfolio is about £7million. He is an elected Fellow and Deputy General Secretary of the International Society of Bionic Engineering, UK Heat Transfer Committee member, and UK EPSRC Peer Review College. He was a member of EU ERC’s Advanced Research Grant Panel (2014–2017). He has supervised more than 30 PhD students and published more than 200 journal papers with over 4000 citations. He has chaired or co-chaired many international conferences/events, such as ICBE2010, ISHT2014, ICBE2016, ISHT&HPC2016, 3rdISFTE2017, and 16UKHTC2019.

Track Organizers

TRACK 1 MICRO/NANOFLUIDICS AND LAB-ON-A-CHIP

Track Organizer: Xiangchun Xuan, *Clemson University, Clemson, SC, United States*

Track Co-Organizer: Dong Liu, *University of Houston, Houston, TX, United States*, Huaqing Xie, *Shanghai Second Polytechnic University, Shanghai, China*

TRACK 2 NANOFLUIDS

Track Organizer: Hani Sait, *MU, Columbia, MO, United States*

Track Co-Organizer: Haiping Hong, *SDSMT, Rapid City, SD, United States*, S.M. Sohel Murshed, *Universidade de Lisboa, Lisboa, Portugal*

TRACK 3 MICRO/NANOSCALE INTERFACIAL TRANSPORT PHENOMENA

Track Organizer: Chen Li, *University of South Carolina, Columbia, SC, United States*

Track Co-Organizer: Zuankai Wang, *City University of Hong Kong, Shenzhen China, China*, Calvin Hong Li, *Villanova University, Villanova, PA, United States*

TRACK 4 NANO/MICROSCALE BOILING AND CONDENSATION HEAT TRANSFER

Track Organizer: Xianming Dai, *University of Texas at Dallas, Richardson, TX, United States*

Track Co-Organizer: Xiaodong Wang, *North China Electric Power University, Beijing, China*, Xuehu Ma, *Dalian University of Technology, Dalian, Liaoning Province*

TRACK 5 MICRO/NANOSCALE THERMAL RADIATION

Track Organizer: Xinwei Wang, *Iowa State University, Ames, IA, United States*

Track Co-Organizer: Ceji Fu, *Peking University, Beijing, China*, Yu-bin Chen, *National Tsing Hua University, Hsinchu, Taiwan*

TRACK 6 MICRO/NANOSCALE ENERGY DEVICES AND SYSTEMS

Track Organizer: Bao Yang, *University of Maryland, College Park, MD, United States*

Track Co-Organizer: Qing Hao, *University of Arizona, Tucson, AZ, United States*, Yuwen Zhang, *University of Missouri, Columbia, MO, United States*

TRACK 7 MICRO/NANO-THERMAL MANUFACTURING AND MATERIALS PROCESSING

Track Organizer: Debjyoti Banerjee, *Texas A&M University, College Station, TX, United States*

Track Co-Organizer: Zhixiong Guo, *Rutgers University, Piscataway, NJ, United States*, Haiwang Li, *Beihang University, Beijing, China*

TRACK 9 MICRO/NANOSCALE HEAT CONDUCTION

Track Organizer: Deyu Li, *Vanderbilt University, Nashville, TN, United States*

Track Co-Organizer: Ronggui Yang, *University of Colorado, Boulder, CO, United States*, Zhichun Liu, *Huazhong University of Science and Technology, China, Wuhan, China*

TRACK 10 COMPUTATIONAL METHODS IN MICRO/NANOSCALE TRANSPORT

Track Organizer: Peixue Jiang, *Tsinghua University, Beijing, China*

Track Co-Organizer: Wei Li, *Zhejiang University, Hang-Zhou City, Zhejiang, China*, David R. Emerson, *STFC Daresbury Laboratory, Warrington, United Kingdom*

TRACK 11 HEAT AND MASS TRANSFER IN SMALL SCALE

Track Organizer: Yulong Ji, *Dalian Maritime University, Dalian, Liaoning, China*

Track Co-Organizer: Chaobin Dang, *The University of Tokyo, Chiba, Japan*, Liwu Fan, *Zhejiang University, Hangzhou, Zhejiang, China*

TRACK 12 MICRO/MINIATURE TWO-PHASE DEVICES/SYSTEMS

Track Organizer: Scott Thompson, *Auburn University, Auburn, AL, United States*

Track Co-Organizer: Cheng-xian Lin, *Florida International University, Miami, FL, United States*, Jianyin Miao, *Chinese Academy of Space Technology, Beijing, China*

TRACK 13 BIOMEDICAL APPLICATIONS OF MICRO/NANOSCALE TRANSPORT

Track Organizer: Liang Zhu, *University of Maryland Baltimore County, Baltimore, MD, United States*

Track Co-Organizer: Shuhuai Yao, *The Hong Kong University of Science and Technology, Kowloon, Hong Kong*, Fengmin Su, *Dalian Maritime University, Dalian, Liaoning, China*

TRACK 14 OSCILLATING HEAT AND MASS TRANSFER IN CAPILLARIES

Track Organizer: Li Jia, *Beijing Jiaotong university, Beijing, China*

Track Co-Organizer: Nannan Zhao, *Dalian Maritime University, Dalian, China*, Tingting Hao, *Dalian University of technology, Dalian, Liaoning, China*

TRACK 15 VISUALIZATION OF HEAT AND MASS TRANSFER IN MICRO/NANOSCALE

Track Organizer: Chang Kyoung Choi, *Michigan Technological University, Houghton, MI, United States*

Track Co-Organizer: Nenad Miljkovic, *Massachusetts Institute of Technology, Cambridge, MA, United States*, Jingming Dong, *Dalian Maritime University, Dalian, China*

TRACK 16 MEASUREMENT TECHNIQUES AND THERMOPHYSICAL PROPERTIES IN MICRO/NANOSCALE

Track Organizer: Oronzio Manca, *Università Della Campania, Aversa, Italy*

TRACK 17 POSTER PRESENTATIONS

Track Organizer: Qiuwang Wang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Track Co-Organizer: Yun Wang, *University of California, Irvine, United States*

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Manager, Publications Webtool	Stacey Cooper
Coordinator, Copyrights	Annette Robinson

MONDAY, JULY 8

11-1: MICRO/NANOSCALE HEAT TRANSFER 3rd Floor, Mudan Hall 10:30AM–12:00PM

Session Organizer: Zhiting Tian, *Cornell University, Ithaca, NY, United States*

Session Co-Organizer: Xiu Xiao, *Dalian Maritime University, Dalian, China*, Yanxia Li, *Beijing University of Technology, Beijing, China*

Experimental and Theoretical Study on the Effect of Pressure and Surface Roughness on Thermal Contact Resistance With LMA As TIM

Technical Paper Publication. MNHMT2019-4083

Yulong Ji, Jiantong Xu, Weichen Gao, Huilong Yan, Fengmin Su, *Dalian Maritime University, Dalian, Liaoning, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

Thermal Property Enhancement of Liquid Metal Used As Thermal Interface Material by Mixing Magnetic Particles

Technical Paper Publication. MNHMT2019-4155

Ma Xianfeng, Li Gen, Zheng Xueling, Wang Xiaozhong, Wang Zhongcheng, *Shanghai Maritime University, Shanghai, China*, Yulong Ji, *Dalian Maritime University, Dalian, Liaoning, China*

Experimental Study on the Effect of Interface Heat Transfer on Performance of Thermoelectric Generators

Technical Paper Publication. MNHMT2019-4156

Yan Baoyu, Li Gen, Cao Hongfei, Wang Xiaozhong, Wang Zhongcheng, *Shanghai Maritime University, Shanghai, China*, Yulong Ji, *Dalian Maritime University, Dalian, Liaoning, China*

Molecular Mechanism of Water Transport Through Cellulose Cell Wall Matrix

Technical Paper Publication. MNHMT2019-4031

Jiaqi Sun, Xinrong Zhang, *Peking University, Beijing, China*

Nusselt Number Prediction for Slip Flow in Confined Porous Media Based on Lattice Boltzmann Method

Technical Paper Publication. MNHMT2019-4192

Ammar Tariq, Zhenyu Liu, Zhiyu Mu, Huiying Wu, *Shanghai Jiao Tong University, Shanghai, China*

1-2: DROPLETS 3rd Floor, Huaihua Hall #1 10:30AM–12:00PM

Session Organizer: Yong Ren, *University of Nottingham Ningbo China, Ningbo, Zhejiang, China*

Session Co-Organizer: Xiaodong Chen, *Beijing Institute of Technology, Beijing, China*

Invited Presentation: Non-isotropic Wetting and Drying of Sessile Droplet on Micropyramid Patterned Surface

Technical Presentation. MNHMT2019-4273

Fei Duan, *Nanyang Technological University, Singapore, Singapore*

High-Throughput Generation of Surface Tension Confined Droplet Arrays

Technical Presentation. MNHMT2019-4112

Jinbo Wu, *Shanghai University, Shanghai, China*

High Throughput Fabrication of Microdroplets Using Needle Based Microfluidic System

Technical Paper Publication. MNHMT2019-4263

Zheng Lian, Yong Ren, *University of Nottingham Ningbo China, Ningbo, Zhejiang, China*, Kai Seng Koh, *Heriot-Watt University Malaysia, Jalan Venna, Putrajaya, Malaysia*, Jun He, George Zheng Chen, Xiaogang Yang, *University of Nottingham Ningbo China, Ningbo, Zhejiang, China*

Impact of Water Microdroplet Onto an Oil Film: Dynamics and Outcomes

Technical Presentation. MNHMT2019-4224

Xiaodong Chen, Bo Wang, *Beijing Institute of Technology, Beijing, China*

Numerical Study of Janus Droplet Migration by OpenFOAM

Technical Presentation. MNHMT2019-4249

Fan Bai, Sangwoo Joo, *Yeungnam University, Gyeongsan, Gyeongsangbukdo, Korea (Republic)*, Hongna Zhang, *Sun Yat-Sen University, Zhuhai, Guangdong, China*

Non-Newtonian Droplet Generation in a Flow-Focusing Microchannel

Technical Paper Publication. MNHMT2019-4196

Chundong Xue, Zhongping Sun, Yongjiang Li, Kairong Qin, *Dalian University of Technology, Dalian, China*

3-1: TRANSPORT PHENOMENA ON SOLID-SOLID INTERFACES 3rd Floor, Huaihua Hall #2 10:30AM–12:00PM

Session Organizer: Tengfei Luo, *University of Notre Dame, Notre Dame, IN, United States*

Session Co-Organizer: Ping Zhang, *Gullin University of Electronic Technology, Gullin, China*

Thermal Transport Across Metal/Metal-Oxides Interfaces in Memristor Devices

Technical Presentation. MNHMT2019-4070

Liang Chen, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, Xiaojia Wang, *University of Minnesota, Minneapolis, MN, United States*, Shuangtao Chen, Yu Hou, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Thermoelectric Properties of Point Contacts Between Two Multiwall Carbon Nanotubes

Technical Presentation. MNHMT2019-4090

Yang Zhao, *Vanderbilt University, Nashville, TN, United States*, Juekuan Yang, *Southeast University, Nanjing, China*, Deyu Li, *Vanderbilt University, Nashville, TN, United States*

Understanding the Kink Effect on Thermal Transport Through Nanowires

Technical Presentation. MNHMT2019-4091

Yang Zhao, Lin Yang, Qian Zhang, Deyu Li, *Vanderbilt University, Nashville, TN, United States*

Technical Sessions

Interfacial Thermal Conductance and Thermal Rectification Across In-Plane Graphene/h-BN Heterostructures With Different Bonding Types

Technical Paper Publication. MNHMT2019-4159

Ping Zhang, Ting Liang, Peng Yuan, Man Zhou, Siping Zhai, *Guilin University of Electronic Technology, Guilin, China*

Nanostructured Interfaces Enhance Interfacial Thermal Transport

Technical Presentation. MNHMT2019-4143

Eungkyu Lee, Tengfei Luo, *University of Notre Dame, Notre Dame, IN, United States*

4-1: NEW SURFACES FOR PHASE CHANGE -1

3rd Floor, Huaihua Hall #3 10:30AM–12:00PM

Session Organizer: Hao Wang, *Peking University, Beijing, China*
Session Co-Organizer: Zhenyuan Xu, *Shanghai Jiao Tong University, Shanghai, China*

Invited Presentation: Interfacial Solutions to Water-Energy Problems

Technical Presentation. MNHMT2019-4191

Kyoo-Chul Park, *Northwestern University, Evanston, IL, United States*

Enhancing Condensation on Air-Independent Rough Surfaces

Technical Presentation. MNHMT2019-4006

Gaurav Sirohia, Zongqi Guo, Xianming Dai, *University of Texas at Dallas, Richardson, TX, United States*

Enhanced Condensation Phase Change on Hierarchical Lubricant Infused Surfaces

Technical Presentation. MNHMT2019-4264

Daniel Orejon, *The University of Edinburgh, Edinburgh, United Kingdom*,
Peng Zhang, *Shanghai Jiao Tong University, Shanghai, China*, Yota Maeda, *Kubota, Osaka, Japan*, Fengyong Lv, *Shanghai Jiao Tong University, Shanghai, China*, Yasuyuki Takata, *Kyushu University, Fukuoka, Japan*

Engineered Surfaces for Improved Dropwise Condensation

Technical Presentation. MNHMT2019-4102

Sushant Anand, Seetharam Koundinya Muthya, Sanmitra Dutta, Sameera Khan, *University of Illinois at Chicago, Chicago, IL, United States*

High Performance Condensation Process for Clean Water Collection by Using Thermoelectric Technology

Technical Presentation. MNHMT2019-4268

Na Lu, Yining Feng, *Purdue University, West Lafayette, IN, United States*,
Qing Hao, *University of Arizona, Tucson, AZ, United States*

Directional Transport of Droplets Mediated by Temperature on Gradient Surfaces

Technical Presentation. MNHMT2019-4311

Cong Liu, Yahua Liu, *Dalian University of Technology, Dalian, China*

9-1: THERMAL TRANSPORT IN NANOWIRES AND NANOFIBERS

3rd Floor, Baihe Hall #1 10:30AM–12:00PM

Session Organizer: Dongyan Xu, *The Chinese University of Hong Kong, Shatin, Hong Kong*

Thermal Transport in Polyethylenes: From Single Chain to Semicrystalline

Technical Presentation. MNHMT2019-4009

Xiaobo Li, Cong Yang, *Huazhong University of Science and Technology, Wuhan, China*, Tingyu Lu, Jixiong He, *North Carolina State University, Raleigh, NC, United States*, Xuhui Duan, *Huazhong University of Science and Technology, Wuhan, Hubei, China*, Jun Liu, *North Carolina State University, Raleigh, NC, United States*

Tuning Thermoelectric Properties of Bismuth Selenide Nanoribbons by Copper Intercalation/Deintercalation

Technical Presentation. MNHMT2019-4073

Yucheng Xiong, Nien-Chu Lai, *The Chinese University of Hong Kong, Hong Kong, Hong Kong*, Hao Tang, *Wuhan University of Technology, Wuhan, China*, Yi-Chun Lu, *The Chinese University of Hong Kong, Hong Kong, Hong Kong*, Dongyan Xu, *The Chinese University of Hong Kong, Shatin, Hong Kong*

Thermal Conductivity Anisotropy in Indium Doped CdSe Nanoribbons

Technical Presentation. MNHMT2019-4326

Chao Wu, Juekuan Yang, Chenhan Liu, *Southeast University, Nanjing, China*, Yi Tao, *Vanderbilt University, Nashville, TN, United States*, Hao Tang, *Wuhan University of Technology, Wuhan, China*, Yunfei Chen, *Southeast University, Nanjing, China*

Thermal Conductivity and Electrical Resistivity of a Single Copper Nanowire

Technical Presentation. MNHMT2019-4107

Wei-Tsu Peng, Fu-Ren Chen, Ming-Chang Lu, *National Chiao Tung University, Hsinchu, Hsinchu, Taiwan*

Thermal Transport in Quasi-1D van der Waals Crystal Nanowires

Technical Presentation. MNHMT2019-4089

Yang Zhao, Lin Yang, Qian Zhang, Deyu Li, *Vanderbilt University, Nashville, TN, United States*

14-1: OSCILLATING HEAT AND MASS TRANSFER IN CAPILLARIES

3rd Floor, Baihe Hall #2 10:30AM–12:00PM

The Phenomenon of Unidirectional Circulating Flow in an Oscillating Heat Pipe

Technical Paper Publication. MNHMT2019-3937

Chunrong Yu, Yulong Ji, Lilin Chu, Zongyu Wang, Yadong Li, *Dalian Maritime University, Dalian, Liaoning, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

Experimental Study on Oscillating Heat Pipe With Hydraulic Diameter Far Exceeding the Maximum Hydraulic Diameter

Technical Paper Publication. MNHMT2019-4092

Lilin Chu, Yulong Ji, Chunrong Yu, Yantao Li, *Dalian Maritime University, Dalian, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*, Yang Guo, *Dalian Maritime University, Dalian, Liaoning, China*

Heat Transfer Characteristics of Horizontal Nano-Structured Oscillating Heat Pipes

Technical Paper Publication. MNHMT2019-4100

Tingting Hao, Huiwen Yu, Xuehu Ma, Zhong Lan, *Dalian University of Technology, Dalian, Liaoning, China*

Oscillatory Thermosolutal Capillary Convection of High Prandtl Number Fluid for Liquid Bridge Under Gravity Environment

Technical Presentation. MNHMT2019-4119

Shuo Yang, Yu Gao, Rui Ma, Qing L. Kong, Guo Q. Lei, Zi A. Hu, *Shenyang Institute of Engineering, Shenyang, China*

Analytical Approach for Enhancing Solar Collectors by Oscillating Heat Pipe for the Use of Ejector Refrigeration System

Technical Paper Publication. MNHMT2019-4127

Hani Sait, *MU, Columbia, MO, United States*, Badr Habib, Nadim Turkman, *KAU, Jeddah, Saudi Arabia*

12-1: MICRO/MINIATURE TWO-PHASE DEVICES/ SYSTEMS I

3rd Floor, Baihe Hall #3 10:30AM-12:00PM

Session Organizer: Qin Sun, *Jiangsu University, Zhenjiang, Jiangsu, China*

Experimental Investigation of a Miniature Ejector Using Water as Working Fluid

Technical Paper Publication. MNHMT2019-3925

Jingming Dong, Yuxin Xia, *Dalian Maritime University, Dalian, China*, He Song, *Beihang University, Beijing, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*, Zhongxi Zhao, Tao Liang, *Dalian Maritime University, Dalian, China*

Theoretical Analysis of Evaporation Heat Transfer in the Thin-Film Region of Nanofluids

Technical Paper Publication. MNHMT2019-3970

Nannan Zhao, Huan Lin, Fengmin Su, *Dalian Maritime University, Dalian, China*, Benwei Fu, *Dalian Maritime University, Shanghai, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*, Bohan Tian, *Dalian Maritime University, Dalian, Liaoning, China*

Effect of Salinity on the Capturing CO₂ Capabilities of Brine in Two-Dimensional Porous Media

Technical Paper Publication. MNHMT2019-4256

Changzhong Zhao, Yongchen Song, Mingkun Chen, Yuan Chi, Yi Zhang, *Dalian University of Technology, Dalian, Liaoning Province, China*

A Modified Correlation for Flow Boiling Heat Transfer in Plate Heat Exchangers

Technical Paper Publication. MNHMT2019-4037

Tong Lv, Boren Zheng, *Zhejiang University, Hangzhou, Zhejiang Province, China*, Wei Li, *Zhejiang University, Hang-Zhou City, Zhejiang, China*, Zahid Ayub, *Isotherm, Inc., Arlington, TX, United States*

17-1: TRACK 1 MICRO/NANOFLUIDICS AND LAB-ON-A-CHIP

3rd Floor, Mudan Hall Poster 1 3:35PM-6:00PM

Session Organizer: Xiangchun Xuan, *Clemson Univ, Clemson, SC, United States*

Engineering Embolic Microparticles From a Periodically-Pulsating Charged Liquid Meniscus

Poster Presentation. MNHMT2019-3952

Xiaowei Tian, Liqiu Wang, *University of Hong Kong, Hong Kong, Hong Kong*

Numerical Simulation on the Deformation and Migration of a Droplet in the Quadrupole Electric Field

Poster Presentation. MNHMT2019-4035

Yinshi Li, Yanning Wang, *Xi'an Jiaotong University, Xi'an, China*

Study on Particle Aggregation and Phonon Transport in Nanofluid

Poster Presentation. MNHMT2019-4048

Dongxing Song, Weigang Ma, Xing Zhang, *Tsinghua University, Beijing, China*

Flow Modes and Interface Instabilities in Coaxial Flow Focusing

Poster Presentation. MNHMT2019-4152

Kai Mu, Ting Si, Hang Ding, *University of Science and Technology of China, Hefei, Anhui, China*

Rapid Enrichment of Nanoparticles by ACEK Nanofluidics and Their Sensitive Detection

Poster Presentation. MNHMT2019-4187

Jian Wang, Jian Zhang, *Hefei University of Technology, Hefei, China*, Jie Wu, *The University of Tennessee, Knoxville, TN, United States*

Numerical and Experimental Investigations of Real-Time Microfluidics Heating by Close-Loop Control

Poster Presentation. MNHMT2019-4193

Junyu Tong, Tao Zhang, Shanshan Li, *Hebei University of Technology, Tianjin, Tianjin, China*, Jie J. Wu, *University of Tennessee, Knoxville, Knoxville, TN, United States*, Junwei Li, *Hebei University of Technology, Tianjin, Tianjin, China*

Manipulate Liquid Metal Droplet Dynamics by Electrowetting: An Experimental and Modelling Study

Poster Presentation. MNHMT2019-4199

Bing-He Bai, Gui Lu, Xiaodong Wang, *North China Electric Power University, Beijing, China*

Technical Sessions

Application of Knudsen Thermal Force for Detection of Ammonia Gas by MEMS Gas Sensor

Poster Presentation. MNHMT2019-4303

Mostafa BarzegarGerdroodbary, Babol Noshirvani University of Technology, Babol, Islamic Republic of Iran

17-2: TRACK 2 NANOFUIDS 3rd Floor, Mudan Hall Poster 2 3:35PM–6:00PM

Session Organizer: Hani Sait, MU, Columbia, MO, United States

Heat Transfer Enhancement in Helically Micro-Coiled Tubes Using Nanoparticle-Viscoelastic Fluids by Elastic Turbulence

Poster Presentation. MNHMT2019-3913

Haie Yang, Beihang University, Beijing, Beijing, China

17-3: TRACK 3 MICRO/NANOSCALE INTERFACIAL TRANSPORT PHENOMENA 3rd Floor, Mudan Hall Poster 3 3:35PM–6:00PM

Session Organizer: Chen Li, University of South Carolina, Columbia, SC, United States

Wettabilities of Different Faces of Quartz

Poster Presentation. MNHMT2019-3958

Yajun Deng, Hailong Lu, Hao Wang, Peking University, Beijing, China

The Thermal Rectification Phenomenon at the Contacted Interface Between Carbon Nanotubes and Metals

Poster Presentation. MNHMT2019-3962

Guang Zhang, Chinese Academy of Space Technology, Beijing, China

Tuning the Thermal Conductance of Polymer and Sapphire Interface

Poster Presentation. MNHMT2019-3995

Kun Zheng, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China, Jie Zhu, Dalian University of Technology, Dalian, China, Fangyuan Sun, Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China, Yongmei Ma, Institute of Chemistry, Chinese Academy of Sciences, Beijing, China, Dawei Tang, Dalian University of Technology, Dalian, China

Multiscale Simulation of Deposition on Cold Surface Under Laminar Flow Conditions

Poster Presentation. MNHMT2019-4032

XiaoYing Xu, Wen Wang, Shanghai Jiao Tong University, Shanghai, China

Simulation of Phase Change Behavior in Grooved Wicks

Poster Presentation. MNHMT2019-4142

Xiting Chen, Chao Qi, Wen Wang, Shanghai Jiao Tong University, Shanghai, China, Jianyin Miao, Hongxing Zhang, Chinese Academy of Space Technology, Beijing, China

Droplet Impact Dynamics on Patterned Copper-Nanowire Superhydrophobic Cooling Surfaces

Poster Presentation. MNHMT2019-4158

Siyun Yang, Xuehu Ma, Tingting Hao, Yufei Zhang, Mucan Liu, Yanxian Tao, Dalian University of Technology, Dalian, China

Serial-Wedge-Shaped Wettability Pattern for Pumpless and Long-Distance Transportation of Subaqueous Gas Bubbles

Poster Presentation. MNHMT2019-4209

Ziai Liu, Jinlong Song, Dalian University of Technology, Dalian, China

First-Principles Calculations of Photoconductivity

Poster Presentation. MNHMT2019-4347

Yijun Ge, Timothy T.S. Fisher, UCLA, Los Angeles, CA, United States

17-4: TRACK 4 NANO/MICROSCALE BOILING AND CONDENSATION HEAT TRANSFER 3rd Floor, Mudan Hall Poster 4 3:35PM–6:00PM

Session Organizer: Xianming Dai, University of Texas at Dallas, Richardson, TX, United States

Icing and Deicing of Condensed Droplets on Superhydrophobic Surfaces

Poster Presentation. MNHMT2019-3916

Fuqiang Chu, Dongsheng Wen, Beihang University, Beijing, China

Molecular Dynamics Simulation of Condensation on Hybrid Nanotextured Surfaces With Concentric Rings

Poster Presentation. MNHMT2019-4023

Shan Gao, Wei Liu, Zhichun Liu, Huazhong University of Science and Technology, China, Wuhan, China

Boiling Heat Transfer Enhancement by Constructal Surfaces

Poster Presentation. MNHMT2019-4269

Guanglei Chen, Villanova University, Broomall, PA, United States, Calvin Hong Li, Villanova University, Villanova, PA, United States

Droplet Size Distribution Model for Jumping-Droplet Condensation

Poster Presentation. MNHMT2019-4293

Zhenyuan Xu, Shanghai Jiao Tong University, Shanghai, China, Lenan Zhang, Evelyn Wang, Massachusetts Institute of Technology, Cambridge, MA, United States

Effect of Non-Condensable Gas on Steam Jet Condensation in Subcooled Water Flow of a Vertical Pipe Using CFD Simulation

Poster Presentation. MNHMT2019-4300

Xianbing Chen, Maocheng Tian, Shandong University, Jinan, Shandong, China

17-5: TRACK 5 MICRO/NANOSCALE THERMAL RADIATION

3rd Floor, Mudan Hall Poster 5 3:35PM–6:00PM

Session Organizer: Xinwei Wang, Iowa State University, Ames, IA, United States

Numerical Simulations on the Thermal Radiative Properties Based on Anisotropic Metamaterial

Poster Presentation. MNHMT2019-4124

Yi Zhao, Wenjing Zhang, Shenzhen University, Shenzhen, China

Optimization Design of Broadband Absorber With Composite Structure for Harvesting Solar Energy

Poster Presentation. MNHMT2019-4338

Wenwen Zhang, Zhitian Niu, Hong Qi, Mingjian He, Yatao Ren, Liming Ruan, Harbin Institute of Technology, Harbin, China

17-6: TRACK 6 MICRO/NANOSCALE ENERGY DEVICES AND SYSTEMS

3rd Floor, Mudan Hall Poster 6 3:35PM–6:00PM

Session Organizer: Bao Yang, University of Maryland, College Park, MD, United States

Realization of Spectrally Selective for Transmittance for Energy-Saving Glass

Poster Presentation. MNHMT2019-3931

Yen-Hsiang Chen, Yu-bin Chen, Ming-Tsang Lee, National Tsing Hua University, Hsinchu City, Taiwan

17-7: TRACK 7 MICRO/NANO-THERMAL MANUFACTURING AND MATERIALS PROCESSING

3rd Floor, Mudan Hall Poster 7 3:35PM–6:00PM

Session Organizer: Debjyoti Banerjee, Texas A&M University, College Station, TX, United States

Ultralight and Conductive PEDOT: PSS/2D Graphene Oxide Composite Aerogel for Thermoelectric Conversion Device

Poster Presentation. MNHMT2019-4081

Xin Qi, Tsinghua University, Beijing, China, Guang Zhang, Chinese Academy of Space Technology, Beijing, China, Weigang Ma, Xing Zhang, Tsinghua University, Beijing, China, Chun Zhang, Lanzhou Jiaotong University, Lanzhou, China

17-8: TRACK 9 MICRO/NANOSCALE HEAT CONDUCTION

3rd Floor, Mudan Hall Poster 8 3:35PM–6:00PM

Session Organizer: Deyu Li, Vanderbilt University, Nashville, TN, United States

Time-Domain Transient Fluorescence Spectroscopy for Thermal Characterization of Polymers

Poster Presentation. MNHMT2019-3915

Hao Wu, Yanan Yue, Wuhan University, Wuhan, China

Numerical Simulation of Electronic Chip Microchannel Heatsink

Poster Presentation. MNHMT2019-3917

Yalong Lu, Zhengzhou University, Zhengzhou, Henan Province, China

Effect of Ti Interlayer on Interfacial Thermal Conductance Between Cu and Diamond

Poster Presentation. MNHMT2019-3919

Guo Chang, University of Science and Technology Beijing, Beijing, China, Fangyuan Sun, Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China, Jialiang Duan, Zifan Che, Xitao Wang, University of Science and Technology Beijing, Beijing, China, Jinguo Wang, Moon J. Kim, The University of Texas at Dallas, Richardson, TX, United States, Hailong Zhang, University of Science and Technology Beijing, Beijing, China

Thermal and Electrical Transport in 6.4nm Au Films deposited on Peek Substrates

Poster Presentation. MNHMT2019-3981

Huan Lin, Jianlun Zhang, Aijing Kou, Hua Dong, Qingdao University of Technology, Qingdao, Shandong, China

Thermal Properties of Graphene Fiber Fabricated by One-Step Hydrothermal Method

Poster Presentation. MNHMT2019-3994

Huan Lin, Aijing Kou, Jianlun Zhang, Hua Dong, Qingdao University of Technology, Qingdao, Shandong, China

Mechanical Exfoliation and Thermal Property Measurement of Monolayer and Multilayer Two-Dimensional MoS₂

Poster Presentation. MNHMT2019-4071

Yufeng Zhang, Xing Zhang, Haidong Wang, Tsinghua University, Beijing, China

Study on the Thermal and Electrical Transport Properties of Two-Dimensional Tungsten Disulfide

Poster Presentation. MNHMT2019-4078

Shuting Luo, Xing Zhang, Haidong Wang, Tsinghua University, Beijing, China

Technical Sessions

Enhanced Thermoelectric Performance of Suspended Graphene Nanoribbons

Poster Presentation. MNHMT2019-4207

Qin-Yi Li, *Kyushu University, Fukuoka, Japan*, Toshiaki Kato, *Tohoku University, Sendai, Japan*, Koji Takahashi, *Kyushu University, Fukuoka, Japan*

17-10: TRACK 11 HEAT AND MASS TRANSFER IN SMALL SCALE
3rd Floor, Mudan Hall Poster 10 **3:35PM–6:00PM**

Session Organizer: Yulong Ji, *Dalian Maritime University, Dalian, Liaoning, China*

Flow Boiling Characteristics of Diverging Channels Heat Sink Applied for Hybrid Concentrated Solar Power Thermal Management System

Poster Presentation. MNHMT2019-3957

Sihui Hong, Jiacheng He, *University of Tokyo, Tokyo, Japan*, Chaobin Dang, *University of Tokyo, Chiba, Japan*

Aviation Kerosene Film Cooling at Supercritical Condition in a Micro Channel

Poster Presentation. MNHMT2019-4004

Yunfei Xing, *IMECH, CAS, Beijing, China*, Fengquan Zhong, *State Key Laboratory of High Temperature Gas Dynamics, Institute of Mechanics, Beijing, China*, Xinyu Zhang, *IMECH, CAS, Beijing, China*

Numerical Simulation of Electronic Chip Microchannel Heatsink

Poster Presentation. MNHMT2019-4007

LU Yalong, Zhou Junjie Zhou, *Zhengzhou University, Zhengzhou City, Henan Province, China*

Molecular Simulation of Water and Methane Diffusion in Shale Organic Nano-Pores

Poster Presentation. MNHMT2019-4051

Kecheng Zeng, Ruina Xu, Peixue Jiang, *Tsinghua University, Beijing, China*

Kinetic Analysis of Thermal Microplasma at Atmospheric Micro Gas Discharges

Poster Presentation. MNHMT2019-4052

Sun Li, Zengyao Li, Zhou Wen, *Xi'an Jiaotong University, Xi'an, China*, Li He-Ping, *Tsinghua University, Beijing, China*, Jiang Wei, *Huazhong University of Science and Technology, Wuhan, China*

Point Heating-Probing Method for Thermal Conductivity Measurement and Structure Characterization

Poster Presentation. MNHMT2019-4061

Shen Xu, *Shanghai University of Engineering Science, Shanghai, Shanghai, China*, Xinwei Wang, *Iowa State University, Ames, IA, United States*

Transport of Water Molecules and Hydrogen Chloride Molecules in Porous Ceramics With Complex Structures

Poster Presentation. MNHMT2019-4069

Cong Shuo, Cai Jingcheng, Guo Fei, *Dalian University of Technology, Dalian, China*

The Effect of Pore Structures on The Performance of Coated Adsorber

Poster Presentation. MNHMT2019-4079

Zhaohong He, H.Y. Huang, Y.J. Lin, Lisheng Deng, *Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, Guangzhou, China*

Pool Boiling CHF Enhancement with Electrowetting Modulation

Poster Presentation. MNHMT2019-4219

Yi Lu, *Huazhong University of Science and Technology, Wuhan, Hubei, China*

17-11: TRACK 13 BIOMEDICAL APPLICATIONS OF MICRO/NANOSCALE TRANSPORT
3rd Floor, Mudan Hall Poster 11 **3:35PM–6:00PM**

Session Organizer: Liang Zhu, *University of Maryland Baltimore County, Baltimore, MD, United States*

Study on Inverse Leidenfrost Effect in Droplet Quenching Process

Poster Presentation. MNHMT2019-4350

Taijie Zhan, Haikao Feng, Yi Xu, Tingting Yang, *University of Shanghai for Science and Technology, Shanghai, China*

17-12: TRACK 14 OSCILLATING HEAT AND MASS TRANSFER IN CAPILLARIES
3rd Floor, Mudan Hall Poster 12 **3:35PM–6:00PM**

Session Organizer: Li Jia, *Beijing Jiaotong University, Beijing, China*

Cryogenic Two Phase Flow Oscillation in a Cryogenic Loop Heat Pipe

Poster Presentation. MNHMT2019-4169

Yuandong Guo, *Beihang University, Beijing, China*

17-13: TRACK 16 MEASUREMENT TECHNIQUES AND THERMOPHYSICAL PROPERTIES IN MICRO/NANOSCALE
3rd Floor, Mudan Hall Poster 13 **3:35PM–6:00PM**

Session Organizer: Oronzio Manca, *Università Della Campania, Aversa, CE, Italy*

Accurate Thermal Diffusivity Instrument With Low Measurement Uncertainty

Poster Presentation. MNHMT2019-4356

Yuan Hu, Timothy T.S. Fisher, *UCLA, Los Angeles, CA, United States*

1-3: ELECTROKINETICS 3rd Floor, Huaihua Hall #1

3:35PM–6:00PM

Session Organizer: JunSheng Wang, *Dalian Maritime University, Dalian, China*

Session Co-Organizer: Teng Zhou, *Hainan University, Haikou, China*

Invited Presentation: Interface and Transport in Ionic-Liquid-Based Supercapacitors

Technical Presentation. MNHMT2019-4272

Guang Feng, *Huazhong University of Science and Technology, Wuhan, Hubei, China*

Pulsatile Electroosmotic Flow of a Fractional Maxwell Fluid in a Microchannel

Technical Presentation. MNHMT2019-4229

Huanying Xu, Haitao Qi, *Shandong University, Weihai, Weihai, China*

Experimental Study of Water Flow in Symmetric Converging-Diverging Microchannels

Technical Presentation. MNHMT2019-4252

Ran Tao, Yakang Jin, Xiang Gao, Zhigang Li, *Hong Kong University of Science and Technology, Hong Kong, Hong Kong*

Recent Advances in Droplet Impacting Micro and Nano Structured Surface

Technical Presentation. MNHMT2019-4322

Tawfiq Chekifi, *Research Center in Industrial Technologies CRTI, Bechar, Algeria*

Numerical Investigation of Dielectrophoretic Deformable Particle: Particle Interactions and Assembly

Technical Presentation. MNHMT2019-4113

Teng Zhou, *Hainan University, Haikou, China*

Induced-Charge Electro-Osmosis in Polyelectrolyte Solutions

Technical Presentation. MNHMT2019-3943

Huicheng Feng, *Northwestern Polytechnical University, Xi'an, China*, Teck Neng Wong, *Nanyang Technological University, Singapore, Singapore*

2-1: SIMULATION IN NANO-FLUID

3RD FLOOR, HUAIHUA HALL #2

3:35PM–6:00PM

Session Organizer: Haiping Hong, *SDSMT, Rapid City, SD, United States*

Three-Dimensional Simulation of Bubble Behavior and Mass Transfer for CO₂ Absorption in Nanoabsorbents

Technical Paper Publication. MNHMT2019-3944

Lirong Li, Yong Tae Kang, *Korea University, Seoul, Korea (Republic)*

A Molecular Dynamics Simulation About the Effect of Localized Surface Plasmon Resonance on the Latent Heat of Vaporization of Silver Nanofluid

Technical Paper Publication. MNHMT2019-3965

chang zhao, Wei An, Tong Zhu, *Tongji University, Shanghai, Shanghai, China*

Effect of Particle Sedimentation on Sessile Nanofluid Droplet

Technical Paper Publication. MNHMT2019-4053

Ming Jin, Dinghua Hu, *Nanjing University of Science and Technology, Nanjing, China*

Ionic Current Magnetic Fields in Charged 3D Nanoslits

Technical Presentation. MNHMT2019-4323

Abraham Mansouri, *HCT, Dubai, United Arab Emir.*

Performance Evaluation of Industrial Shell and Tube Heat Exchangers Employing Al₂O₃: Cu/Water Hybrid Nanofluids

Technical Presentation. MNHMT2019-4327

Anitha S, *Sri Ramakrishna Engineering College, Coimbatore, India*

Experimental Investigation of Graphene Oxide Nanofluids on Thermal Performance of Heat Pipe

Technical Paper Publication. MNHMT2019-4049

Weilin Zhao, Jun Xu, Jinkai Li, *University of Jinan, Jinan, China*

Dynamic Freezing of Single Nanofluid Droplet on a Subcooled Substrate

Technical Presentation. MNHMT2019-4286

Hui Zhang, Chun Yang, *Nanyang Technological University, Singapore Singapore*

Molecular Dynamics Simulation on the Piston Effect of Subcooled and Superheated Liquid

Technical Presentation. MNHMT2019-4297

Chengzhi Hu, Dawei Tang, Xiaoliang Zhang, Minli Bai, Jizu Lv, *Dalian University of Technology, Dalian, Liaoning, China*

7-1: MICRO/NANO-THERMAL MANUFACTURING AND MATERIALS PROCESSING

3rd Floor, Huaihua Hall #3

3:35PM–6:00PM

Session Organizer: Debjyoti Banerjee, *Texas A&M University, College Station, TX, United States*

Session Co-Organizer: Haiwang Li, *Beihang University, Beijing, China*

Subcooled Flow Boiling on Micro-Porous Structured Copper Surface in a Vertical Mini-Gap Channel

Technical Paper Publication. MNHMT2019-3934

Junye Li, Kan Zhou, Wei Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Technical Sessions

Fabrication and Mechanical Property of Bioinspired Three Dimensional Amorphous Carbon Membrane As Anode in Lithium Ion Battery

Technical Paper Publication. MNHMT2019-3990

Xueliang Wang, Yaping Wang, Zhiguo Qu, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

No More Laundry?

Technical Presentation. MNHMT2019-4018

Pingan Zhu, Liqiu Wang, *University of Hong Kong, Hong Kong, Hong Kong*

A New Heat Dissipation Coating Material With Carbon Fiber for LED Cooling: Preparation, Experiment, and Thermal Performance Analysis

Technical Paper Publication. MNHMT2019-4122

Yin Zhang, *Sichuan University, Cheng, China*

Unexpected Strain Response of Thermal Transport Properties of Bilayer Penta-Graphene

Technical Presentation. MNHMT2019-4186

Zhehao Sun, Kunpeng Yuan, Xiaoliang Zhang, Dawei Tang, *Dalian University of Technology, Dalian, China*

Laser Ablation of Crystalline Material With and Without Water on Material Surface

Technical Paper Publication. MNHMT2019-4211

Wenlong Yao, Yan Li, Yunshu Qi, Ning Mei, *Ocean University of China, Qingdao, ShanDong, China*

Molecular Dynamics Study of High-Entropy Alloy Generation Subject to Laser Irradiation

Technical Presentation. MNHMT2019-4288

Pengfei Ji, Lan Jiang, Gen Lin, *Beijing Institute of Technology, Beijing, China*, Yuwen Zhang, *University of Missouri, Columbia, MO, United States*, Yiming Rong, *Southern University of Science and Technology, Shenzhen, China*

6-1: ENERGY GENERATION AND STORAGE DEVICES AND SYSTEMS

3rd Floor, Baihe Hall #1

3:35PM-6:00PM

Session Organizer: Jun Liu, *North Carolina State University, Raleigh, NC, United States*

Session Co-Organizer: Pengfei Ji, *Beijing Institute of Technology, Beijing, China*

Development of Novel Microemulsion Absorption Chillers

Technical Presentation. MNHMT2019-4099

Bao Yang, Chaolun Zheng, *University of Maryland, College Park, MD, United States*

Electrokinetic Energy Conversion in Conical Nanochannels: Regulation Effect due to Conicity

Technical Paper Publication. MNHMT2019-4132

Fang Qian, Deng Huang, Wenyao Zhang, Wenbo Li, Qiuwang Wang, Cunlu Zhao, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Uni-Leg Thermoelectric Module Comprised by Coated Hybrid-Perovskite Thin Film

Technical Paper Publication. MNHMT2019-4162

Shrikant Saini, Japan, Ajay Kumar Baranwal, Tomohide Yabuki, Shuzi Hayase, Koji Miyazaki, *Kyushu Institute of Technology, Kitakyushu, Japan*

Energy Absorption Properties in GaAs Photovoltaics Using Embedded Al-SiO₂ Nanoparticles

Technical Paper Publication. MNHMT2019-4221

Pan Qinghui, Zhou Sihong, Zhao Qishen, Yong Shuai, *Harbin Institute of Technology, Harbin, China*

Energy Harvesting Performance of Vertically Staggered Rectangle-Through-Holes Cantilevered in Piezoelectric Vibration Energy Harvester

Technical Paper Publication. MNHMT2019-4223

Shan Gao, Hongrui Ao, HongYuan Jiang, *Harbin Institute of Technology, Harbin, China*

Control Characteristics of Mass Diffusion in a Meta-Material Based on Transformation Coordinate Method

Technical Paper Publication. MNHMT2019-4228

Haochun Zhang, Yiyi Li, Zhuang Ma, Quan Zou, *Harbin Institute of Technology, Harbin, China*

Thermal Studies of a Si/Ge Interface Formed by Film-Wafer Bonding

Technical Presentation. MNHMT2019-4248

Qing Hao, Sien Wang, Dongchao Xu, Yue Xiao, Qiyu Chen, *University of Arizona, Tucson, AZ, United States*

Microencapsulated Binary Salt Mixture in Silica Shell for High Temperature Latent Heat Storage

Technical Presentation. MNHMT2019-4310

Hanfei Zhang, *Merry Electronics / University of Texas at Arlington, Arlington, TX, United States*, Sunand Santhanagopalan, *University of Texas at Arlington, Arlington, TX, United States*

Scalable Manufacturing of Nanophotonic Surfaces for Thermophotovoltaics

Technical Presentation. MNHMT2019-4321

Kehang Cui, *Shanghai Jiao Tong University, Shanghai, Shanghai, China*

5-3: RADIATION RELATED HEATING/COOLING

3rd Floor, Baihe Hall #2

3:35PM-6:00PM

Session Organizer: Yanan Yue, *Wuhan University, Wuhan, China*
Session Co-Organizer: Yu-bin Chen, *National Tsing Hua University, Hsinchu, Taiwan*

Radiative Cooling in Hot and Humid Areas

Technical Presentation. MNHMT2019-3974

Zhen Chen, Minghao Dong, *Southeast University, Nanjing, China*

Temperature Control and Heat Flux Rectification in Three-Body System

Technical Presentation. MNHMT2019-4197

Mingjian He, Yang Li, Hong Qi, Yatao Ren, Liming Ruan, *Harbin Institute of Technology, Harbin, China*

Multilayer Structures of SiO₂, TiO₂, and Si₃N₄ Films for the Radiative Cooling of Solar PV Cells

Technical Paper Publication. MNHMT2019-4244

Chenguang Jiang, Qunzhi Zhu, *Shanghai University of Electric Power, Shanghai, China*

Unidirectional Radiative Heat Transfer Using Monolithic Cube Absorber/Emitter in Solar-Thermophotovoltaic Systems

Technical Presentation. MNHMT2019-4225

Asaka Kohiyama, Makoto Shimizu, Kana Konno, *Tohoku University, Sendai, Japan*, Hiroo Yugami, *Tohoku University, Sendai Miyagi, Japan*

Super-Planckian Thermal Radiation Induced by Coupled Phosphorene Plasmons

Technical Presentation. MNHMT2019-4235

Xianglei Liu, Jiadong Shen, *Nanjing University of Aeronautics and Astronautics, Nanjing, China*

Anomalous Heat Diffusion in a Chain of Large Particles Through Radiative Heat Transfer

Technical Paper Publication. MNHMT2019-4237

Baokun Liu, Junming Zhao, Linhua Liu, *Harbin Institute of Technology, Harbin, China*

Topological Phonon Polaritons for Thermal Radiation Control

Technical Paper Publication. MNHMT2019-4002

Boxiang Wang, Changying Zhao, *Shanghai Jiao Tong University, Shanghai, China*

10-1: MICROSCALE HEAT AND MASS TRANSFER-1

3rd Floor, Baihe Hall #3 3:35PM–6:00PM

Session Organizer: Mingjia Li, *Xi'an Jiaotong University, Xi'an, China*

Session Co-Organizer: Zhichuan Sun, Junye Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Invited Presentation: Micro/Mesoscale Liquid Ethanol Diffusion Flame Heat Transfer

Technical Presentation. MNHMT2019-4375

Bin Zhang, *Qingdao University of Science and Technology, Qingdao, China*

Invited Presentation: Flow and Heat Transfer of Hydrocarbon Fuel With Pyrolysis and Pyrolytic Coking Under Supercritical Pressure

Technical Presentation. MNHMT2019-4376

Jianqin Zhu, *Beihang University, Beijing, China*

Molecular Dynamics Simulation of Diffusion and Aggregation Behavior of Helium in Tungsten Bulk Materials

Technical Paper Publication. MNHMT2019-3947

Jiawei Zhang, Wei Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*, Zhangcan Yang, Yingzhao He, *Huazhong University of Science and Technology, Wuhan, China*

Numerical Investigation of Condensation Heat Transfer Characteristics of R134A in Rectangular Minichannel

Technical Paper Publication. MNHMT2019-3950

Di Lv, Wei Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*, Jingzhi Zhang, *Shandong University, Qingdao, China*

Thermal Conductivity of Nano-Sized Metal and Non-Metal Composite Materials

Technical Paper Publication. MNHMT2019-4003

Xiao Han, Yaru Dan, Yingguang Liu, *North China Electric Power University, Baoding, Hebei, China*

Numerical Investigation of Flow Boiling in a Manifold Microchannel Heat Sink With Conjugate Heat Transfer

Technical Paper Publication. MNHMT2019-4042

Zhichuan Sun, Yang Luo, Junye Li, Wei Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*, Jingzhi Zhang, *Shandong University, Qingdao, China*, Zhengjiang Zhang, Jie Wu, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Effect of Surface Temperature on Rarefied Flow Past a Circular Micro-Cylinder

Technical Paper Publication. MNHMT2019-4232

Xiao-Jun Gu, David R. Emerson, *STFC Daresbury Laboratory, Warrington, United Kingdom*

Fully Resolved 2D Simulations of Single-Particle Sedimentation in a Vertical Channel With Conjugate Heat Transfer Using a Cartesian Cut-Cell Method

Technical Presentation. MNHMT2019-4377

Meng-Hsuan Chung, *National Kaohsiung University of Science and Technology, Kaohsiung City, Taiwan*

TUESDAY, JULY 9

11-3: GAS AND PHASE CHANGE FLOW AND HEAT TRANSFER AT SMALL SCALES

3rd Floor, Mudan Hall

10:35AM–12:00PM

Session Organizer: Zhihao Chen, *Tianjin University, Tianjin, China*

Session Co-Organizer: Yantao Li, *Dalian Maritime University, Dalian, China*

Experimental Study on Hot-Spot Combustion Instability With Lean Hydrogen/Air in Inert Packed Bed

Technical Presentation. MNHMT2019-4270

Yongfang Xia, *Shenyang Institute of Engineering, Shenyang, China*

Technical Sessions

CFD Modeling of the Oscillating Heat Transfer Inside Diesel Engine Pistons

Technical Presentation. MNHMT2019-4304

Peng Wang, Liangdong Ma, *Dalian University of Technology, Dalian, China*, Sungmin Yoon, *Incheon National University, Incheon, Korea (Republic)*

Numerical Study on Flow and Heat and Mass Transfer in Pulsating Heat Pipe

Technical Paper Publication. MNHMT2019-4012

Jianhong Liu, Fumin Shang, *Changchun Institute of Technology, Changchun, Jilin, China*, Efimov Nikolay, *South Russian State Technical University, Novocherkassk, Rostov, Russia*

The Start-Up Performance of Pulsating Heat Pipe With Communicating Pipe at Different Inclination Angles

Technical Paper Publication. MNHMT2019-4015

Fumin Shang, Shilong Fan, Jianhong Liu, *Changchun Institute of Technology, Changchun, Jilin, China*

4-6: FUNDAMENTALS OF BOILING
3rd Floor, Huaihua Hall #1 10:35AM–12:00PM

Session Organizer: Guang Feng, *Huazhong University of Science and Technology, Wuhan, Hubei, China*

Session Co-Organizer: Gui Lu, *North China Electric Power University, Beijing, China*

Invited Presentation: Lattice Boltzmann Modeling of Boiling Heat Transfer

Technical Presentation. MNHMT2019-4346

Qing Li, *Central South University, Changsha, China*

Molecular Dynamics Simulation of Boiling Behavior of Nanofluid With Various Wettability Nanoparticle on Hydrophobic Surface

Technical Paper Publication. MNHMT2019-4164

Xunyan Yin, Minli Bai, Chengzhi Hu, Jizu Lv, *Dalian University of Technology, Dalian, China*, Yubai Li, *Carnegie Mellon University, Pittsburgh, PA, United States*

Theoretical Analysis for Combined Compact Evaporative Cooler Utilizing Nanostructured Surfaces

Technical Paper Publication. MNHMT2019-3902

Laith Ismael, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

Experiment of Enhanced Pool Boiling Heat Transfer on Coupling Effects of Nano-Structure and Synergistic Micro-Channel

Technical Paper Publication. MNHMT2019-4215

Gao Linsong, Jizu Lv, Minli Bai, Chengzhi Hu, Du Liqun, *Dalian University of Technology, Dalian, China*, Yubai Li, *Carnegie Mellon University, Pittsburgh, PA, United States*

Nucleate Boiling of Water on Graphene Coated Copper Wire: Tunable Bubble Dynamics From Nanoscale to Microscale

Technical Presentation. MNHMT2019-4348

Yu-Ting Li, Bing-He Bai, Gui Lu, *North China Electric Power University, Beijing, China*

15-1: HEAT AND MASS TRANSFER PHOTOGALLERY
3rd Floor, Huaihua Hall #2 10:35AM–12:00PM

Session Organizer: Chang Kyoung Choi, *Michigan Technological University, Houghton, MI, United States*

Session Co-Organizer: Nenad Miljkovic, *Massachusetts Institute of Technology, Cambridge, MA, United States*, Jingming Dong, *Dalian Maritime University, Dalian, China*

Visualization of Evaporating Thin Films in Contact Line Region Using Surface Plasmon Resonance Imaging

Technical Presentation. MNHMT2019-4123

Seong Hyuk Lee, *Chung-Ang University, Seoul, Korea (Republic)*, Chang Kyoung Choi, *Michigan Technological University, Houghton, MI, United States*, Dae Yun Kim, *Chung-Ang University, Seoul, Korea (Republic)*

Flow Boiling Experiments of Micro/Nano-Scale Structured Surfaces and Flow Visualization With Quantitative Analysis In Microchannels

Technical Presentation. MNHMT2019-4262

Wei Li, Kan Zhou, Junye Li, Hua Zhu, Zhengjiang Zhang, Jincui Du, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Condensation on Hybrid Superhydrophobic and Superhydrophilic Surfaces

Technical Presentation. MNHMT2019-4318

Hai Wang, *Jiangsu University, Zhenjiang, Jiangsu, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

Self-Driven Liquid Metal Mollusk Oscillations

Technical Presentation. MNHMT2019-4341

Tingting Hao, Xuehu Ma, *Dalian University of Technology, Dalian, Liaoning Province, Hongbin Ma, University of Missouri, Columbia, MO, United States*

Visualization of an Oscillating Heat Pipe With Hydraulic Diameter Far Exceeding the Conventional Maximum Hydraulic Diameter

Technical Presentation. MNHMT2019-4344

Yulong Ji, Lilin Chu, Chunrong Yu, Zongyu Wang, *Dalian Maritime University, Dalian, Liaoning, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

Surface Plasmon Resonance Imaging: A Technique to Reveal the Mechanism of Dropwise Condensation

Technical Presentation. MNHMT2019-4373

Chang Kyoung Choi, *Michigan Technological University, Houghton, MI, United States*

4-2: NEW SURFACES FOR PHASE CHANGE -2

3rd Floor, Huaihua Hall #3 10:35AM–12:00PM

Session Organizer: Rong Chen, *Chongqing University, Chongqing, China*
Session Co-Organizer: Rongfu Wen, *University of Colorado Boulder, Boulder, CO, United States*

Invited Presentation: Tuning water and ice nucleation with biphilic topography

Technical Presentation. MNHMT2019-4284

Shuhuai Yao, *The Hong Kong University of Science and Technology, Kowloon, Hong Kong*

Condensation Droplet Distribution Affected by Electrowetting Approach

Technical Paper Publication. MNHMT2019-3982

Run Yan, Chung-Lung Chen, *University of Missouri, Columbia, Columbia, MO, United States*

Sustaining Anti-Icing for High-Performance Heat Transfer

Technical Presentation. MNHMT2019-4109

Rongfu Wen, Ronggui Yang, *University of Colorado Boulder, Boulder, CO, United States*

Immune to Ice: Anti-Icing Potential of Phase Transitioning Surfaces

Technical Presentation. MNHMT2019-4105

Rukmava Chatterjee, *University of Illinois at Chicago, Chicago, IL, United States*, **Daniel Beysens,** *PMMH/ESPCI & CNRS, Paris, France*, **Sushant Anand,** *University of Illinois at Chicago, Chicago, IL, United States*

Effect of Environmental Conditions on the Anti-Icing Potential of Road Salts

Technical Presentation. MNHMT2019-4104

Rukmava Chatterjee, *University of Illinois at Chicago, Chicago, IL, United States*, **Daniel Beysens,** *PMMH/ESPCI & CNRS, Paris, France*, **Sushant Anand,** *University of Illinois at Chicago, Chicago, IL, United States*

9-3: THERMAL TRANSPORT THROUGH THIN FILMS AND INTERFACES

3rd Floor, Baihe Hall #1 10:35AM–12:00PM

Session Organizer: Deyu Li, *Vanderbilt University, Nashville, TN, United States*

Invited Presentation: Heat Conduction Through Multilayer Thin Films

Technical Presentation. MNHMT2019-4324

Yunfei Chen, Yi Tao, *Southeast University, Nanjing, China*

A Method for Measuring Thermal Conductivity of Low-Dimensional Materials Based on DC Heating

Technical Paper Publication. MNHMT2019-3911

Xiao Yang, Xinghua Zheng, Zheng Yang, Liang Wang, Haisheng Chen, *Institute of Engineering Thermophysics, CAS, Beijing, China*

Experimental Study of Thermal Transport in Strained Silicon Thin Films

Technical Presentation. MNHMT2019-4274

Xuewang Wu, *University of Minnesota at Twin Cities, Minneapolis, MN, United States*, **Fabian Javier Medina, Dongchao Xu,** *University of Arizona, Tucson, AZ, United States*, **Lis Stolik, Xiaojia Wang,** *University of Minnesota, Minneapolis, MN, United States*, **Qing Hao,** *University of Arizona, Tucson, AZ, United States*

Phonon Scattering at Disorder Surface: Interplay Between Mode Conversion and Surface Modes

Technical Presentation. MNHMT2019-4363

Cheng Shao, Qingyuan Rong, *Shanghai Jiao Tong University, Shanghai, China*, **Hua Bao,** *University of Michigan-Shanghai Jiaotong University Joint Institute, Shanghai, China*

Mode-by-Mode Phonon-Diffuson Two-Channel Model for the Low Thermal Conductivity of La₂Zr₂O₇ Pyrochlores

Technical Presentation. MNHMT2019-4365

Yixiu Luo, Xiaolong Yang, *Purdue University, West Lafayette, IN, United States*, **Jingyang Wang,** *Chinese Academy of Sciences, Shenyang, China*, **Xiulin Ruan,** *Purdue University, West Lafayette, IN, United States*

5-1: RADIATION-STRUCTURE INTERACTION

3rd Floor, Baihe Hall #2 10:35AM–12:00PM

Session Organizer: Shen Xu, *Shanghai University of Engineering Science, Shanghai, China*

Session Co-Organizer: Ceji Fu, *Peking University, Beijing, China*

Invited Presentation: Active Control of Thermal Radiation in Both Far and Near Fields

Technical Presentation. MNHMT2019-4281

Liping Wang, *Arizona State University, Tempe, AZ, United States*

Selective Solar Absorber Made of Silicon-Cored Tungsten Nanowires

Technical Presentation. MNHMT2019-4095

Jui-Yung Chang, Xiaoyan Ying, Sydney Taylor, *Arizona State University, Tempe, AZ, United States*, **Yu-bin Chen,** *National Tsing Hua University, Hsinchu, Taiwan*, **Liping Wang,** *Arizona State University, Tempe, AZ, United States*

A Visible-Infrared Compatible Stealth Structure With a Function of Heat Dissipation by Radiation

Technical Paper Publication. MNHMT2019-4257

Saichao Dang, Hong Ye, *University of Science and Technology of China, Hefei, China*

Optical Property of Multiple-Edged Nanoparticles

Technical Presentation. MNHMT2019-4145

Caiyan Qin, Bong Jae Lee, *KAIST, Daejeon, Korea (Republic)*

Technical Sessions

Scalable Dual-Layer Film With Ideal Selective Emission for Sub-Ambient Radiative Cooling

Technical Presentation. MNHMT2019-4334

Yue Yang, Sheng Meng, Yonggang Zhu, *Harbin Institute of Technology (Shenzhen), Shenzhen, Guangdong, China*

Four-Phonon Scattering-Dominated Damping Factor in the Lorenz Oscillator Model

Technical Presentation. MNHMT2019-4364

Xiaolong Yang, *Purdue University, West Lafayette, IN, United States*, Tianli Feng, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, Xiulin Ruan, *Purdue University, West Lafayette, IN, United States*

10-2: NEW METHODS IN MICROSCALE STUDY
3rd Floor, Baihe Hall #3 10:35AM–12:00PM

Session Organizer: Ruina Xu, *Tsinghua University, Beijing, Beijing, China*
Session Co-Organizer: Jingzhi Zhang, *Shandong University, Qingdao, China*, Yang Luo, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Invited Presentation: Predicting Multiphase Fluids in Subsurface Microporous Media: From Quantum Simulation, Lattice Boltzmann Modeling to 3D Printing Digital Microfluidics

Technical Presentation. MNHMT2019-4369

Tiejun Zhang, *Khalifa University of Science and Technology, Abu Dhabi, United Arab Emir.*

Invited Presentation: Droplet Detachment Modes and Condensation Heat Transfer Models on Functional Surface With Micro/nano Structures

Technical Presentation. MNHMT2019-4372

Jian Xie, *North China Electric Power University, Beijing, China*

Lattice Boltzmann Modeling of Oxygen Reactive Transport in Cathode Catalyst Layer of Proton Exchange Membrane Fuel Cell

Technical Paper Publication. MNHMT2019-3953

Yuze Hou, Hao Deng, Qing Du, Kui Jiao, *Tianjin University, Tianjin, Tianjin, China*

MFP-Based Monte Carlo Method for Nanostructure Phonon Transport

Technical Paper Publication. MNHMT2019-4136

Jincai YU, *HKUST, Hong Kong, Hong Kong*, Wenjing Ye, Baoling Huang, Daniel Josephus Villaroman, Qi Wang, *HKUST, Kowloon, Hong Kong*

A Hybrid Smoothed Dissipative Particle Dynamics and Immersed Boundary Method (SDPD-IBM): A Numerical Study of Cell Transport in Complex Microchannel

Technical Presentation. MNHMT2019-4121

Ting Ye, *Jilin University, Changchun, China*

Boson Dispersion, Lifetime and Thermal Conductivity of Iron From Spin-Lattice Dynamics Simulations

Technical Presentation. MNHMT2019-4144

Zeyu Liu, *University of Notre Dame, Notre Dame, IN, United States*, Xufei Wu, *University of Notre Dame, South Bend, IN, United States*, Tengfei Luo, *University of Notre Dame, Notre Dame, IN, United States*

4-7: DROPLET AND SURFACE INTERACTIONS
3rd Floor, Huaihua Hall #1 3:35PM–5:30PM

Session Organizer: Yahua Liu, *Dalian University of Technology, Dalian, China*

Session Co-Organizer: Benli Peng, *Dalian Maritime University, Dalian, China*

Invited: Kinetics of Dynamic Contact Angle and Spreading Radius for Non-Newtonian Droplets

Technical Presentation. MNHMT2019-4313

Xiaodong Wang, *North China Electric Power University, Beijing, China*

Dynamic Scenario Simulation of Dropwise Condensation on a Superhydrophobic Surface With Droplet Jumping

Technical Presentation. MNHMT2019-4294

Kaixin Meng, Hao Wang, *Peking University, Beijing, Beijing, China*

Atomistic Modeling of Condensation Over Nano-Structured Surface

Technical Paper Publication. MNHMT2019-4247

Mohammad Nasim Hasan, Md. Hafijur Rahman, Salauddin Omar, Chandni Akhter, *Bangladesh University of Engineering and Technology, Dhaka, Bangladesh*

The Wettability of Pyramids on Silicon Wafer

Technical Presentation. MNHMT2019-4340

Wenjing Zhang, Maria Fernandino, C.A. Dorao, *Norwegian University of Science and Technology, Trondheim, Norway*

Light Levitation and 2D Motion of Droplets

Technical Presentation. MNHMT2019-4354

Long Jiao, Rong Chen, Xun Zhu, Liao Qiang, Hong Wang, Dongliang Li, Wei Li, *Chongqing University, Chongqing, China*

Dynamics and Mechanisms of Transition Regimes to Leidenfrost State on Micro-Fabricated Surfaces

Technical Presentation. MNHMT2019-3914

Navid Saneie, Varun Kulkarni, Sushant Anand, *University of Illinois at Chicago, Chicago, IL, United States*

3-2: DROPLET DYNAMICS
3rd Floor, Huaihua Hall #2 3:35PM–5:30PM

Session Organizer: Benli Peng, *Dalian Maritime University, Dalian, Liaoning, China*

Session Co-Organizer: Wenbin Cui, *Dalian Maritime University, Dalian, Liaoning, China*

Invited Presentation: Ripening Droplet: Spontaneous Droplet Movement on Homogeneous Surfaces

Technical Presentation. MNHMT2019-4245

Zongqi Guo, Gaurav Sirohia, Xianming Dai, *University of Texas at Dallas, Richardson, TX, United States*

Interaction of Impact Liquid Drop With Splat in Spray Cooling

Technical Paper Publication. MNHMT2019-3908

Gangtao Liang, Haibing Yu, Liuzhu Chen, Shengqiang Shen, *Dalian University of Technology, Dalian, China*

Numerical Simulation on the Evaporation of a Nonspherical Sessile Droplet

Technical Paper Publication. MNHMT2019-3987

Wenbin Cui, *Dalian Maritime University, Dalian, Liaoning, China*, Benwei Fu, *Dalian Maritime University, Shanghai, China*

The Spreading Characteristics and Temperature Evolution of Droplet Impact on Cold Superhydrophilic Surface

Technical Paper Publication. MNHMT2019-4041

Jiang Chun, Tingting Hao, Yansong Chen, Yi zheng, *Dalian University of Technology, Dalian, China*, Xuehu Ma, *Dalian University of Technology, Dalian, Liaoning Province*, Zhong Lan, *Dalian University of Technology, Dalian, Liaoning, China*

Dynamics of Generation of Droplet From a Yarn in the Limit of Critically Low Weber Number

Technical Presentation. MNHMT2019-4098

Bhaskarjyoti Sarma, Amaresh Dalal, Dipankar Narayan Basu, *Indian Institute of Technology Guwahati, Guwahati, Assam, India*

4-3: CONDENSATION

3rd Floor, Huaihua Hall #3

3:35PM–5:30PM

Session Organizer: Liwu Fan, *Zhejiang University, Hangzhou, Zhejiang, China*

Session Co-Organizer: Zhong Lan, *Dalian University of Technology, Dalian, Liaoning, China*

Invited Presentation: Flow Characteristics and Local Temperature Distribution of Falling Films Over Horizontal Superhydrophilic Tubes

Technical Presentation. MNHMT2019-4332

Xuehu Ma, *Dalian University of Technology, Dalian, Liaoning Province*, Yi Zheng, *Dalian University of Technology, Dalian, China*

A Visualized Study of the Enhanced Condensation Heat Transfer of Steam on Microporous Superhydrophobic Surfaces in the Presence of a Non-Condensable Gas

Technical Presentation. MNHMT2019-4080

Tianyu Zhang, Linwei Mou, Jiayi Zhang, Jiaqi Li, Liwu Fan, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Comparison of Heat Transfer Performance Between Smooth and Enhanced Heat Transfer Tubes

Technical Paper Publication. MNHMT2019-4044

David Kukulka, *State University of New York at Buffalo, Buffalo, NY, United States*, Wei Li, *Zhejiang University, Hang-Zhou City, Zhejiang, China*, Rick Smith, *Vipertex, Buffalo, NY, United States*

Condensation of NH₃ Within a Plate Heat Exchanger of Small Diameter Channel

Technical Paper Publication. MNHMT2019-3920

Xuan Tao, *Delft University of Technology, Delft, Netherlands*, Joost Kirkenier, *Bluerise BV, Delft, Netherlands*, Carlos Infante Ferreira, *Delft University of Technology, Delft, Netherlands*

Evaluation of Existing Frictional Pressure Drop Correlations During Condensation of R410A in Four Horizontal Tubes

Technical Paper Publication. MNHMT2019-4038

Kunrong Shen, Zhichuan Sun, Wei Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*, Xiang Ma, *Qingdao University of Science and Technology, Qingdao, Shandong, China*, Yan He, *Qingdao University of Science and Technology Qingdao, Qingdao, China*, Yuansheng Lin, Zhiwu Ke, Hanbing Ke, *Science and Technology on Thermal Energy and Power Laboratory, Wuhan, China*

9-4: MOLECULAR DYNAMICS AND MONTE CARLO SIMULATIONS OF NANOSCALE CONDUCTION

3rd Floor, Baihe Hall #1

3:35PM–5:30PM

Session Organizer: Qing Hao, *University of Arizona, Tucson, AZ, United States*

Investigation of the Thermo-Mechanical Property of Knitting 3D Polyethylene: A Comparative Study

Technical Paper Publication. MNHMT2019-4029

Bo Zhang, Shan Gao, Yunmin Liang, Ji Li, Peng Mao, Wei Liu, Zhichun Liu, *Huazhong University of Science and Technology, Wuhan, Wuhan, China*

Molecular Dynamics Study on Effect of Interface Between Silicon and Silicon Carbide Crystals on Phonon Heat Conduction on Nanoscale

Technical Paper Publication. MNHMT2019-4114

Xianhua Nie, Li Zhao, Shuai Deng, Yue Zhang, Zhenyu Du, *Tianjin University, Tianjin, China*

Numerical Investigation of Wave Effects in Si/Ge Superlattices

Technical Presentation. MNHMT2019-4138

Jincai Yu, *HKUST, Hong Kong, Hong Kong*, Qi Li, Wenjing Ye, *HKUST, Kowloon, Hong Kong*

Thermal Resistance by N-Scattering in Phonon Hydrodynamics

Technical Presentation. MNHMT2019-4227

Xun Li, Sangyeop Lee, *University of Pittsburgh, Pittsburgh, PA, United States*

Coupled Electron and Phonon Monte Carlo Simulations for Thermal Studies of GaN-Based Devices

Technical Presentation. MNHMT2019-4265

Qing Hao, Yue Xiao, *University of Arizona, Tucson, AZ, United States*

Technical Sessions

Predictions of Thermo and Mechanical Properties of Crosslinked Polyacrylamide Hydrogels Using Molecular Simulations

Technical Presentation. MNHMT2019-4316

Meng An, *Shaanxi University of Science and Technology, Xi'an, China*,
Baris Demir, *Deakin University, Geelong, Australia*, Xiao Wan, Han Meng,
Nuo Yang, *Huazhong University of Science and Technology, Wuhan, China*,
Tiffany Walsh, *Deakin University, Geelong, Australia*

5-2: RADIATION PROPERTIES/MEASUREMENT
3rd Floor, Baihe Hall #2 **3:35PM–5:30PM**

Session Organizer: Ceji Fu, *Peking University, Beijing, China*
Session Co-Organizer: Shen Xu, *Shanghai University of Engineering Science, Shanghai, China*

Invited Presentation: Active Control of Radiative Properties Using Ordered and Disordered Nanostructures

Technical Presentation. MNHMT2019-4259

Changying Zhao, *Shanghai Jiao Tong University, Shanghai, Shanghai, China*

Research on Thermal Properties of Insulator-Metal Transition at Room Temperature in Sm^{1-x}CaxMnO₃

Technical Paper Publication. MNHMT2019-3963

Ruxia Chang, Desong Fan, Qiang Li, *Nanjing University of Science and Technology, Nanjing, Jiangsu, China*

Predicting Multi-Order Magnetic Polaritons Resonance in SiC Slit Arrays by Improved LC Circuit Model

Technical Paper Publication. MNHMT2019-4147

Yanming Guo, Yong Shuai, *Harbin institute of technology, Harbin, Heilongjiang, China*

Magneto-Optical Control for Nanoscale Thermotronics

Technical Presentation. MNHMT2019-4150

Annika Ott, *Oldenburg University, Oldenburg, Germany*, Riccardo Messina,
Philippe Ben-Abdallah, *Laboratoire Charles Fabry/Institut d'Optique, Palaiseau, France*, Svend-Age Biehs, *Oldenburg University, Oldenburg, Germany*

Design of Grating-Based Solar Thermal Absorber Using Deep Neural Network

Technical Presentation. MNHMT2019-4013

Junyong Seo, Mingeon Kim, Soung-hyeok Yang, Ikjin Lee, Bong Jae Lee, *KAIST, Daejeon, Korea (Republic)*

13-1: MICRO/NANOSCALE TRANSPORT IN MEDICAL APPLICATIONS: PHYSIOLOGY AND HYPERTHERMIA
3rd Floor, Baihe Hall #3 **3:35PM–5:30PM**

Session Organizer: Liang Zhu, *University of Maryland Baltimore County, Baltimore, MD, United States*
Session Co-Organizer: Zhenpeng Qin, *University of Texas at Dallas, Richardson, TX, United States*

Invited Presentation: Numerical Simulation of Laser-Induced Thrombus Formation in Microvessel: To Achieve Intelligentized Laser Treatment of Vascular Dermatology

Technical Presentation. MNHMT2019-4325

Bin Chen, Dong Li, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Invited Presentation: Microcirculation Modeling for Assessment of Vasomotion and Oxygen Transport by a 1D/3D Coupling Method

Technical Presentation. MNHMT2019-4330

Ying He, Yuanliang Tang, Yueping Wang, *Dalian University of Technology, Dalian, China*

Molecular Hyperthermia to Manipulate Protein Activity in Living Systems

Technical Presentation. MNHMT2019-4154

Piyuan Kang, Zhenpeng Qin, *University of Texas at Dallas, Richardson, TX, United States*

Temperature Distribution and Thermal Dosage Affected by Nanoparticle Distribution in Tumours During Magnetic Nanoparticle Hyperthermia

Technical Paper Publication. MNHMT2019-4233

Manpreet Singh, Qimei Gu, Ronghui Ma, Liang Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*

Perfusion of Magnetic Nanoparticles Into Rat Kidney as a Model of Nanowarming the Cryopreserved Organs

Technical Presentation. MNHMT2019-4351

Ke Liu, Yi Xu, *University of Shanghai for Science and Technology, Shanghai, China*

WEDNESDAY, JULY 10

1-6: CELLS
3rd Floor, Huaihua Hall #1 **10:15AM–12:00PM**

Session Organizer: Nan Xiang, *Southeast University, Nanjing, Jiangsu, China*
Session Co-Organizer: Hongna Zhang, *Sun Yat-Sen University, Zhuhai, Guangdong, China*

Invited Presentation: Microfluidics-Enabled Cancer Diagnosis

Technical Presentation. MNHMT2019-4255

Jiashu Sun, *National Center for Nanoscience and Technology, Beijing, China*

Invited Presentation: Mobile Digital Clinical Lab

Technical Presentation. MNHMT2019-4280

Jinhong Guo, *University of Electronic Science and Technology of China, Chengdu, China*

Parallel Implication of SDPD for Blood Flow With Inflow/Outflow Boundary Conditions

Technical Presentation. MNHMT2019-4173

Guansheng Li, *Jilin University, Changchun, China*

A Passive Microfluidic Device for Particle Ordering in Viscoelastic Flow

Technical Presentation. MNHMT2019-4133

Liang-Liang Fan, *Xi'an Jiaotong University, Xi'an, OO, China*, Xu Wu, Zhi Zhao, *Xi'an Jiaotong University, Xi'an, China*, Jiang Zhe, *University of Akron, Akron, OH, United States*, Liang Zhao, *Xi'an Jiaotong University, Xi'an, China*

Differential Particle Inertial Focusing in Symmetric Sinusoidal Microchannels

Technical Presentation. MNHMT2019-4134

Jun Zhang, *Griffith University, Brisbane, QLD, Australia*, Weihua Li, *University of Wollongong, New South Wales, NSW, Australia*, Nam-trung Nguyen, *Queensland Micro and Nanotechnology Centre, Brisbane, QLD, Australia*

Cell Differentiation Using Deformability and Electrical Impedance of Cells

Technical Presentation. MNHMT2019-4171

Dezhi Tang, Nan Xiang, Zhonghua Ni, *Southeast University, Nanjing, Jiangsu, China*

3-3: THIN LIQUID FILM TRANSPORT PHENOMENA

3rd Floor, Huaihua Hall #2 10:15AM-12:00PM

Session Organizer: A.K.M. Morshed, *Bangladesh University of Engineering and Technology, Dhaka, Dhaka, Bangladesh*

Session Co-Organizer: Bladimir Ramos-Alvarado, *Penn State University, University Park, PA, United States*

Invited Presentation: Phenomenon and Mechanism of Spray Cooling on Micro/Nano Hybrid Structures

Technical Presentation. MNHMT2019-4320

Ruina Xu, Kai Chen, Peixue Jiang, *Tsinghua University, Beijing, China*

Invited Presentation: Confined Distributed Jet Array Impingement Boiling of Dielectric Coolant on Smooth and Enhanced Surfaces

Technical Presentation. MNHMT2019-4374

Fangjun Hong, *Shanghai Jiao Tong University, Shanghai, China*

Invited Presentation: Modeling Interfacial Affinity via Wetting Behavior and the Implications on Heat Transfer Across Solid-Liquid Interfaces

Technical Presentation. MNHMT2019-4283

Bladimir Ramos-Alvarado, *Penn State University, University Park, PA, United States*

Fluid Flow and Thin Film Evolution Near the Triple Line of Evaporative Sessile Droplet During Mixing Process

Technical Paper Publication. MNHMT2019-4085

Tengxiao Ma, Leping Zhou, *North China Electric Power University, Beijing, China*

Mechanism Research of Coupling Drag Reduction and Heat Transfer on Surface With Different Liquid-Solid Interaction

Technical Paper Publication. MNHMT2019-4180

Lin Shi, Chengzhi Hu, Minli Bai, Jizu Lv, *Dalian University of Technology, Dalian, Liaoning, China*, Yubai Li, *Carnegie Mellon University, Pittsburgh, PA, United States*

Evaporation of Microdroplet Suspended on Heated Porous Micropillar Structure

Technical Presentation. MNHMT2019-4359

Li Shan, Binjian Ma, Junhui Li, Xinyu Jiang, *Washington University in St. Louis, St. Louis, MO, United States*, Baris Dogruoz, *Cisco Systems Inc., Santa Clara, CA, United States*, Damena Agonafer, *Washington University in St. Louis, St. Louis, MO, United States*

4-4: CONDENSATION AND BOILING

3rd Floor, Huaihua Hall #3 10:15AM - 12:00PM

Session Organizer: Chuanhua Duan, *Boston University, Boston, China*
Session Co-Organizer: Zhihao Chen, *Tianjin University, Tianjin, China*

Invited Presentation: Quick and Continuous Renewal of Horizontal Condensing Surface Driven by Capillary Effect

Technical Presentation. MNHMT2019-4307

Yaqi CHENG, *City University of Hongkong, Hong Kong, China*, Yufei Zhang, Bingang Du, Yansong Chen, Xuehu Ma, *Dalian University of Technology, Dalian, Liaoning Province*, Zuankai Wang, *City University of Hong Kong, Shenzhen, China*

High-Flux Heat Dissipation Using Thin Film Boiling

Technical Presentation. MNHMT2019-4190

Qingyang Wang, Renkun Chen, *University of California, San Diego, La Jolla, CA, United States*

PTFE Modification to Enhance Boiling Performance of Porous Surface

Technical Paper Publication. MNHMT2019-4208

Ya Qiao Wang, Jia-Li Luo, Yi Heng, Dong-chuan MO, Shu-Shen LYU, *Sun Yat-sen University, Guangzhou, China*

Experimental Study on Boiling Heat Transfer of Graphene Nanosheets/ Alumina Nanoparticles Mixture in Ethylene Glycol/Deionized Water Mixed Liquid

Technical Paper Publication. MNHMT2019-4027

S.G. Yao, Zecheng Teng, J.X. Li, Y.D. Song, *Jiangsu University of Science and Technology, Zhenjiang, Jiangsu, China*

Technical Sessions

Downward Facing Pool Boiling Critical Heat Flux Enhancement by Cold Spray on SA508 Carbon Steel

Technical Presentation. MNHMT2019-4298

Xiang Zhang, bin jiang, *SNPTRD, Beijing, China*, Daogui Tian, *SPIC, Beijing, China*, Dawen Zhong, *North China Electric Power University, Beijing, China*

10-3: MICROSCALE HEAT AND MASS TRANSFER-2
3rd Floor, Baihe Hall #1 10:15AM–12:00PM

Session Organizer: Bin Zhang, *Qingdao University of Science and Technology, Qingdao, China*
Session Co-Organizer: Jianqin Zhu, *Beihang University, Beijing, China*

Invited Presentation: Contact Line Exploration and Modeling

Technical Presentation. MNHMT2019-4371

Hao Wang, *Beijing University, Beijing, Beijing, China*

Invited Presentation: Numerical and Experimental Analysis of Multiphysical Effects on Microalgae Growth in Photobioreactors

Technical Presentation. MNHMT2019-4368

Mingjia Li, *Xi'an Jiaotong University, Xi'an, China*

A Lattice Boltzmann Simulation for Thermal Energy Diffusion Through a Micro/Nanoscale Thin Film

Technical Paper Publication. MNHMT2019-3901

Yan Su, *University of Macau, Macau, Macau*

Modelling of Solid-Liquid Phase Change Using a High Performance Lattice Boltzmann Code

Technical Presentation. MNHMT2019-4355

Jianping Meng, Xiao-Jun Gu, David R. Emerson, *STFC Daresbury Laboratory, Warrington, United Kingdom*

Thermal Conductivity Analysis of Nanostructured ZnO by Kapitza Resistance

Technical Paper Publication. MNHMT2019-4025

ChunPu Huang, Jie Yan, Yingguang Liu, *North China Electric Power University, Baoding, Hebei, China*

Investigation on Thermal Conductivity and Viscosity of Thin Water Film by Molecular Dynamics Simulation

Technical Paper Publication. MNHMT2019-4087

Lu Jin, Leping Zhou, *North China Electric Power University, Beijing, China*

Numerical Study on Successive Liquid Metal Alloy Droplet Depositions

Technical Paper Publication. MNHMT2019-4239

Vimalan Adaikalanathan, Albert Y. Tong, *University of Texas at Arlington, Arlington, TX, United States*

2-2: EXPERIMENTAL STUDIES IN NANOFUIDS
3rd Floor, Baihe Hall #2 10:15AM–12:00PM

Session Organizer: Hani Sait, *MU, Columbia, MO, United States*
Session Co-Organizer: Haiping Hong, *SDSMT, Rapid City, SD, United States*

Electrorepulsion in Nanofluids: Experimental Characterization For a Stable Behavior

Technical Presentation. MNHMT2019-3979

Daming Chen, *Pontificia Universidad Católica de Chile, Santiago, RM - Santiago, Chile*, Diego Vasco, *Universidad de Santiago de Chile, Santiago, Chile*, Mario Di Capua H., Amador M. Guzmán, *Pontificia Universidad Católica de Chile, Santiago, Chile*

Electrorepulsion in Nanofluids: Experimental Characterization for a Stable Behavior

Technical Paper Publication. MNHMT2019-3980

Daming Chen, *Pontificia Universidad Católica de Chile, Santiago, RM - Santiago, Chile*, Diego Vasco, *Universidad de Santiago de Chile, Santiago, Chile*, Mario Di Capua H., Amador M. Guzmán, *Pontificia Universidad Católica de Chile, Santiago, Chile*

Nano Fluids With Enhanced Thermal Conductivity and Reduced Amount of Carbon Nanotubes (SWNT and MWNT) Loading

Technical Presentation. MNHMT2019-4282

Haiping Hong, *SDSMT, Rapid City, SD, United States*

Utilizing Nanoparticles for Enhancing the Freezing Process in Thermal Energy Storage

Technical Presentation. MNHMT2019-4358

Hani Sait, *MU, Columbia, MO, United States*

Numerical Study on the Mechanism of Heat Transfer Enhancement in Fe₃O₄ Nanofluids With Magnetic Field

Technical Paper Publication. MNHMT2019-4198

Chenfei Wang, Gao Dongdong, Minli Bai, Peng Wang, *Dalian University of Technology, Dalian, China*, Yubai Li, *Carnegie Mellon University, Pittsburgh, PA, United States*

A Molecular Dynamics Simulation About the Effect of Localized Surface Plasmon Resonance on Latent Heat of Vaporization of Silver Nanofluids

Technical Presentation. MNHMT2019-4339

Chang Zhao, *Tongji University, Shanghai, Shanghai, China*

6-2: THERMAL MANAGEMENT IN ENERGY DEVICES AND SYSTEMS
3rd Floor, Baihe Hall #3 10:15AM–12:00PM

Session Organizer: Nuo Yang, *Huazhong University of Science and Technology, Wuhan, China*

Experimental Investigation Into a Nanoparticle Based Direct Absorption Solar Oscillating Heat Pipe

Technical Presentation. MNHMT2019-3918

Haichuan Jin, Guiping Lin, Fuqiang Chu, Dongsheng Wen, *Beihang University, Beijing, Beijing, China*

Study on Thermal Control Behavior by Using BaTiO₃-Based PTC Materials With Room Temperature Curie Point

Technical Paper Publication. MNHMT2019-4014

Aimei Yu, Qiang Li, *Nanjing University of Technology and Science, Nanjing, China*

Preparation and Modification of Microencapsulated Phase Change Materials Using Acrylic Resin Copolymers/n-Dodecanol

Technical Paper Publication. MNHMT2019-4036

Jinli Lu, Yang Li, Yafang Han, *Anhui University of Technology, Ma'anshan, China*

1-4: PARTICLES

3rd Floor, Huaihua Hall #1

1:00PM–2:30PM

Session Organizer: Jun Zhang, *Griffith University, Brisbane, QLD, Australia*
Session Co-Organizer: Liang-Liang Fan, *Xi'an Jiaotong University, Xi'an, China*

Invited Presentation: Microfluidic Manipulation of Magnetic Droplets Using a Uniform Magnetic Field

Technical Presentation. MNHMT2019-4153

Cheng Wang, Jie Zhang, Md. Rifat Hassan, *Missouri University of Science and Technology, Rolla, MO, United States*

Instabilities of Pre-Stretched Viscoelastic Flow in Microfluidic Cross-Slot Devices

Technical Paper Publication. MNHMT2019-4120

Meng Zhang, *Harbin Institute of Technology, Harbin, China*, Wu Zhang, *Harvard University, Cambridge, MA, United States*, Zheng-wei Wu, *University of Massachusetts Lowell, Lowell, MA, United States*, Weihua Cai, Zhiying Zheng, Yicheng Chen, Chaofeng Lan, *Harbin Institute of Technology, Harbin, China*

An Electromechanical Model for Electrowetting

Technical Paper Publication. MNHMT2019-4130

Deng Huang, Fang Qian, Wenyao Zhang, Cunlu Zhao, Wenbo Li, Qiuwang Wang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Fluid Mixing Using Induced Charge Electro-Osmotic Transverse Flow Actuated by Asymmetrical Driving Electrode Sequence

Technical Paper Publication. MNHMT2019-4181

Xiaoming Chen, Yukun Ren, Likai Hou, Tianyi Jiang, HongYuan Jiang, *Harbin Institute of Technology, Harbin, China*

Experimental Investigation on Nanoparticle Adhesion to Vascular Endothelium in an Artificial Blood Vessel

Technical Presentation. MNHMT2019-4202

Kai Yue, *University of Science and Technology Beijing, Beijing, China*, Xueying Wang, *University of Jinan, Jinan, China*, Yu You, Yiang Wei, Xinxin Zhang, *University of Science and Technology Beijing, Beijing, China*

Three-Dimensional Numerical Study of Magnetic Particle-Particle Interactions Using Iterative Dipole Moment Method

Technical Presentation. MNHMT2019-4220

Qi Fan, Xiaotao Han, Quanliang Cao, *Huazhong University of Science and Technology, Wuhan, China*

3-4: TRANSPORT PHENOMENA IN CONFINED DOMAINS

3rd Floor, Huaihua Hall #2

1:00PM–2:30PM

Session Organizer: Chuanhua Duan, *Boston University, Boston, China*
Session Co-Organizer: A.K.M. Morshed, *Bangladesh University of Engineering and Technology, Dhaka, Dhaka, Bangladesh*

Invited Presentation: Ultrafast Diameter-Dependent Water Evaporation from Nanopores

Technical Presentation. MNHMT2019-4275

Chuanhua Duan, *Boston University, Boston, Massachusetts*

Wettability Transition of a Liquid Droplet on Solid Surface With Nanoscale Inverted Triangular Grooves

Technical Paper Publication. MNHMT2019-4217

Meiling Cai, Yuxiu Li, Ying Chen, *Guangdong University of Technology, Guangzhou, China*, Jinliang Xu, Longyan Zhang, Junpeng Lei, *North China Electric Power University, Beijing, China*

Negative Differential Thermal Resistance and Thermal Rectification Through Nanoscale Confined Fluids

Technical Presentation. MNHMT2019-4246

Fan Li, Jun Wang, Guodong Xia, *Beijing University of Technology, Beijing, China*, Zhigang Li, *Hong Kong University of Science and Technology, Hong Kong, Hong Kong*

Enhanced Specific Heat Capacity of Liquid Entrapped Between Two Solid Walls Separated by a Nanogap

Technical Presentation. MNHMT2019-4276

A.K.M. Morshed, Rifat Mahmud, *Bangladesh University of Engineering and Technology, Dhaka, Dhaka, Bangladesh*

Optimization of Micropillar Array Arrangement for Droplet Evaporation Based on Particle Swarm Optimization Algorithm

Technical Presentation. MNHMT2019-4361

Junhui Li, Haotian Wu, Binjian Ma, Li Shan, Abel Solomon, *Washington University in St. Louis, St. Louis, MO, United States*, Jorge Padilla, *Google LLC, Mountain View, CA, United States*, Damena Agonafer, *Washington University in St. Louis, St. Louis, MO, United States*

Technical Sessions

4-5: FLOW BOILING

3rd Floor, Huaihua Hall #3

1:00PM–2:30PM

Session Organizer: Qian Fu, *Chongqing University, Chongqing, China*
Session Co-Organizer: Daxiang Deng, *Xiamen University, Xiamen, Fujian, China*

Invited Presentation: Challenges and Recent Advances in Enhancing Flow Boiling in Microchannels on Low Surface Tension Fluids

Technical Presentation. MNHMT2019-4319

Wenming Li, *Georgia Tech, West Columbia, SC, United States*, Jiaxuan Ma, Chen Li, *University of South Carolina, Columbia, SC, United States*

Flow Boiling Characteristics of R410A in Horizontal Annuli of Enhanced Surface Tubes

Technical Paper Publication. MNHMT2019-4039

Zhichuan Sun, Wei Li, *Zhejiang University, Hangzhou, Zhejiang Province, China*, Xiang Ma, *Qingdao University of Science and Technology, Qingdao, Shandong, China*, Yuansheng Lin, Zhiwu Ke, Hanbing Ke, *Science and Technology on Thermal Energy and Power Laboratory, Wuhan, China*

Flow Boiling Enhancement of Pin Fin-Interconnected Reentrant Microchannels

Technical Presentation. MNHMT2019-4328

Liang Chen, Daxiang Deng, Wei Wan, *Xiamen University, Xiamen, Fujian, China*

Experimental Study on Heat Transfer Characteristics of Subcooled Flow Boiling in a High-Aspect-Ratio Rectangular Microchannel

Technical Presentation. MNHMT2019-4305

Zengchao Chen, *Zhejiang University, Hangzhou, China*

Numerical and Experimental Investigation of Boiling Heat Transfer for Subcooled Water Flowing in a Small-Diameter Tube

Technical Paper Publication. MNHMT2019-4163

Makoto Shibahara, Qiusheng Liu, Koichi Hata, Katsuya Fukuda, *Kobe University, Kobe, Japan*

9-5: THEORETICAL AND NUMERICAL ANALYSIS OF NANOSCALE HEAT CONDUCTION

3rd Floor, Baihe Hall #1

1:00PM - 2:30PM

Session Organizer: Hua Bao, *University of Michigan-Shanghai Jiaotong University Joint Institute, Shanghai, China*

First Principles Study of Interlayer Interaction Effect on Graphene Thermal Conductivity

Technical Paper Publication. MNHMT2019-3905

Yuan Dong, Chi Zhang, *University of Missouri, Columbia, Columbia, MO, United States*, Chenghao Diao, *Columbia University, New York, NY, United States*, Jian Lin, *University of Missouri, Columbia, Columbia, MO, United States*

Heat Transport of Nano-ZnO With Tilt Grain Boundaries by Molecular Dynamics Simulation

Technical Paper Publication. MNHMT2019-4024

Yongqing Bian, Yingguang Liu, *North China Electric Power University, Baoding, Hebei, China*

Modified Müller-Plathe Method Capable of Quickly Establishing Expected Temperature Difference in Classical and Ab Initio Molecular Dynamics Simulations for Thermal Conductivity Calculations

Technical Presentation. MNHMT2019-4176

Xiaoliang Zhang, Kunpeng Yuan, Zhehao Sun, Zheng Chang, Dawei Tang, *Dalian University of Technology, Dalian, China*

Different Response of In/Out-Plane Lattice Thermal Conductivity of Orthorhombic GeSe to Pressure

Technical Presentation. MNHMT2019-4178

Kunpeng Yuan, Zhehao Sun, Xiaoliang Zhang, Dawei Tang, *Dalian University of Technology, Dalian, China*

Phonon-Vacancy Scattering in IV-VI From Ab Initio Green's Function Method

Technical Presentation. MNHMT2019-4226

Ruiqiang Guo, Sangyeop Lee, *University of Pittsburgh, Pittsburgh, PA, United States*

Phonon and Electron Thermal Transport in Metals From First-Principles

Technical Presentation. MNHMT2019-4362

Zhen Tong, *Shanghai Jiao Tong University, Shanghai*, Hua Bao, *University of Michigan-Shanghai Jiaotong University Joint Institute, Shanghai, China*

12-2: MICRO/MINIATURE TWO-PHASE DEVICES/ SYSTEMS II

3rd Floor, Baihe Hall #2

1:00PM–2:30PM

Session Organizer: Jingming Dong, *Dalian Maritime University, Dalian, China*

A Novel Thermal Solution for Electronics: Alumina Flat-Plate Oscillating Heat Pipe

Technical Paper Publication. MNHMT2019-3936

Bohan Tian, *Dalian Maritime University, Dalian, Liaoning, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*, Deming Yang, Jiujun Xu, Zhiyong Wang, Nannan Zhao, *Dalian Maritime University, Dalian, Liaoning, China*

Fluid Flow and Heat Transfer Characteristics of Micro Oscillating Heat Pipes With and Without Expanding Channels

Technical Paper Publication. MNHMT2019-3976

Qin Sun, Jian Qu, Jianping Yuan, Hai Wang, *Jiangsu University, Zhenjiang, Jiangsu, China*, Scott Thompson, *Auburn University, Auburn, AL, United States*

Study on Two-Phase Flow and Heat Transfer Characteristics of Microchannel Flat Tube of Refrigerant

Technical Paper Publication. MNHMT2019-4028

Jinli Lu, Susu Dai, Yafang Han, Yajin Liu, *Anhui University of Technology, Ma'anshan, China*

The Effect of the Operating Temperature on the Thermal Performance of a Micro Pulsating Heat Pipe

Technical Presentation. MNHMT2019-4271

Juno Kim, Sung Jin Kim, *KAIST, Daejeon, Korea (Republic)*

Experimental Study of Loop Heat Pipe With Super-Hydrophilic Porous Wick

Technical Presentation. MNHMT2019-4317

Jinliang Xu, Xianbing Ji, Hao Guo, *North China Electric Power University, Beijing, China*

11-5: MICRO HEAT MASS TRANSFER

3rd Floor, Baihe Hall #3 **1:00PM - 2:30PM**

Session Organizer: Liwu Fan, *Zhejiang University, Hangzhou, Zhejiang, China*

Session Co-Organizer: Yulong Ji, *Dalian Maritime University, Dalian, Liaoning, China*

Effects of Operating Conditions on the Heat Management of a Microscale Fuel Cell

Technical Paper Publication. MNHMT2019-3903

Liyong Sun, *Penn State University Behrend, Erie, PA, United States*, Adam S. Hollinger, Jun Zhou, *Penn State Behrend, Erie, PA, United States*

Theoretical Model of Bubble Growth in Superheated Ethanol-Water Mixture

Technical Paper Publication. MNHMT2019-3985

Chang Cai, Hong Liu, Xi Xi, Ming Jia, Weilong Zhang, Yang He, *Dalian University of Technology, Dalian, China*

Vapor Absorption Into Hygroscopic Liquid Desiccant Droplets: Mechanisms of Droplet Growth and Spreading

Technical Presentation. MNHMT2019-4242

Zhenying Wang, *Kyushu University, Fukuoka, Japan*

Influences of Inner Longitudinal Fins on the Combustion Characteristics of CH₄ and Air Combustion in Narrow Tubes

Technical Presentation. MNHMT2019-4306

Yanxia Li, Zhongliang Liu, *Beijing University of Technology, Beijing, China*

Heat Transfer and Pressure Drop of a Periodic Expanded-Constrained Microchannels Heat Sink

Technical Presentation. MNHMT2019-4329

Guang Pi, Daxiang Deng, Liang Chen, *Xiamen University, Xiamen, China*

Effect Analysis of Various Gradient Particle Size Distribution on Electrical Performance of Anode-Supported SOFCs With Gradient Anode

Technical Paper Publication. MNHMT2019-4279

Pei Fu, Yuansheng Song, Jian Yang, Qiuwang Wang, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

1-5: FLOWS

3rd Floor, Huaihua Hall #1 **3:30PM-5:10PM**

Session Organizer: Quanliang Cao, *Huazhong University of Science and Technology, Wuhan, China*

Session Co-Organizer: Cunlu Zhao, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Invited Presentation: Opportunities and Challenges of Nanofluidics: The Role of Molecular Interactions

Technical Presentation. MNHMT2019-4250

Zhigang Li, *Hong Kong University of Science and Technology, Hong Kong, Hong Kong*

Experimental Investigation of Micromixing Behavior of Fluids Under Static Magnetic Fields Produced by Permanent Magnets

Technical Presentation. MNHMT2019-4218

Xiaotao Han, Chunting Liu, Qi Fan, Quanliang Cao, *Huazhong University of Science and Technology, Wuhan, China*

Study on the Flow and Heat Transfer Characteristics of Micro-Scale Droplets and Fluid on Dynamic Liquid Film Condition by Lattice Boltzmann Method

Technical Paper Publication. MNHMT2019-4214

Yichao He, Yan Li, Zhuang Ding, Han Yuan, Ning Mei, *Ocean University of China, Qingdao, China*

A Numerical Study of Electrode Arrangements for Precise Microdrop Generation in an Electrowetting-Based Digital Microfluidic Platform

Technical Paper Publication. MNHMT2019-4059

Yin Guan, Baiyun Li, Mengnan Zhu, Shengjie Cheng, Jiyue Tu, Lu Xing, *Huazhong University of Science and Technology, Wuhan, China*

Single-Cell Calorimetry

Technical Presentation. MNHMT2019-4189

Renkun Chen, *University of California, San Diego, La Jolla, CA, United States*

A Novel Method Based on Optofluidics Lensless-Holography for Detecting the Composition of Oil

Technical Presentation. MNHMT2019-4203

GeGe Ding, XiaoMei Yu, JunSheng Wang, *Dalian Maritime University, Dalian, China*

Understanding Flow Enhancement In Graphene-Coated Nanochannels

Technical Presentation. MNHMT2019-4251

Yakang Jin, Ran Tao, Zhigang Li, *Hong Kong University of Science and Technology, Hong Kong, Hong Kong*

Technical Sessions

5-4: NEAR-FIELD RADIATION

3rd Floor, Huaihua Hall #2

3:30PM–5:10PM

Session Organizer: Yu-bin Chen, *National Tsing Hua University, Hsinchu, Taiwan*

Session Co-Organizer: Yanan Yue, *Wuhan University, Wuhan, China*

Invited Presentation: Near-Field Thermal Radiation Between Flat Surfaces

Technical Presentation. MNHMT2019-4277

Bong Jae Lee, *KAIST, Daejeon, Korea (Republic)*

Near-Field Radiative Heat Transfer Between Mie Resonance-Based Metamaterials Made of Coated Nonmagnetic Particles

Technical Paper Publication. MNHMT2019-3998

Lu Lu, JinLin Song, Kun Zhou, Qiang Cheng, *Huazhong University of Science and Technology, Wuhan, Hubei, China*

Retrieval of Uniaxial Permittivity and Permeability for the Study of Near-Field Radiative Transport Between Metallic Nanowire Arrays

Technical Presentation. MNHMT2019-4096

Jui-Yung Chang, Payam Sabbaghi, *Arizona State University, Tempe, AZ, United States*, Yu-bin Chen, *National Tsing Hua University, Hsinchu, Taiwan*, Liping Wang, *Arizona State University, Tempe, AZ, United States*

Numerical Study on the Near-Field Radiative Heat Transfer Between Two Planar Alpha-MoO₃ Slabs

Technical Presentation. MNHMT2019-4160

Xiaohu Wu, Ceji Fu, *Peking University, Beijing, China*, Zhuomin Zhang, *Georgia Institute of Technology, Atlanta, GA, United States*

Near-Field Negative Electroluminescent Cooling System With Metal-Semiconductor-Metal Schottky-Junction Structure

Technical Presentation. MNHMT2019-4174

Jaeman Song, Mikyung Lim, Seung S. Lee, Bong Jae Lee, *KAIST, Daejeon, Korea (Republic)*

Near Field Radiative Heat Transfer in a Chain of Metallic Particles

Technical Paper Publication. MNHMT2019-4236

Minggang Luo, Junming Zhao, Linhua Liu, *Harbin Institute of Technology, Harbin, China*

11-2: LIQUID FLOW AND HEAT TRANSFER AT SMALL SCALES

3rd Floor, Huaihua Hall #3

3:30PM–5:10PM

Session Organizer: Liang Gong, *China University of Petroleum, Qingdao, Shandong, China*

Session Co-Organizer: Liang Zhang, *Zhejiang University, Hangzhou, China*

Study on Forced Convective Heat Transfer of FC-72 in Vertical Small Tubes

Technical Paper Publication. MNHMT2019-4086

Yantao Li, Yulong Ji, *Dalian Maritime University, Dalian, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*, Katsuya Fukuda, *Qiusheng Liu, Kobe University, Kobe, Japan*

Heat Transfer and Pressure Loss Measurements of Nanoemulsion Heat Transfer Fluid Inside Direct-Metal-Laser-Sintering (DMLS) Manufactured Microchannel Heat Exchanger

Technical Paper Publication. MNHMT2019-3983

Jiajun Xu, Jaime Rios, *University of the District of Columbia, Washington, DC, United States*

Flow and Heat Transfer in a Microchannel Partially Filled With a Microporous Foam Involving Flow Inertia, Flow/Thermal Slips, Thermal Non-Equilibrium and Thermal Asymmetry

Technical Presentation. MNHMT2019-4312

Huijin Xu, Changying Zhao, *Shanghai Jiao Tong University, Shanghai, Shanghai, China*, Kambiz Vafai, *University of California, Riverside, Riverside, CA, United States*

Numerical Study on the Characteristics of Flow and Heat Transfer of Heatsinks With Area-Varied Microchannels

Technical Presentation. MNHMT2019-4333

Jer-Huan Jang, *Ming Chi University of Technology, New Taipei City, TW, Taiwan*, Han-Chieh Chiu, *Taipei City University of Science and Technology, Taipei, TW, Taiwan*, Chandan Kumar Sah, *Ming-Chi University of Technology, New Taipei City, TW, Taiwan*

Numerical Analysis of Parametric Effects of Tube-Strip Heat Exchanger for Fuel Cell Vehicles

Technical Paper Publication. MNHMT2019-4033

Xiaoyu Wu, Hengyun Zhang, ZH Zhu, Shen Xu, YC Deng, *Shanghai University of Engineering Science, Shanghai, China*

9-6: NANOSCALE HEAT CONDUCTION IN DEVICE APPLICATIONS

3rd Floor, Baihe Hall #1

3:30PM–5:10PM

Session Organizer: Bing-Yang Cao, *Tsinghua University, Beijing, China*

In-Site Current Annealing Method to Obtain Ultra-Clean Graphene Sample

Technical Paper Publication. MNHMT2019-3939

Haidong Wang, Xing Zhang, *Tsinghua University, Beijing, China*

Optimization of Flow and Heat Transfer for a New Double-Layered Microchannel Heat Sink

Technical Paper Publication. MNHMT2019-3967

Huanling Liu, Bin Zhang, *Xidian University, Xi'an, China*

Thermal Conductivity of Metal-Oxides for Memristor Applications

Technical Presentation. MNHMT2019-3971

Liang Chen, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, Xiaojia Wang, *University of Minnesota, Minneapolis, MN, United States*, Shuangtao Chen, *Yu Hou, Xi'an Jiaotong University, Xi'an, Shaanxi, China*

Effects of Local Thermal Non-Equilibrium and Periodicity of Sinusoidal Condition on Conjugate Natural Convection in Porous Square Cavity

Technical Presentation. MNHMT2019-4295

Ammar Alsabery, *National University of Malaysia, Selangor, Malaysia*

Thermal Spreading Resistance in Ballistic-Diffusive Regime for GaN HEMTs

Technical Presentation. MNHMT2019-4331

Bing-Yang Cao, Yuchao Hua, *Tsinghua University, Beijing, China*

Experimental Phonon Dispersion and Lifetimes of Tetragonal CH₃NH₃PbI₃ Perovskite Crystals

Technical Presentation. MNHMT2019-4289

Hao Ma, *Cornell University, Ithaca, NY, United States*, Yunwei Ma, *Virginia Tech, Blacksburg, VA, United States*, Heng Wang, *Illinois Institute of Technology, Chicago, IL, United States*, Carla Slebodnick, *Virginia Tech, Blacksburg, VA, United States*, Ahmet Alatas, *Argonne National Lab, Argonne, IL, United States*, Jeffrey Urban, *Facility Director, Berkeley, CA, United States*, Zhiting Tian, *Cornell University, Ithaca, NY, United States*

13-2: MICRO/NANOSCALE TRANSPORT IN CRYOPRESERVATION

3rd Floor, Baihe Hall #2

3:30PM–5:10PM

Session Organizer: Zhenpeng Qin, *University of Texas at Dallas, Richardson, TX, United States*

Session Co-Organizer: Liang Zhu, *University of Maryland, Baltimore County, Baltimore, MD, United States*

Invited Presentation: Nanomaterials-Mediated Precise Controllability for Applications in Cryomedicine

Technical Presentation. MNHMT2019-4337

Wei Rao, *Technical Institute of Physics and Chemistry, CAS, Beijing, China*

Ultra-High Speed Vitrification of Prostate Cancer Cells Based on Thin Film Evaporation

Technical Paper Publication. MNHMT2019-3910

Fengmin Su, Yiming Fan, He Xu, Nannan Zhao, Yangbo Deng, Yulong Ji, *Dalian Maritime University, Dalian, Liaoning, China*, Hongbin Ma, *University of Missouri, Columbia, MO, United States*

A Novel Dynamic Model to Determine the Cell Membrane Permeability to Water Under Temperature Change

Technical Presentation. MNHMT2019-4230

Tianhang Yang, *Harbin Institute of Technology, Harbin, Heilongjiang, China*, Ji Peng, Shen Ren, Dayong gao, *University of Washington, Seattle, WA, United States*, Songjing Li, *Harbin Institute of Technology, Harbin*

11-4: TWO-PHASE AND MULTI-PHASE FLOW AND HEAT TRANSFER AT SMALL SCALES

3rd Floor, Baihe Hall #3

3:30PM–5:10PM

Session Organizer: Jian Qu, *Jiangsu University, Zhenjiang, Jiangsu, China*

Session Co-Organizer: Hai Wang, *Jiangsu University, Zhenjiang, Jiangsu, China*

Research and Development of a Practical Ultra-Thin Two-Phase Thermal Ground Plane

Technical Presentation. MNHMT2019-4115

Ji Li, *Chinese Academy of Sciences, Beijing, Beijing, China*, Lucang Lv, *China Academy of Space Technology, Beijing, China*

Mechanisms of Heat and Mass Transfer for Thin-Film Evaporation With Velocity Slip and Temperature Jump

Technical Paper Publication. MNHMT2019-4213

Xiu Xiao, Chunji Yan, Yulong Ji, *Dalian Maritime University, Dalian, China*

Experimental Study of Saturated Flow Boiling in Vertical Narrow Microchannel

Technical Paper Publication. MNHMT2019-3935

Yuhao Lin, Kan Zhou, Junye Li, Wei Li, Hua Zhu, Zhengjiang Zhang, Jincai Du, *Zhejiang University, Hangzhou, Zhejiang Province, China*

Analytical Investigation on the Homogeneous Nucleation in a Mono-Component and Bi-Component Droplet

Technical Paper Publication. MNHMT2019-3968

Xi Xi, Hong Liu, Chang Cai, Ming Jia, Weilong Zhang, *Dalian University of Technology, Dalian, China*

Axissymmetric Numerical Investigation on Steam Bubble Condensation

Technical Paper Publication. MNHMT2019-3969

Haibo Li, Maocheng Tian, *Shandong University, Jinan, Shandong, China*, Liangliang Tang, *General Machinery Research Institute, Hefei, China*, Guanmin Zhang, Jingzhi Zhang, Min Wei, Changliang Wang, *Shandong University, Jinan, China*

Experimental Study on Heat Transfer Performance of Pulsating Heat Pipe CPU Radiator

Technical Paper Publication. MNHMT2019-4017

Fumin Shang, Qingjing Yang, Jianhong Liu, *Changchun Institute of Technology, Changchun, Jilin, China*

Characterization of Two-Phase Flow Patterns in a Slit Microchannel

Technical Presentation. MNHMT2019-4345

Fedor Ronshin, Yuriy Dementyev, Evgeny Chinnov, *Kutateladze Institute of Thermophysics SB RAS, Novosibirsk, Russia*

Experimental Study of Thermoelectric Assisted Indirect Evaporative Cooling System

Technical Presentation. MNHMT2019-4357

Hani Sait, *MU, Columbia, MO, United States*

Author Index

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Adaikalanathan	Vimalan	10-3	MNHMT2019-4239
Agonafer	Damena	3-3	MNHMT2019-4359
Agonafer	Damena	3-4	MNHMT2019-4361
Akhter	Chandni	4-7	MNHMT2019-4247
Alatas	Ahmet	9-6	MNHMT2019-4289
Alsabery	Ammar	9-6	MNHMT2019-4295
An	Meng	9-4	MNHMT2019-4316
An	Wei	2-1	MNHMT2019-3965
Anand	Sushant	4-1	MNHMT2019-4102
		4-2	MNHMT2019-4105
		4-2	MNHMT2019-4104
		4-7	MNHMT2019-3914
Ao	Hongrui	6-1	MNHMT2019-4223
Ayub	Zahid	12-1	MNHMT2019-4037
Bai	Bing-He	4-6	MNHMT2019-4348
		17-1	MNHMT2019-4199
Bai	Fan	1-2	MNHMT2019-4249
Bai	Minli	2-2	MNHMT2019-4198
		3-3	MNHMT2019-4180
		4-6	MNHMT2019-4164
		4-6	MNHMT2019-4215
		11-1	MNHMT2019-4297
Bao	Hua	9-3	MNHMT2019-4363
		9-5	MNHMT2019-4362
Baoyu	Yan	11-1	MNHMT2019-4156
Baranwal	Ajay Kumar	6-1	MNHMT2019-4162
BarzegarGerd-roodbary	Mostafa	17-1	MNHMT2019-4303
Basu	Dipankar Narayan	3-2	MNHMT2019-4098
Ben-Abdallah	Philippe	5-2	MNHMT2019-4150
Beysens	Daniel	4-2	MNHMT2019-4105
		4-2	MNHMT2019-4104
Bian	Yongqing	9-5	MNHMT2019-4024
Biehs	Svend-Age	5-2	MNHMT2019-4150
Cai	Chang	11-4	MNHMT2019-3968
		11-5	MNHMT2019-3985
Cai	Meiling	3-4	MNHMT2019-4217
Cai	Weihua	1-4	MNHMT2019-4120
Cao	Bing-Yang	9-6	MNHMT2019-4331
Cao	Quanliang	1-4	MNHMT2019-4220
		1-5	MNHMT2019-4218
Chang	Guo	17-8	MNHMT2019-3919
Chang	Jui-Yung	5-1	MNHMT2019-4095
		5-4	MNHMT2019-4096
Chang	Ruxia	5-2	MNHMT2019-3963
Chang	Zheng	9-5	MNHMT2019-4176
Chatterjee	Rukmava	4-2	MNHMT2019-4105
		4-2	MNHMT2019-4104

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Che	Zifan	17-8	MNHMT2019-3919
Chekifi	Tawfiq	1-3	MNHMT2019-4322
Chen	Bin	13-1	MNHMT2019-4325
Chen	Chung-Lung	4-2	MNHMT2019-3982
Chen	Daming	2-2	MNHMT2019-3979
		2-2	MNHMT2019-3980
Chen	Fu-Ren	9-1	MNHMT2019-4107
Chen	George Zheng	1-2	MNHMT2019-4263
Chen	Guanglei	17-4	MNHMT2019-4269
Chen	Haisheng	9-3	MNHMT2019-3911
Chen	Kai	3-3	MNHMT2019-4320
Chen	Liang	3-1	MNHMT2019-4070
		4-5	MNHMT2019-4328
		9-6	MNHMT2019-3971
		11-5	MNHMT2019-4329
Chen	Liuzhu	3-2	MNHMT2019-3908
Chen	Mingkun	12-1	MNHMT2019-4256
Chen	Qiyu	6-1	MNHMT2019-4248
Chen	Renkun	1-5	MNHMT2019-4189
		4-4	MNHMT2019-4190
Chen	Rong	4-7	MNHMT2019-4354
Chen	Shuangtao	3-1	MNHMT2019-4070
		9-6	MNHMT2019-3971
Chen	Xianbing	17-4	MNHMT2019-4300
Chen	Xiaodong	1-2	MNHMT2019-4224
Chen	Xiaoming	1-4	MNHMT2019-4181
Chen	Xiting	17-3	MNHMT2019-4142
Chen	Yansong	3-2	MNHMT2019-4041
		4-4	MNHMT2019-4307
Chen	Yen-Hsiang	17-6	MNHMT2019-3931
Chen	Yicheng	1-4	MNHMT2019-4120
Chen	Ying	3-4	MNHMT2019-4217
Chen	Yu-bin	5-1	MNHMT2019-4095
		5-4	MNHMT2019-4096
		17-6	MNHMT2019-3931
Chen	Yunfei	9-1	MNHMT2019-4326
		9-3	MNHMT2019-4324
Chen	Zengchao	4-5	MNHMT2019-4305
Chen	Zhen	5-3	MNHMT2019-3974
Cheng	Qiang	5-4	MNHMT2019-3998
Cheng	Shengjie	1-5	MNHMT2019-4059
Cheng	Yaqi	4-4	MNHMT2019-4307
Chi	Yuan	12-1	MNHMT2019-4256
Chinnov	Evgeny	11-4	MNHMT2019-4345
Chiu	Han-Chieh	11-2	MNHMT2019-4333
Choi	Chang Kyoung	15-1	MNHMT2019-4123
		15-1	MNHMT2019-4373
Chu	Fuqiang	6-2	MNHMT2019-3918

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Chu	Fuqiang	17-4	MNHMT2019-3916
Chu	Lilin	14-1	MNHMT2019-3937
		14-1	MNHMT2019-4092
		15-1	MNHMT2019-4344
chun	jiang	3-2	MNHMT2019-4041
Chung	Meng-Hsuan	10-1	MNHMT2019-4377
Cui	Kehang	6-1	MNHMT2019-4321
Cui	Wenbin	3-2	MNHMT2019-3987
Dai	Susu	12-2	MNHMT2019-4028
Dai	Xianming	3-2	MNHMT2019-4245
		4-1	MNHMT2019-4006
Dalal	Amaresh	3-2	MNHMT2019-4098
Dan	Yaru	10-1	MNHMT2019-4003
Dang	Chaobin	17-10	MNHMT2019-3957
Dang	Saichao	5-1	MNHMT2019-4257
Dementyev	Yuriy	11-4	MNHMT2019-4345
Demir	Baris	9-4	MNHMT2019-4316
Deng	Daxiang	4-5	MNHMT2019-4328
		11-5	MNHMT2019-4329
Deng	Hao	10-2	MNHMT2019-3953
Deng	Lisheng	17-10	MNHMT2019-4079
Deng	Shuai	9-4	MNHMT2019-4114
Deng	Yajun	17-3	MNHMT2019-3958
Deng	Yangbo	13-2	MNHMT2019-3910
Deng	Y.C.	11-2	MNHMT2019-4033
Di Capua H.	Mario	2-2	MNHMT2019-3979
		2-2	MNHMT2019-3980
Diao	Chenghao	9-5	MNHMT2019-3905
Ding	GeGe	1-5	MNHMT2019-4203
Ding	Hang	17-1	MNHMT2019-4152
Ding	Zhuang	1-5	MNHMT2019-4214
Dogruoz	Baris	3-3	MNHMT2019-4359
Dong	Hua	17-8	MNHMT2019-3981
		17-8	MNHMT2019-3994
Dong	Jingming	12-1	MNHMT2019-3925
Dong	Minghao	5-3	MNHMT2019-3974
Dong	Yuan	9-5	MNHMT2019-3905
dongdong	Gao	2-2	MNHMT2019-4198
Dorao	C.A.	4-7	MNHMT2019-4340
Du	Bingang	4-4	MNHMT2019-4307
Du	Jincai	11-4	MNHMT2019-3935
		15-1	MNHMT2019-4262
Du	Qing	10-2	MNHMT2019-3953
Du	Zhenyu	9-4	MNHMT2019-4114
Duan	Chuanhua	3-4	MNHMT2019-4275
Duan	Fei	1-2	MNHMT2019-4273
Duan	Jialiang	17-8	MNHMT2019-3919
Duan	Xuhui	9-1	MNHMT2019-4009

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Dutta	Sanmitra	4-1	MNHMT2019-4102
Emerson	David R.	10-1	MNHMT2019-4232
		10-3	MNHMT2019-4355
Fan	Desong	5-2	MNHMT2019-3963
Fan	Liang-Liang	1-6	MNHMT2019-4133
Fan	Liwu	4-3	MNHMT2019-4080
Fan	Qi	1-4	MNHMT2019-4220
		1-5	MNHMT2019-4218
Fan	Shilong	11-3	MNHMT2019-4015
Fan	Yiming	13-2	MNHMT2019-3910
Fei	Guo	17-10	MNHMT2019-4069
Feng	Guang	1-3	MNHMT2019-4272
Feng	Haikao	17-11	MNHMT2019-4350
Feng	Huicheng	1-3	MNHMT2019-3943
Feng	Tianli	5-1	MNHMT2019-4364
Feng	Yining	4-1	MNHMT2019-4268
Fernandino	Maria	4-7	MNHMT2019-4340
Fisher	Timothy T.S.	17-13	MNHMT2019-4356
		17-3	MNHMT2019-4347
Fu	Benwei	3-2	MNHMT2019-3987
		12-1	MNHMT2019-3970
Fu	Ceji	5-4	MNHMT2019-4160
Fu	Pei	11-5	MNHMT2019-4279
Fukuda	Katsuya	4-5	MNHMT2019-4163
		11-2	MNHMT2019-4086
Gao	Dayong	13-2	MNHMT2019-4230
Gao	Shan	6-1	MNHMT2019-4223
		9-4	MNHMT2019-4029
		17-4	MNHMT2019-4023
Gao	Weichen	11-1	MNHMT2019-4083
Gao	Xiang	1-3	MNHMT2019-4252
Gao	Yu	14-1	MNHMT2019-4119
Ge	Yijun	17-3	MNHMT2019-4347
Gen	Li	11-1	MNHMT2019-4155
		11-1	MNHMT2019-4156
Gu	Qimei	13-1	MNHMT2019-4233
Gu	Xiao-Jun	10-1	MNHMT2019-4232
		10-3	MNHMT2019-4355
Guan	Yin	1-5	MNHMT2019-4059
Guo	Hao	12-2	MNHMT2019-4317
Guo	Jinhong	1-6	MNHMT2019-4280
Guo	Ruiqiang	9-5	MNHMT2019-4226
Guo	Yang	14-1	MNHMT2019-4092
Guo	Yanming	5-2	MNHMT2019-4147
Guo	Yuandong	17-12	MNHMT2019-4169
Guo	Zongqi	3-2	MNHMT2019-4245
		4-1	MNHMT2019-4006
Guzmán	Amador M.	2-2	MNHMT2019-3979

Author Index

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER	LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
		2-2	MNHMT2019-3980	Hu	Yuan	17-13	MNHMT2019-4356
Habib	Badr	14-1	MNHMT2019-4127	Hu	Zi A.	14-1	MNHMT2019-4119
Han	Xiao	10-1	MNHMT2019-4003	Hua	Yuchao	9-6	MNHMT2019-4331
Han	Xiaotao	1-4	MNHMT2019-4220	Huang	Baoling	10-2	MNHMT2019-4136
		1-5	MNHMT2019-4218	Huang	ChunPu	10-3	MNHMT2019-4025
Han	Yafang	6-2	MNHMT2019-4036	Huang	Deng	1-4	MNHMT2019-4130
		12-2	MNHMT2019-4028			6-1	MNHMT2019-4132
Hao	Qing	4-1	MNHMT2019-4268	Huang	H.Y.	17-10	MNHMT2019-4079
		6-1	MNHMT2019-4248	Infante Ferreira	Carlos	4-3	MNHMT2019-3920
		9-3	MNHMT2019-4274	Ismael	Laith	4-6	MNHMT2019-3902
		9-4	MNHMT2019-4265	Jang	Jer-Huan	11-2	MNHMT2019-4333
Hao	Tingting	3-2	MNHMT2019-4041	Ji	Pengfei	7-1	MNHMT2019-4288
		14-1	MNHMT2019-4100	Ji	Xianbing	12-2	MNHMT2019-4317
		15-1	MNHMT2019-4341	Ji	Yulong	11-1	MNHMT2019-4083
		17-3	MNHMT2019-4158			11-1	MNHMT2019-4155
Hasan	Mohammad Nasim	4-7	MNHMT2019-4247			11-1	MNHMT2019-4156
Hassan	Md. Rifat	1-4	MNHMT2019-4153			11-4	MNHMT2019-4213
Hata	Koichi	4-5	MNHMT2019-4163			11-2	MNHMT2019-4086
Hayase	Shuzi	6-1	MNHMT2019-4162			13-2	MNHMT2019-3910
He	Jiacheng	17-10	MNHMT2019-3957			14-1	MNHMT2019-3937
He	Jixiong	9-1	MNHMT2019-4009			14-1	MNHMT2019-4092
He	Jun	1-2	MNHMT2019-4263			15-1	MNHMT2019-4344
He	Mingjian	5-3	MNHMT2019-4197	Jia	Ming	11-4	MNHMT2019-3968
		17-5	MNHMT2019-4338			11-5	MNHMT2019-3985
He	Yan	4-3	MNHMT2019-4038	Jiang	Bin	4-4	MNHMT2019-4298
He	Yang	11-5	MNHMT2019-3985	Jiang	Chenguang	5-3	MNHMT2019-4244
He	Yichao	1-5	MNHMT2019-4214	Jiang	HongYuan	1-4	MNHMT2019-4181
He	Ying	13-1	MNHMT2019-4330			6-1	MNHMT2019-4223
He	Yingzhao	10-1	MNHMT2019-3947	Jiang	Lan	7-1	MNHMT2019-4288
He	Zhaohong	17-10	MNHMT2019-4079	Jiang	Peixue	3-3	MNHMT2019-4320
Heng	Yi	4-4	MNHMT2019-4208			17-10	MNHMT2019-4051
He-Ping	Li	17-10	MNHMT2019-4052	Jiang	Tianyi	1-4	MNHMT2019-4181
Hollinger	Adam S.	11-5	MNHMT2019-3903	Jiang	Xinyu	3-3	MNHMT2019-4359
Hong	Fangjun	3-3	MNHMT2019-4374	Jiao	Kui	10-2	MNHMT2019-3953
Hong	Haiping	2-2	MNHMT2019-4282	Jiao	Long	4-7	MNHMT2019-4354
Hong	Sihui	17-10	MNHMT2019-3957	Jin	Haichuan	6-2	MNHMT2019-3918
Hongfei	Cao	11-1	MNHMT2019-4156	Jin	Lu	10-3	MNHMT2019-4087
Hou	Likai	1-4	MNHMT2019-4181	Jin	Ming	2-1	MNHMT2019-4053
Hou	Yu	3-1	MNHMT2019-4070	Jin	Yakang	1-3	MNHMT2019-4252
		9-6	MNHMT2019-3971			1-5	MNHMT2019-4251
Hou	Yuze	10-2	MNHMT2019-3953	Jingcheng	Cai	17-10	MNHMT2019-4069
Hsieh	Ren-Horn	11-2	MNHMT2019-4333	Joo	Sangwoo	1-2	MNHMT2019-4249
Hu	Chengzhi	3-3	MNHMT2019-4180	Kang	Peiyuan	13-1	MNHMT2019-4154
		4-6	MNHMT2019-4164	Kang	Yong Tae	2-1	MNHMT2019-3944
		4-6	MNHMT2019-4215	Kato	Toshiaki	17-8	MNHMT2019-4207
		11-1	MNHMT2019-4297	Ke	Hanbing	4-3	MNHMT2019-4038
Hu	Dinghua	2-1	MNHMT2019-4053			4-5	MNHMT2019-4039
				Ke	Zhiwu	4-3	MNHMT2019-4038

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
		4-5	MNHMT2019-4039
Khan	Sameera	4-1	MNHMT2019-4102
Kim	Dae Yun	15-1	MNHMT2019-4123
Kim	Juno	12-2	MNHMT2019-4271
Kim	Mingeon	5-2	MNHMT2019-4013
Kim	Moon J.	17-8	MNHMT2019-3919
Kim	Sung Jin	12-2	MNHMT2019-4271
Kirkenier	Joost	4-3	MNHMT2019-3920
Koh	Kai Seng	1-2	MNHMT2019-4263
Kohiyama	Asaka	5-3	MNHMT2019-4225
Kong	Qing L.	14-1	MNHMT2019-4119
Konno	Kana	5-3	MNHMT2019-4225
Kou	Aijing	17-8	MNHMT2019-3981
		17-8	MNHMT2019-3994
Kukulka	David	4-3	MNHMT2019-4044
Kulkarni	Varun	4-7	MNHMT2019-3914
Lai	Nien-Chu	9-1	MNHMT2019-4073
Lan	Chaofeng	1-4	MNHMT2019-4120
Lan	Zhong	3-2	MNHMT2019-4041
		14-1	MNHMT2019-4100
Lee	Bong Jae	5-1	MNHMT2019-4145
		5-2	MNHMT2019-4013
		5-4	MNHMT2019-4174
		5-4	MNHMT2019-4277
Lee	Eungkyu	3-1	MNHMT2019-4143
Lee	Ikjin	5-2	MNHMT2019-4013
Lee	Ming-Tsang	17-6	MNHMT2019-3931
Lee	Sangyeop	9-4	MNHMT2019-4227
		9-5	MNHMT2019-4226
Lee	Seong Hyuk	15-1	MNHMT2019-4123
Lee	Seung S.	5-4	MNHMT2019-4174
Lei	Guo Q.	14-1	MNHMT2019-4119
Lei	Junpeng	3-4	MNHMT2019-4217
Li	Baiyun	1-5	MNHMT2019-4059
Li	Calvin Hong	17-4	MNHMT2019-4269
Li	Chen	4-5	MNHMT2019-4319
Li	Deyu	3-1	MNHMT2019-4090
		3-1	MNHMT2019-4091
		9-1	MNHMT2019-4089
Li	Dong	13-1	MNHMT2019-4325
Li	Dongliang	4-7	MNHMT2019-4354
Li	Fan	3-4	MNHMT2019-4246
Li	Guansheng	1-6	MNHMT2019-4173
Li	Haibo	11-4	MNHMT2019-3969
Li	J.X.	4-4	MNHMT2019-4027
Li	Ji	9-4	MNHMT2019-4029
		11-4	MNHMT2019-4115
Li	Jiaqi	4-3	MNHMT2019-4080

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Li	Jinkai	2-1	MNHMT2019-4049
Li	Junhui	3-3	MNHMT2019-4359
		3-4	MNHMT2019-4361
Li	Junwei	17-1	MNHMT2019-4193
Li	Junye	7-1	MNHMT2019-3934
		10-1	MNHMT2019-4042
		11-4	MNHMT2019-3935
		15-1	MNHMT2019-4262
Li	Lirong	2-1	MNHMT2019-3944
Li	Mingjia	10-3	MNHMT2019-4368
Li	Qi	9-4	MNHMT2019-4138
Li	Qiang	5-2	MNHMT2019-3963
		6-2	MNHMT2019-4014
Li	Qing	4-6	MNHMT2019-4346
Li	Qin-Yi	17-8	MNHMT2019-4207
Li	Shanshan	17-1	MNHMT2019-4193
Li	Songjing	13-2	MNHMT2019-4230
Li	Sun	17-10	MNHMT2019-4052
Li	Wei	4-3	MNHMT2019-4044
		4-7	MNHMT2019-4354
		4-3	MNHMT2019-4038
		4-5	MNHMT2019-4039
		7-1	MNHMT2019-3934
		10-1	MNHMT2019-3947
		10-1	MNHMT2019-3950
		10-1	MNHMT2019-4042
		11-4	MNHMT2019-3935
		12-1	MNHMT2019-4037
		15-1	MNHMT2019-4262
Li	Weihua	1-6	MNHMT2019-4134
Li	Wenbo	1-4	MNHMT2019-4130
		6-1	MNHMT2019-4132
Li	Wenming	4-5	MNHMT2019-4319
Li	Xiaobo	9-1	MNHMT2019-4009
Li	Xun	9-4	MNHMT2019-4227
Li	Yadong	14-1	MNHMT2019-3937
Li	Yan	1-5	MNHMT2019-4214
		7-1	MNHMT2019-4211
Li	Yang	5-3	MNHMT2019-4197
		6-2	MNHMT2019-4036
Li	Yantao	11-2	MNHMT2019-4086
		14-1	MNHMT2019-4092
Li	Yanxia	11-5	MNHMT2019-4306
Li	Yinshi	17-1	MNHMT2019-4035
Li	Yiyi	6-1	MNHMT2019-4228
Li	Yongjiang	1-2	MNHMT2019-4196
Li	Yubai	2-2	MNHMT2019-4198
		3-3	MNHMT2019-4180

Author Index

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER	LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
		4-6	MNHMT2019-4164	Liu	Yajin	12-2	MNHMT2019-4028
		4-6	MNHMT2019-4215	Liu	Yingguang	9-5	MNHMT2019-4024
Li	Yu-Ting	4-6	MNHMT2019-4348			10-1	MNHMT2019-4003
Li	Yuxiu	3-4	MNHMT2019-4217			10-3	MNHMT2019-4025
Li	Zengyao	17-10	MNHMT2019-4052	Liu	Zeyu	10-2	MNHMT2019-4144
Li	Zhigang	1-3	MNHMT2019-4252	Liu	Zhenyu	11-1	MNHMT2019-4192
		1-5	MNHMT2019-4250	Liu	Zhichun	9-4	MNHMT2019-4029
		1-5	MNHMT2019-4251			17-4	MNHMT2019-4023
		3-4	MNHMT2019-4246	Liu	Zhongliang	11-5	MNHMT2019-4306
Lian	Zheng	1-2	MNHMT2019-4263	Liu	Ziai	17-3	MNHMT2019-4209
Liang	Gangtao	3-2	MNHMT2019-3908	Lu	Gui	4-6	MNHMT2019-4348
Liang	Tao	12-1	MNHMT2019-3925			17-1	MNHMT2019-4199
Liang	Ting	3-1	MNHMT2019-4159	Lu	Hailong	17-3	MNHMT2019-3958
Liang	Yunmin	9-4	MNHMT2019-4029	Lu	Jinli	6-2	MNHMT2019-4036
Lim	Mikyung	5-4	MNHMT2019-4174			12-2	MNHMT2019-4028
Lin	Gen	7-1	MNHMT2019-4288	Lu	Lu	5-4	MNHMT2019-3998
Lin	Guiping	6-2	MNHMT2019-3918	Lu	Ming-Chang	9-1	MNHMT2019-4107
Lin	Huan	12-1	MNHMT2019-3970	Lu	Na	4-1	MNHMT2019-4268
		17-8	MNHMT2019-3981	Lu	Tingyu	9-1	MNHMT2019-4009
		17-8	MNHMT2019-3994	Lu	Yi	17-10	MNHMT2019-4219
Lin	Jian	9-5	MNHMT2019-3905	Lu	Yi-Chun	9-1	MNHMT2019-4073
Lin	Y.J.	17-10	MNHMT2019-4079	Luo	Jia-Li	4-4	MNHMT2019-4208
Lin	Yuansheng	4-3	MNHMT2019-4038	Luo	Minggang	5-4	MNHMT2019-4236
		4-5	MNHMT2019-4039	Luo	Shuting	17-8	MNHMT2019-4078
Lin	Yuhao	11-4	MNHMT2019-3935	Luo	Tengfei	3-1	MNHMT2019-4143
Linsong	Gao	4-6	MNHMT2019-4215			10-2	MNHMT2019-4144
liqun	Du	4-6	MNHMT2019-4215	Luo	Yang	10-1	MNHMT2019-4042
Liu	Baokun	5-3	MNHMT2019-4237	Luo	Yixiu	9-3	MNHMT2019-4365
Liu	Chenhan	9-1	MNHMT2019-4326	Lv	Di	10-1	MNHMT2019-3950
Liu	Chunting	1-5	MNHMT2019-4218	Lv	Fengyong	4-1	MNHMT2019-4264
Liu	Cong	4-1	MNHMT2019-4311	Lv	Jizu	3-3	MNHMT2019-4180
Liu	Hong	11-4	MNHMT2019-3968			4-6	MNHMT2019-4164
		11-5	MNHMT2019-3985			4-6	MNHMT2019-4215
Liu	Huanling	9-6	MNHMT2019-3967			11-1	MNHMT2019-4297
Liu	Jianhong	11-3	MNHMT2019-4012	Lv	Lucang	11-4	MNHMT2019-4115
		11-3	MNHMT2019-4015	Lv	Tong	12-1	MNHMT2019-4037
		11-4	MNHMT2019-4017	Lyu	Shu-Shen	4-4	MNHMT2019-4208
Liu	Jun	9-1	MNHMT2019-4009	Ma	Binjian	3-3	MNHMT2019-4359
Liu	Ke	13-1	MNHMT2019-4351			3-4	MNHMT2019-4361
Liu	Linhua	5-3	MNHMT2019-4237	Ma	Hao	9-6	MNHMT2019-4289
		5-4	MNHMT2019-4236	Ma	Hongbin	4-6	MNHMT2019-3902
Liu	Mucan	17-3	MNHMT2019-4158			11-1	MNHMT2019-4083
Liu	Qiusheng	4-5	MNHMT2019-4163			11-2	MNHMT2019-4086
		11-2	MNHMT2019-4086			12-1	MNHMT2019-3925
Liu	Wei	9-4	MNHMT2019-4029			12-1	MNHMT2019-3970
		17-4	MNHMT2019-4023			12-2	MNHMT2019-3936
Liu	Xianglei	5-3	MNHMT2019-4235			13-2	MNHMT2019-3910
Liu	Yahua	4-1	MNHMT2019-4311			14-1	MNHMT2019-3937

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
		14-1	MNHMT2019-4092
		15-1	MNHMT2019-4318
		15-1	MNHMT2019-4341
		15-1	MNHMT2019-4344
Ma	Jiaxuan	4-5	MNHMT2019-4319
Ma	Liangdong	11-3	MNHMT2019-4304
Ma	Ronghui	13-1	MNHMT2019-4233
Ma	Rui	14-1	MNHMT2019-4119
Ma	Tengxiao	3-3	MNHMT2019-4085
Ma	Weigang	17-7	MNHMT2019-4081
		17-1	MNHMT2019-4048
Ma	Xiang	4-3	MNHMT2019-4038
		4-5	MNHMT2019-4039
Ma	Xuehu	3-2	MNHMT2019-4041
		4-3	MNHMT2019-4332
		4-4	MNHMT2019-4307
		14-1	MNHMT2019-4100
		15-1	MNHMT2019-4341
		17-3	MNHMT2019-4158
Ma	Yongmei	17-3	MNHMT2019-3995
Ma	Yunwei	9-6	MNHMT2019-4289
Ma	Zhuang	6-1	MNHMT2019-4228
Maeda	Yota	4-1	MNHMT2019-4264
Mahmud	Rifat	3-4	MNHMT2019-4276
Mansouri	Abraham	2-1	MNHMT2019-4323
Mao	Peng	9-4	MNHMT2019-4029
Medina	Fabian Javier	9-3	MNHMT2019-4274
Mei	Ning	1-5	MNHMT2019-4214
		7-1	MNHMT2019-4211
Meng	Han	9-4	MNHMT2019-4316
Meng	Jianping	10-3	MNHMT2019-4355
Meng	Kaixin	4-7	MNHMT2019-4294
Meng	Sheng	5-1	MNHMT2019-4334
Messina	Riccardo	5-2	MNHMT2019-4150
Miao	Jiinyin	17-3	MNHMT2019-4142
Miyazaki	Koji	6-1	MNHMT2019-4162
Mo	Dong-chuan	4-4	MNHMT2019-4208
Morshed	A.K.M.	3-4	MNHMT2019-4276
Mou	Linwei	4-3	MNHMT2019-4080
Mu	Kai	17-1	MNHMT2019-4152
Mu	Zhiyu	11-1	MNHMT2019-4192
Muthya	Seetharam Koundinya	4-1	MNHMT2019-4102
Nguyen	Nam-trung	1-6	MNHMT2019-4134
Ni	Zhonghua	1-6	MNHMT2019-4171
Nie	Xianhua	9-4	MNHMT2019-4114
Nikolay	Efimov	11-3	MNHMT2019-4012
Niu	Zhitian	17-5	MNHMT2019-4338

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Omar	Salauddin	4-7	MNHMT2019-4247
Orejon	Daniel	4-1	MNHMT2019-4264
Ott	Annika	5-2	MNHMT2019-4150
Padilla	Jorge	3-4	MNHMT2019-4361
Park	Kyoo-Chul	4-1	MNHMT2019-4191
Peng	Ji	13-2	MNHMT2019-4230
Peng	Wei-Tsu	9-1	MNHMT2019-4107
Pi	Guang	11-5	MNHMT2019-4329
Qi	Chao	17-3	MNHMT2019-4142
Qi	Haitao	1-3	MNHMT2019-4229
Qi	Hong	5-3	MNHMT2019-4197
		17-5	MNHMT2019-4338
Qi	Xin	17-7	MNHMT2019-4081
Qi	Yunshu	7-1	MNHMT2019-4211
Qian	Fang	1-4	MNHMT2019-4130
		6-1	MNHMT2019-4132
Qiang	Liao	4-7	MNHMT2019-4354
Qin	Caiyan	5-1	MNHMT2019-4145
Qin	Kairong	1-2	MNHMT2019-4196
Qin	Zhenpeng	13-1	MNHMT2019-4154
Qinghui	Pan	6-1	MNHMT2019-4221
Qishen	Zhao	6-1	MNHMT2019-4221
Qu	Jian	12-2	MNHMT2019-3976
Qu	Zhiguo	7-1	MNHMT2019-3990
Rahman	Md. Hafijur	4-7	MNHMT2019-4247
Ramos-Alvarado	Bladimir	3-3	MNHMT2019-4283
Rao	Wei	13-2	MNHMT2019-4337
Ren	Shen	13-2	MNHMT2019-4230
Ren	Yatao	5-3	MNHMT2019-4197
		17-5	MNHMT2019-4338
Ren	Yong	1-2	MNHMT2019-4263
Ren	Yukun	1-4	MNHMT2019-4181
Rios	Jaime	11-2	MNHMT2019-3983
Rong	Qingyuan	9-3	MNHMT2019-4363
Rong	Yiming	7-1	MNHMT2019-4288
Ronshin	Fedor	11-4	MNHMT2019-4345
Ruan	Liming	5-3	MNHMT2019-4197
		17-5	MNHMT2019-4338
Ruan	Xiulin	5-1	MNHMT2019-4364
		9-3	MNHMT2019-4365
S	Anitha	2-1	MNHMT2019-4327
Sabbaghi	Payam	5-4	MNHMT2019-4096
Sah	Chandan Kumar	11-2	MNHMT2019-4333
Saini	Shrikant	6-1	MNHMT2019-4162
Sait	Hani	2-2	MNHMT2019-4358
		11-4	MNHMT2019-4357
		14-1	MNHMT2019-4127
Saneie	Navid	4-7	MNHMT2019-3914

Author Index

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER	LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Santhanagopalan	Sunand	6-1	MNHMT2019-4310	Sun	Zhichuan	4-3	MNHMT2019-4038
Sarma	Bhaskarjyoti	3-2	MNHMT2019-4098			4-5	MNHMT2019-4039
Seo	Junyong	5-2	MNHMT2019-4013			10-1	MNHMT2019-4042
Shan	Li	3-3	MNHMT2019-4359	Sun	Zhongping	1-2	MNHMT2019-4196
		3-4	MNHMT2019-4361	Takahashi	Koji	17-8	MNHMT2019-4207
Shang	Fumin	11-3	MNHMT2019-4012	Takata	Yasuyuki	4-1	MNHMT2019-4264
		11-3	MNHMT2019-4015	Tang	Dawei	7-1	MNHMT2019-4186
		11-4	MNHMT2019-4017			9-5	MNHMT2019-4176
Shao	Cheng	9-3	MNHMT2019-4363			9-5	MNHMT2019-4178
Shen	Jiadong	5-3	MNHMT2019-4235			11-1	MNHMT2019-4297
Shen	Kunrong	4-3	MNHMT2019-4038			17-3	MNHMT2019-3995
Shen	Shengqiang	3-2	MNHMT2019-3908	Tang	Dezhi	1-6	MNHMT2019-4171
Shi	Lin	3-3	MNHMT2019-4180	Tang	Hao	9-1	MNHMT2019-4073
Shibahara	Makoto	4-5	MNHMT2019-4163			9-1	MNHMT2019-4326
Shimizu	Makoto	5-3	MNHMT2019-4225	Tang	Liangliang	11-4	MNHMT2019-3969
Shuai	Yong	5-2	MNHMT2019-4147	Tang	Yuanliang	13-1	MNHMT2019-4330
		6-1	MNHMT2019-4221	Tao	Ran	1-3	MNHMT2019-4252
Shuo	Cong	17-10	MNHMT2019-4069			1-5	MNHMT2019-4251
Si	Ting	17-1	MNHMT2019-4152	Tao	Xuan	4-3	MNHMT2019-3920
Sihong	Zhou	6-1	MNHMT2019-4221	Tao	Yanxian	17-3	MNHMT2019-4158
Singh	Manpreet	13-1	MNHMT2019-4233	Tao	Yi	9-1	MNHMT2019-4326
Sirohia	Gaurav	3-2	MNHMT2019-4245			9-3	MNHMT2019-4324
		4-1	MNHMT2019-4006	Tariq	Ammar	11-1	MNHMT2019-4192
Slebodnick	Carla	9-6	MNHMT2019-4289	Taylor	Sydney	5-1	MNHMT2019-4095
Smith	Rick	4-3	MNHMT2019-4044	Teng	Zecheng	4-4	MNHMT2019-4027
Solomon	Abel	3-4	MNHMT2019-4361	Thompson	Scott	12-2	MNHMT2019-3976
Song	Dongxing	17-1	MNHMT2019-4048	Tian	Bohan	12-1	MNHMT2019-3970
Song	He	12-1	MNHMT2019-3925			12-2	MNHMT2019-3936
Song	Jaeman	5-4	MNHMT2019-4174	Tian	Daogui	4-4	MNHMT2019-4298
Song	JinLin	5-4	MNHMT2019-3998	Tian	Maocheng	11-4	MNHMT2019-3969
Song	Jinlong	17-3	MNHMT2019-4209			17-4	MNHMT2019-4300
Song	Y.D.	4-4	MNHMT2019-4027	Tian	Xiaowei	17-1	MNHMT2019-3952
Song	Yongchen	12-1	MNHMT2019-4256	Tian	Zhiting	9-6	MNHMT2019-4289
Song	Yuansheng	11-5	MNHMT2019-4279	Tong	Albert Y	10-3	MNHMT2019-4239
Stolik	Lis	9-3	MNHMT2019-4274	Tong	Junyu	17-1	MNHMT2019-4193
Su	Fengmin	11-1	MNHMT2019-4083	Tong	Zhen	9-5	MNHMT2019-4362
		12-1	MNHMT2019-3970	Tu	Jiyue	1-5	MNHMT2019-4059
		13-2	MNHMT2019-3910	Turkman	Nadim	14-1	MNHMT2019-4127
Su	Yan	10-3	MNHMT2019-3901	Urban	Jeffrey	9-6	MNHMT2019-4289
Sun	Fangyuan	17-8	MNHMT2019-3919	Vafai	Kambiz	11-2	MNHMT2019-4312
		17-3	MNHMT2019-3995	Vasco	Diego	2-2	MNHMT2019-3979
Sun	Jiaqi	11-1	MNHMT2019-4031			2-2	MNHMT2019-3980
Sun	Jiashu	1-6	MNHMT2019-4255	Villaroman	Daniel Jose- phus	10-2	MNHMT2019-4136
Sun	Liyong	11-5	MNHMT2019-3903	Walsh	Tiffany	9-4	MNHMT2019-4316
Sun	Qin	12-2	MNHMT2019-3976	Wan	Wei	4-5	MNHMT2019-4328
Sun	Zhehao	7-1	MNHMT2019-4186	Wan	Xiao	9-4	MNHMT2019-4316
		9-5	MNHMT2019-4176	Wang	Bo	1-2	MNHMT2019-4224
		9-5	MNHMT2019-4178				

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER	LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Wang	Boxiang	5-3	MNHMT2019-4002	Wang	Yueping	13-1	MNHMT2019-4330
Wang	Changliang	11-4	MNHMT2019-3969	Wang	Zhenying	11-5	MNHMT2019-4242
Wang	Chenfei	2-2	MNHMT2019-4198	Wang	Zhiyong	12-2	MNHMT2019-3936
Wang	Cheng	1-4	MNHMT2019-4153	Wang	Zongyu	14-1	MNHMT2019-3937
Wang	Evelyn	17-4	MNHMT2019-4293			15-1	MNHMT2019-4344
Wang	Hai	12-2	MNHMT2019-3976	Wang	Zuankai	4-4	MNHMT2019-4307
		15-1	MNHMT2019-4318	Wei	Jiang	17-10	MNHMT2019-4052
Wang	Haidong	9-6	MNHMT2019-3939	Wei	Min	11-4	MNHMT2019-3969
		17-8	MNHMT2019-4071	Wei	Yiang	1-4	MNHMT2019-4202
		17-8	MNHMT2019-4078	Wen	Dongsheng	6-2	MNHMT2019-3918
Wang	Hao	4-7	MNHMT2019-4294			17-4	MNHMT2019-3916
		10-3	MNHMT2019-4371	Wen	Rongfu	4-2	MNHMT2019-4109
		17-3	MNHMT2019-3958	Wen	Zhou	17-10	MNHMT2019-4052
Wang	Heng	9-6	MNHMT2019-4289	Wong	Teck Neng	1-3	MNHMT2019-3943
Wang	Hong	4-7	MNHMT2019-4354	Wu	Chao	9-1	MNHMT2019-4326
Wang	Jian	17-1	MNHMT2019-4187	Wu	Hao	17-8	MNHMT2019-3915
Wang	Jinguo	17-8	MNHMT2019-3919	Wu	Haotian	3-4	MNHMT2019-4361
Wang	Jingyang	9-3	MNHMT2019-4365	Wu	Huiying	11-1	MNHMT2019-4192
Wang	Jun	3-4	MNHMT2019-4246	Wu	Jie	10-1	MNHMT2019-4042
Wang	JunSheng	1-5	MNHMT2019-4203			17-1	MNHMT2019-4187
Wang	Liang	9-3	MNHMT2019-3911	Wu	Jie J	17-1	MNHMT2019-4193
Wang	Liping	5-1	MNHMT2019-4095	Wu	Jinbo	1-2	MNHMT2019-4112
		5-1	MNHMT2019-4281	Wu	Xiaohu	5-4	MNHMT2019-4160
		5-4	MNHMT2019-4096	Wu	Xiaoyu	11-2	MNHMT2019-4033
Wang	Liqu	7-1	MNHMT2019-4018	Wu	Xu	1-6	MNHMT2019-4133
		17-1	MNHMT2019-3952	Wu	Xuewang	9-3	MNHMT2019-4274
Wang	Peng	2-2	MNHMT2019-4198	Wu	Xufei	10-2	MNHMT2019-4144
		11-3	MNHMT2019-4304	Wu	Zheng-wei	1-4	MNHMT2019-4120
Wang	Qi	10-2	MNHMT2019-4136	Xi	Xi	11-4	MNHMT2019-3968
Wang	Qingyang	4-4	MNHMT2019-4190			11-5	MNHMT2019-3985
Wang	Qiuwang	1-4	MNHMT2019-4130	Xia	Guodong	3-4	MNHMT2019-4246
		6-1	MNHMT2019-4132	Xia	Yongfang	11-3	MNHMT2019-4270
		11-5	MNHMT2019-4279	Xia	Yuxin	12-1	MNHMT2019-3925
Wang	Sien	6-1	MNHMT2019-4248	Xianfeng	Ma	11-1	MNHMT2019-4155
Wang	Wen	17-3	MNHMT2019-4032	Xiang	Nan	1-6	MNHMT2019-4171
		17-3	MNHMT2019-4142	Xiao	Xiu	11-4	MNHMT2019-4213
Wang	Xiaodong	4-7	MNHMT2019-4313	Xiao	Yue	6-1	MNHMT2019-4248
		17-1	MNHMT2019-4199			9-4	MNHMT2019-4265
Wang	Xiaojia	3-1	MNHMT2019-4070	Xiaozhong	Wang	11-1	MNHMT2019-4155
		9-6	MNHMT2019-3971			11-1	MNHMT2019-4156
		9-3	MNHMT2019-4274	Xie	Jian	10-2	MNHMT2019-4372
Wang	Xinwei	17-10	MNHMT2019-4061	Xing	Lu	1-5	MNHMT2019-4059
Wang	Xitao	17-8	MNHMT2019-3919	Xing	Yunfei	17-10	MNHMT2019-4004
Wang	Xueliang	7-1	MNHMT2019-3990	Xiong	Yucheng	9-1	MNHMT2019-4073
Wang	Xueying	1-4	MNHMT2019-4202	Xu	Dongchao	6-1	MNHMT2019-4248
Wang	Ya Qiao	4-4	MNHMT2019-4208			9-3	MNHMT2019-4274
Wang	Yanning	17-1	MNHMT2019-4035	Xu	Dongyan	9-1	MNHMT2019-4073
Wang	Yaping	7-1	MNHMT2019-3990	Xu	He	13-2	MNHMT2019-3910

Author Index

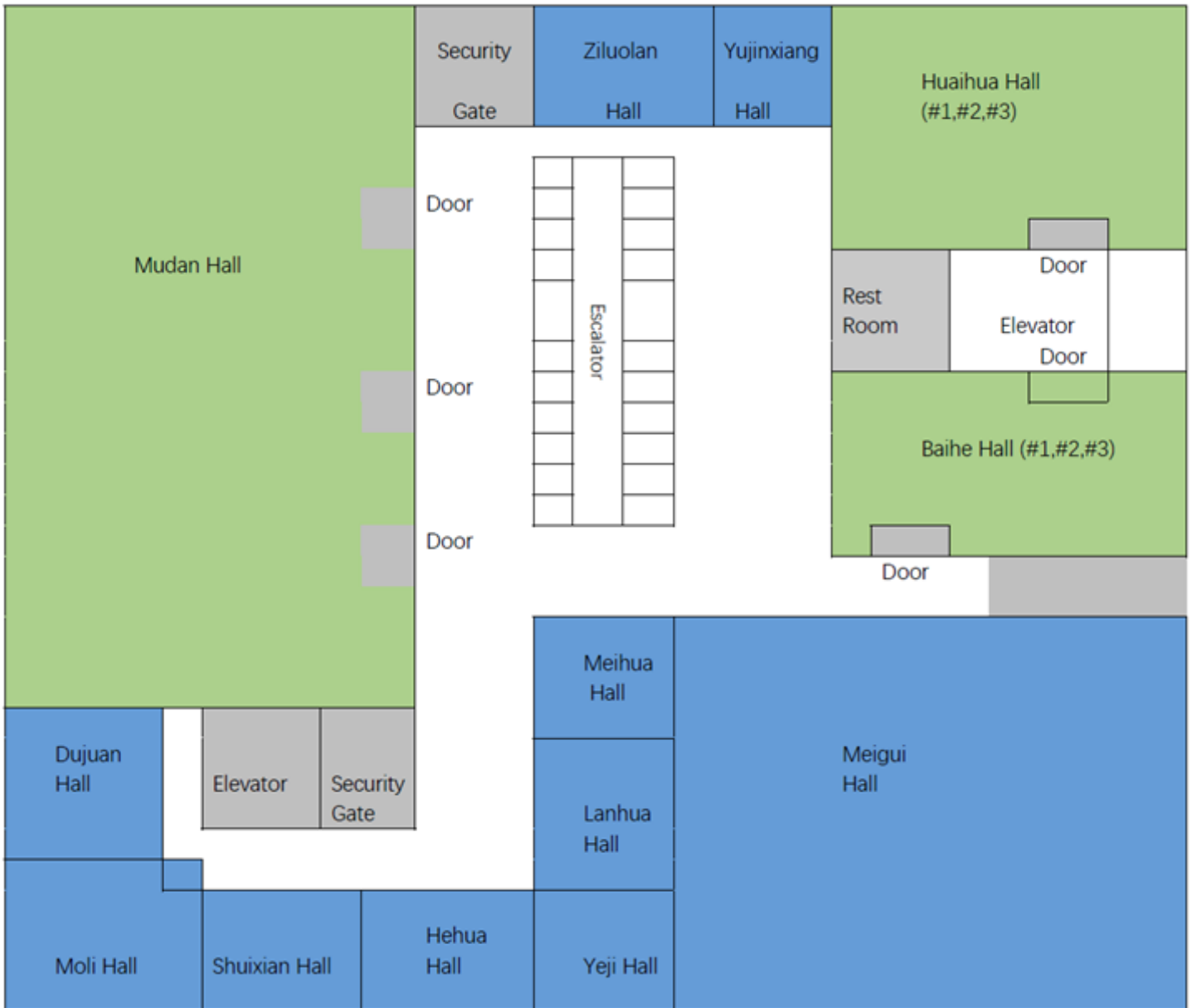
LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER	LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Xu	Huanying	1-3	MNHMT2019-4229	Yang	Zhangcan	10-1	MNHMT2019-3947
Xu	Huijin	11-2	MNHMT2019-4312	yang	zheng	9-3	MNHMT2019-3911
Xu	Jiajun	11-2	MNHMT2019-3983	Yao	S.G.	4-4	MNHMT2019-4027
Xu	Jiantong	11-1	MNHMT2019-4083	Yao	Shuhuai	4-2	MNHMT2019-4284
Xu	Jinliang	3-4	MNHMT2019-4217	Yao	Wenlong	7-1	MNHMT2019-4211
		12-2	MNHMT2019-4317	Ye	Hong	5-1	MNHMT2019-4257
Xu	Jiujun	12-2	MNHMT2019-3936	Ye	Ting	10-2	MNHMT2019-4121
Xu	Jun	2-1	MNHMT2019-4049	Ye	Wenjing	9-4	MNHMT2019-4138
Xu	Ruina	3-3	MNHMT2019-4320			10-2	MNHMT2019-4136
		17-10	MNHMT2019-4051	Yin	Xunyan	4-6	MNHMT2019-4164
Xu	Shen	11-2	MNHMT2019-4033	Ying	Xiaoyan	5-1	MNHMT2019-4095
		17-10	MNHMT2019-4061	Yoon	Sungmin	11-3	MNHMT2019-4304
Xu	XiaoYing	17-3	MNHMT2019-4032	You	Yu	1-4	MNHMT2019-4202
Xu	Yi	13-1	MNHMT2019-4351	Yu	Aimei	6-2	MNHMT2019-4014
		17-11	MNHMT2019-4350	Yu	Chunrong	14-1	MNHMT2019-3937
Xu	Zhenyuan	17-4	MNHMT2019-4293			14-1	MNHMT2019-4092
Xue	Chundong	1-2	MNHMT2019-4196			15-1	MNHMT2019-4344
Xueling	Zheng	11-1	MNHMT2019-4155	Yu	Haibing	3-2	MNHMT2019-3908
Yabuki	Tomohide	6-1	MNHMT2019-4162	Yu	Huiwen	14-1	MNHMT2019-4100
Yalong	Lu	17-8	MNHMT2019-3917	Yu	Jincai	9-4	MNHMT2019-4138
		17-10	MNHMT2019-4007			10-2	MNHMT2019-4136
Yan	Chunji	11-4	MNHMT2019-4213	Yu	XiaoMei	1-5	MNHMT2019-4203
Yan	Huilong	11-1	MNHMT2019-4083	Yuan	Han	1-5	MNHMT2019-4214
Yan	Jie	10-3	MNHMT2019-4025	Yuan	Jianping	12-2	MNHMT2019-3976
Yan	Run	4-2	MNHMT2019-3982	Yuan	Kunpeng	7-1	MNHMT2019-4186
Yang	Bao	6-1	MNHMT2019-4099			9-5	MNHMT2019-4176
Yang	Chun	2-1	MNHMT2019-4286			9-5	MNHMT2019-4178
Yang	Cong	9-1	MNHMT2019-4009	Yuan	Peng	3-1	MNHMT2019-4159
Yang	Deming	12-2	MNHMT2019-3936	Yue	Kai	1-4	MNHMT2019-4202
Yang	Haie	17-2	MNHMT2019-3913	Yue	Yanan	17-8	MNHMT2019-3915
Yang	Jian	11-5	MNHMT2019-4279	Yugami	Hiroo	5-3	MNHMT2019-4225
Yang	Juekuan	3-1	MNHMT2019-4090	Zeng	Kecheng	17-10	MNHMT2019-4051
		9-1	MNHMT2019-4326	Zhai	Siping	3-1	MNHMT2019-4159
Yang	Lin	3-1	MNHMT2019-4091	Zhan	Taijie	17-11	MNHMT2019-4350
		9-1	MNHMT2019-4089	Zhang	Bin	9-6	MNHMT2019-3967
Yang	Nuo	9-4	MNHMT2019-4316			10-1	MNHMT2019-4375
Yang	Qingjing	11-4	MNHMT2019-4017	Zhang	Bo	9-4	MNHMT2019-4029
Yang	Ronggui	4-2	MNHMT2019-4109	Zhang	Chi	9-5	MNHMT2019-3905
Yang	Shuo	14-1	MNHMT2019-4119	Zhang	Chun	17-7	MNHMT2019-4081
Yang	Siyan	17-3	MNHMT2019-4158	Zhang	Guang	17-7	MNHMT2019-4081
Yang	Soung-hyeok	5-2	MNHMT2019-4013	Zhang	Guang	17-3	MNHMT2019-3962
Yang	Tianhang	13-2	MNHMT2019-4230	Zhang	Guanmin	11-4	MNHMT2019-3969
Yang	Tingting	17-11	MNHMT2019-4350	Zhang	Hailong	17-8	MNHMT2019-3919
Yang	Xiao	9-3	MNHMT2019-3911	Zhang	Hanfei	6-1	MNHMT2019-4310
Yang	Xiaogang	1-2	MNHMT2019-4263	Zhang	Haochun	6-1	MNHMT2019-4228
Yang	Xiaolong	5-1	MNHMT2019-4364	Zhang	Hengyun	11-2	MNHMT2019-4033
		9-3	MNHMT2019-4365	Zhang	Hongna	1-2	MNHMT2019-4249
Yang	Yue	5-1	MNHMT2019-4334	Zhang	Hongxing	17-3	MNHMT2019-4142

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Zhang	Hui	2-1	MNHMT2019-4286
Zhang	Jian	17-1	MNHMT2019-4187
Zhang	Jianlun	17-8	MNHMT2019-3981
		17-8	MNHMT2019-3994
Zhang	Jiapei	10-1	MNHMT2019-3947
Zhang	Jiayi	4-3	MNHMT2019-4080
Zhang	Jie	1-4	MNHMT2019-4153
Zhang	Jingzhi	10-1	MNHMT2019-3950
		10-1	MNHMT2019-4042
		11-4	MNHMT2019-3969
Zhang	Jun	1-6	MNHMT2019-4134
Zhang	Lenan	17-4	MNHMT2019-4293
Zhang	Longyan	3-4	MNHMT2019-4217
Zhang	Meng	1-4	MNHMT2019-4120
Zhang	Peng	4-1	MNHMT2019-4264
Zhang	Ping	3-1	MNHMT2019-4159
Zhang	Qian	3-1	MNHMT2019-4091
Zhang	Qian	9-1	MNHMT2019-4089
Zhang	Tao	17-1	MNHMT2019-4193
Zhang	Tianyu	4-3	MNHMT2019-4080
zhang	Tiejun	10-2	MNHMT2019-4369
Zhang	Weilong	11-4	MNHMT2019-3968
		11-5	MNHMT2019-3985
Zhang	Wenjing	4-7	MNHMT2019-4340
		17-5	MNHMT2019-4124
Zhang	Wenwen	17-5	MNHMT2019-4338
Zhang	Wenyao	1-4	MNHMT2019-4130
		6-1	MNHMT2019-4132
Zhang	Wu	1-4	MNHMT2019-4120
Zhang	Xiang	4-4	MNHMT2019-4298
Zhang	Xiaoliang	7-1	MNHMT2019-4186
		9-5	MNHMT2019-4176
		9-5	MNHMT2019-4178
		11-1	MNHMT2019-4297
Zhang	Xing	9-6	MNHMT2019-3939
		17-7	MNHMT2019-4081
		17-1	MNHMT2019-4048
		17-8	MNHMT2019-4071
		17-8	MNHMT2019-4078
Zhang	Xinrong	11-1	MNHMT2019-4031
Zhang	Xinxin	1-4	MNHMT2019-4202
Zhang	Xinyu	17-10	MNHMT2019-4004
Zhang	Yi	12-1	MNHMT2019-4256
Zhang	Yin	7-1	MNHMT2019-4122
Zhang	Yue	9-4	MNHMT2019-4114
Zhang	Yufei	4-4	MNHMT2019-4307
		17-3	MNHMT2019-4158
Zhang	Yufeng	17-8	MNHMT2019-4071

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Zhang	Yuwen	7-1	MNHMT2019-4288
Zhang	Zhengjiang	10-1	MNHMT2019-4042
		11-4	MNHMT2019-3935
Zhang	Zhengjiang	15-1	MNHMT2019-4262
Zhang	Zhuomin	5-4	MNHMT2019-4160
Zhao	Chang	2-1	MNHMT2019-3965
		2-2	MNHMT2019-4339
Zhao	Changying	5-3	MNHMT2019-4002
		5-2	MNHMT2019-4259
		11-2	MNHMT2019-4312
Zhao	Changzhong	12-1	MNHMT2019-4256
Zhao	Cunlu	1-4	MNHMT2019-4130
		6-1	MNHMT2019-4132
Zhao	Junming	5-3	MNHMT2019-4237
		5-4	MNHMT2019-4236
Zhao	Li	9-4	MNHMT2019-4114
Zhao	Liang	1-6	MNHMT2019-4133
Zhao	Nannan	12-1	MNHMT2019-3970
		12-2	MNHMT2019-3936
		13-2	MNHMT2019-3910
Zhao	Weilin	2-1	MNHMT2019-4049
Zhao	Yang	3-1	MNHMT2019-4090
		3-1	MNHMT2019-4091
		9-1	MNHMT2019-4089
Zhao	Yi	17-5	MNHMT2019-4124
Zhao	Zhi	1-6	MNHMT2019-4133
Zhao	Zhongxi	12-1	MNHMT2019-3925
Zhe	Jiang	1-6	MNHMT2019-4133
Zheng	Boren	12-1	MNHMT2019-4037
Zheng	Chaolun	6-1	MNHMT2019-4099
Zheng	Kun	17-3	MNHMT2019-3995
Zheng	Xinghua	9-3	MNHMT2019-3911
Zheng	Yi	3-2	MNHMT2019-4041
		4-3	MNHMT2019-4332
Zheng	Zhiying	1-4	MNHMT2019-4120
Zhong	Dawen	4-4	MNHMT2019-4298
Zhong	Fengquan	17-10	MNHMT2019-4004
Zhongcheng	Wang	11-1	MNHMT2019-4155
		11-1	MNHMT2019-4156
Zhou	Jun	11-5	MNHMT2019-3903
Zhou	Kan	7-1	MNHMT2019-3934
		11-4	MNHMT2019-3935
		15-1	MNHMT2019-4262
Zhou	Kun	5-4	MNHMT2019-3998
Zhou	Leping	3-3	MNHMT2019-4085
		10-3	MNHMT2019-4087
Zhou	Man	3-1	MNHMT2019-4159
Zhou	Teng	1-3	MNHMT2019-4113

Author Index

LAST NAME	FIRST NAME	SESSION #	PAPER NUMBER
Zhou	Zhou Junjie	17-10	MNHMT2019-4007
Zhu	Hua	11-4	MNHMT2019-3935
		15-1	MNHMT2019-4262
Zhu	Jianqin	10-1	MNHMT2019-4376
Zhu	Jie	17-3	MNHMT2019-3995
Zhu	Liang	13-1	MNHMT2019-4233
Zhu	Mengnan	1-5	MNHMT2019-4059
Zhu	Pingan	7-1	MNHMT2019-4018
Zhu	Qunzhi	5-3	MNHMT2019-4244
Zhu	Tong	2-1	MNHMT2019-3965
Zhu	Xun	4-7	MNHMT2019-4354
Zhu	Yonggang	5-1	MNHMT2019-4334
Zhu	Z.H.	11-2	MNHMT2019-4033
Zou	Quan	6-1	MNHMT2019-4228





ASME[®] 2019 MNHMT

