ACTS 2024

The Third Asian Conference on Thermal Sciences

Conference Program

Shanghai, China

June 23-27, 2024

Table of Contents

Welcome Message

First of all, on behalf of Organizing Committee, we would like to extend our warmest welcome to all of you to the third Asian Conference on Thermal Sciences (ACTS 2024), taking place during June 23 - 27, 2024. To promote scientific interactions among Asian researchers, scientists and practitioners working in the area of thermal sciences and engineering, a regional networking system, AUTSE, was established in November of 2015. AUTSE has decided to launch a new series of conference, ACTS. The first ACTS was organized by the Thermal Engineering Division (TED) of Korean Society of Mechanical Engineers (KSME) and co-organized by Heat Transfer Society of Japan (HTSJ) and Heat and Mass Transfer Society of China (HMTSC). The second ACTS was organized by the HTSJ and co-organized by the HMTSC and the TED of KSME. The third ACTS (this time) was organized by Chinese Society of Engineering Thermophysics and co-organized by HTSJ, KSME, Australasian Fluid and Thermal Engineering Society and Indian Society for Heat and Mass Transfer.

We would like to express our thanks to the members of International Scientific Committee, and Local Organizing Committee. Without their dedication and efforts, this conference would not have been made possible. The main objective of ACTS 2024 is to bring together researchers, scientists, and engineers from Asia and also other part of the world for sharing the most recent advances and exciting research outcomes in thermal sciences. More than 850 participants from 16 countries will attend the conference. There will be a total of 625 presentations consisting of 8 plenary lectures, 5 award lectures, 2 panel discussions and 45 keynote lectures by distinguished speakers at the leading edge of their specific fields. In particular, in this ACTS 2024, we will organize two panel discussions: Panel 1 The role of thermal sciences on carbon neutrality, and Panel 2 Thermal sciences and AI. Our hope is that these panels will inspire new ideas, shape ways of thinking, and lead to revolutionary innovations for all researchers in thermal sciences. Over the next few days, we will engage in a robust exchange of ideas, showcase groundbreaking research, and explore new avenues for collaboration.

Besides, we would like you to enjoy this journey in Shanghai. Shanghai, one of the China's largest and most prosperous cities, exudes an atmosphere of self-confidence and vitality. Hope you enjoy the prosperity, history culture and cuisine here. We have provided several tour routes for you.

Once again, a warm welcome to all our distinguished guests. I look forward to meeting all of you and engaging in the meaning discussions which will shape the future of thermal sciences research. Thank you for your presence and your commitment to our shared goals. I wish you all a productive and enlightening conference in Shanghai.

Chang-Ying Zhao
Chair

Naoki Shikazono
Co-Chair

Ji Hwan Jeong
Co-Chair

Message from AUTSE President

The Asian Union of Thermal Science and Engineering (AUTSE), established in November 2015, aims to foster collaboration and knowledge exchange among researchers, scientists, and practitioners in the field of thermal sciences and engineering across Asia. Since its establishment, the AUTSE has been growing steadily for nine years. The AUTSE members, which initially started with China, Korea and Japan, have increased to eight countries/regions by joining with India, Chinese Taipei, Australia, Singapore and United Arab Emirates in turn. The United Arab Emirates joined in April 2024, becoming the eighth member. In line with the mission of forming a network within Asian Heat Transfer Community and exchange information between participating countries/regions, AUTSE initiated the ACTS conference series, successfully holding the first conference in Jeju, Korea in 2017 and the second in Fukuoka, Japan in 2021. And the third Asian Conference on Thermal Sciences (ACTS 2024) takes place during June 23 - 27, 2024 in Shanghai, China

As we well know, thermal science is one of the key disciplines for solving energy problems and environmental pollution by improving our energy utilization efficiency. It also plays a crucial role in addressing global challenges related to carbon reduction and carbon neutrality. Our commitment to creating a low-carbon future has led to great progress in emerging research areas, such as renewable energy systems, energy storage, thermal management in the digital information industry, and thermal protection under extreme conditions. It is indeed a great pleasure for us to gather in Shanghai to participate in this intelligent and enthusiastic international event, and to discuss and exchange cutting-edge progress and latest achievements in the field of thermal sciences.

I am pleased to note the interdisciplinary integration and expansion of thermal sciences, extending beyond the traditional thermal sciences to include areas like AI, bio and medical applications, materials science, electronics, or carbon capture, utilization and storage. We are always open to engaging in brainstorming sessions and exchanging ideas with other disciplines. I hope this conference will facilitate communication channels between senior, mid-career, and young scholars, as well as graduate and advanced undergraduate students.

On behalf of the Asian Union of Thermal Science and Engineering, I would like to express my sincere thanks to conference organizers and committee members for their great efforts in preparation and operation of the conference. I would also like to sincerely thank all the guests and attendees for your attention and support to this conference. I hope that this academic conference can become a platform for academic exchange and cooperation, promoting in-depth dialogue and cooperation between academia and industry, and jointly promoting the development and application of thermal sciences. I wish this conference a great success and I hope that all of you here will have a very profitable conference and a pleasant stay in Shanghai!

Xing Zhang
President of AUTSE

Organizing Committees

Conference Chairs

Chair

Chang-Ying Zhao	Shanghai Jiao Tong University

Co-chairs

Naoki Shikazono	The University of Tokyo	Ji Hwan Jeong	Pusan National University

International Scientific Committee

Takuto Araki	Yokohama National University
Tatsunori Asaoka	Shinshu University
Yildiz Bayazitoglu	Rice University
Gautam Biswas	Indian Institute of Technology Kanpur
Bingyang Cao	Tsinghua University
Young Soo Chang	Kookmin University
Haisheng Chen	Institute of Engineering Thermophysics, Chinese Academy of Sciences
Shohei Chiashi	Tokyo University
Honghyun Cho	Chosun University
Jae Dong Chung	Sejong University
Pedro Coelho	University of Lisbon
Leonid Dombrovsky	Joint Institute for High Temperatures of the Russian Academy of Sciences
Liejin Guo	Xi'an Jiaotong University
Katsunori Hanamura	Tokyo Institute of Technology
Jun Hayashi	Kyoto University
Yaling He	Xi'an Jiaotong University
Tomoya Houra	Nagoya Institute of Technology
Shuhei Inoue	Kindai University
Hiroshi Iwai	Kyoto University
Ji Hwan Jeong	Pusan National University
Peixue Jiang	Tsinghua University
Hongguang Jin	Institute of Engineering Thermophysics, Chinese Academy of Sciences
Hyunchul Ju	Inha University
Yong Tae Kang	Korea University
Tassos Karayiannis	Brunel University London
Gota Kikugawa	Tohoku University
Hyun Jung Kim	Ajou University
Min Soo Kim	Seoul National University
Minsung Kim	Chung-Ang University
Sung Jin Kim	Korea Advanced Institute of Science and Technology
Taesung Kim	Sungkyunkwan University
Ikuya Kinefuchi	Tokyo University
Masamichi Kohno	Kyushu University
Atsuki Komiya	Tohoku University
Bong Jae Lee	Korea Advanced Institute of Science and Technology
Hyunjin Lee	Kookmin University
Jaeseon Lee	Ulsan National Institute of Science and Technology
Jungho Lee	Ajou University
Seong Hyuk Lee	Chung-Ang University
Chengwang Lei	The University of Sydney
Qiang Li	Nanjing University of Science and Technology
Xiaosen Li	Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences

Qiang Liao	Chongqing University
Jing Liu	Technical Institute of Physics and Chemistry, Chinese Academy of Sciences
Linhua Liu	Shandong University
Wei Liu	Huazhong University of Science and Technology
Kaihong Luo	University College London
Mengüç M. Pinar	Özyeğin University
Josua Meyer	Stellenbosch University
Stathis Michaelides	Texas Christian University
Koji Miyazaki	Kyushu Institute of Technolog
Michael Modest	The University of California, Merced
Shoji Mori	Kyushu University
Yoichi Murakami	Tokyo Institute of University
Hosei Nagano	Nagoya University
Taku Ohara	Tohoku University
Chan Woo Park	Jeonbuk National University
Hyung Gyu Park	Pohang University of Science and Technology
Laurent Pilon	University of California at Los Angeles
Vish Prasad	University of North Texas
Takushi Saito	Tokyo Institute of Technology
Atsushi Sakurai	Niigata University
Khellil Sefiane	The University of Edinburgh
Daisuke Shimokuri	Hiroshima University
Jeeyoung Shin	Sookmyung Women's University
Yong Shuai	Harbin Institute of Technology
Dong Keun Song	Korea Institute of Machinery and Materials
Soonho Song	Yonsei University
Yongchen Song	Dalian University of Technology
Aldo Steinfeld	Eidgenössische Technische Hochschule Zürich
Janusz S. Szmyd	AGH University of Science and Technology, Krakow
Yutaka Tabe	Hokkaido University
Mamoru Tanahashi	Tokyo Institute of Technology
Dawei Tang	Dalian University of Technology
Kazuya Tatsumi	Kyoto University
Shohji Tsushima	Osaka University
Kambiz Vafai	The University of California, Riverside
Qiuwang Wang	Xi'an Jiaotong University
Ruzhu Wang	Shanghai Jiao Tong University
Zuankai Wang	The Hong Kong Polytechnic University
Dongsheng Wen	Technical University of Munich
Huaqing Xie	Shanghai Polytechnic University
Yimin Xuan	Nanjing University of Aeronautics and Astronautics
Charles Chun Yang	Nanyang Technological University
Yongping Yang	North China Electric Power University
Seok Ho Yoon	Korea Institute of Machinery and Materials
Sangseok Yu	Chungnam National University
Lizhi Zhang	South China University of Technology
Xing Zhang	Tsinghua University
Xinxin Zhang	University of Science and Technology Beijing
Yinping Zhang	Tsinghua University
Chang-Ying Zhao	Shanghai Jiao Tong University
Tianshou Zhao	Southern University of Science and Technology
Huaichun Zhou	China University of Mining and Technology

Local Organizing Committee

Chair

Chang-Ying Zhao	Shanghai Jiao Tong University

Secretary General

Weigang Ma	Tsinghua University
Boxiang Wang	Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences / Shanghai Jiao Tong University

Members

Hua Bao	Shanghai Jiao Tong University
Weiwei Cai	Shanghai Jiao Tong University
Li Chen	Xi'an Jiaotong University
Aoran Fan	Tsinghua University
Liwu Fan	Zhejiang University
Qian Fu	Chongqing University
Shuai Gong	Shanghai Jiao Tong University
Xiaokun Gu	Shanghai Jiao Tong University
Yulian He	Shanghai Jiao Tong University
Run Hu	Huazhong University of Science and Technology
Shenghong Ju	Shanghai Jiao Tong University
Mingjia Li	Beijing Institute of Technology
Shangchao Lin	Shanghai Jiao Tong University
Mengqi Liu	Shanghai Jiao Tong University
Xianglei Liu	Nanjing University of Aeronautics and Astronautics
Xiaoshi Qian	Shanghai Jiao Tong University
Zhonghao Rao	Hebei University of Technology
Tao Ren	Shanghai Jiao Tong University
Bai Song	Peking University
Qian Wang	Shanghai Jiao Tong University
Rui Wu	Shanghai Jiao Tong University
Chao Xu	North China Electric Power University
Zhenyuan Xu	Shanghai Jiao Tong University
Jun Yan	Shanghai Jiao Tong University
Jiayue Yang	Shandong University
Wei Yu	Shanghai Polytechnic University
Yaoxin Zhang	Shanghai Jiao Tong Univerisity
Junming Zhao	Harbin Institute of Technology

Track Organizers

Track 01: Bio and Medical Applications			
Bin Chen	Xi'an Jiaotong University	Wei Li	Zhejiang University
Atsuki Komiya	Tohoku Univerisity		
Track 02: Boiling, Evaporation and Condensation			
Shoji Mori	Kyushu University	Hao Wang	Peking University
Youngsuk Nam	Korea Advanced Institute of Science and Technology		
Track 03: Carbon Capture, Utilization and Storage			
Jongsup Hong	Yonsei University	Ruina Xu	Tsinghua University
Yutaka Tabe	Hokkaido University		
Track 04: Combustion			
Hyungrok Do	Seoul National University	Kun Luo	Zhejiang University
Jun Hayashi	Kyoto University		
Track 05: Computational Methods and Simulations			
Tomoya Houra	Nagoya Institute of Technology	Guihua Tang	Xi'an Jiaotong University
Seong Hyuk Lee	Chung-Ang University		
Track 06: Conduction			
Jungwan Cho	Sungkyunkwan University	Takushi Saito	Tokyo Institute of Technology
Yanhui Feng	University of Science and Technology Beijing		
Track 07: Convective Heat Transfer			
Rong Chen	Chongqing University	Kazuya Tatsumi	Kyoto University
Chan Woo Park	Jeonbuk National University		
Track 08: Electronic Cooling and Thermal Management			
Hyoungsoon Lee	Chung-Ang University	Hosei Nagano	Nagoya University
Zhichun Liu	Huazhong University of Science and Technology		
Track 09: Energy Storage			
Minsung Kim	Chung-Ang University	Shohji Tsushima	Osaka University
Qibin Liu	Institute of Engineering Thermophysics, Chinese Academy of Sciences		
Track 10: Heat Exchangers and Industrial Applications			
Gota Kikugawa	Tohoku University	Zhiguo Qu	Xi'an Jiaotong University
Jaeseon Lee	Ulsan National Institute of Science and Technology		
Track 11: Melting and Solidification			
Tatsunori Asaoka	Shinshu University	Haiwang Li	Beihang University
Li Chen	Xi'an Jiaotong University		

Track 12: Metamaterial and Thermoelectric Devices			
Hyungyu Jin	Pohang University of Science and Technology	Yong Shuai	Harbin Institute of Technology
Yoichi Murakami	Tokyo Institute of Technology		
Track 13: Heat Exchangers and Industrial Applications			
Shohei Chiashi	The University of Tokyo	Junming Zhao	Harbin Institute of Technology
Daesho Lee	Gachon University		
Track 14: Multiphase Flow			
Ikuya Kinefuchi	The University of Tokyo	Youjun Lv	Xi'an Jiaotong University
Sung Min Kim	Sungkyunkwan University		
Track 15: Nuclear Energy			
Hanyang Gu	Shanghai Jiao Tong University	Dong In Yu	Pukyoung National University
Tomio Okawa	University of Electro-Communications		
Track 16: Porous Media			
Hiroshi Iwai	Kyoto University	Moran Wang	Tsinghua University
Hyung Gyu Park	Pohang University of Science and Technology		
Track 17: Refrigeration and Cryogenics			
Honghyun Cho	Chosun University	Liwei Wang	Shanghai Jiao Tong University
Naoki Shikazono	The University of Tokyo		
Track 18: Solar/Renewable Energy			
Shuhei Inoue	Kindai University	Hyunjin Lee	Kookmin University
Kui Jiao	Tianjin University	Mingjia Li	Beijing Institute of Technology
Track 19: Thermal Radiation			
Bong Jae Lee	Korea Advanced Institute of Science and Technology	Atsushi Sakurai	Niigata University
Xianglei Liu	Nanjing University of Aeronautics and Astronautics		
Boxiang Wang	Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences / Shanghai Jiao Tong University		
Track 20: Thermocatalysis, Thermochemistry, and Energy Conversion			
Takuto Araki	Yokohama National University	Sangseok Yu	Chungnam National University
Chao Xu	North China Electric Power University		
Track 21: Heat Exchangers and Industrial Applications			
Masamichi Kohno	Kyushu University	Dong-Wook Oh	Chosun University
Weigang Ma	Tsinghua University		

About AUTSE

Asia has a lot of emerging countries and regions that are winning recognition in the world heat transfer community. To enhance more scientific interactions among Asian researchers, scientists, engineers, and practitioners working in the area of heat transfer, the regional international association, Asian Union of Thermal Sciences and Engineering (AUTSE), was established in November 2015.

AUTSE initiated the ACTS conference series, successfully holding the first conference in Jeju, Korea in 2017 and the second in Fukuoka, Japan in 2021. And the third Asian Conference on Thermal Sciences (ACTS 2024) takes place during June 23 - 27, 2024 in Shanghai, China. The third ACTS was organized by Chinese Society of Engineering Thermophysics and co-organized by Heat Transfer Society of Japan, Korean Society of Mechanical Engineers, Australasian Fluid and Thermal Engineering Society and Indian Society for Heat and Mass Transfer.

AUTSE Committees

Executive Board Members

Xing Zhang	Tsinghua University	Pallippattu Vijayan	Indian Institute of Technology
Min Soo Kim	Seoul National University	Taku Ohara	Tohoku University
Katsunori Hanamura	Tokyo Institute of Technology	Mamoru Tanahashi	Tokyo Institute of Technology
Bing-Yang Cao	Tsinghua University	Ji Hwan Jeong	Pusan National University
Chengwang Lei	The University of Sydney	Jungho Lee	Ajou University
Chang-Ying Zhao	Shanghai Jiao Tong University	Chun Yang	Nanyang Technological University
Ming-Tsang Lee	National Tsing Hua University		

Scientific Council Members

Suman Chakraborty	Indian Institute of Technology kharagpur	Wei Liu	Huazhong University of Science and Technology
Chin-Hsiang Cheng	National Cheng Kung University	Ramesh Narayanaswamy	Curtin University
Hyung Hee Cho	Yonsei University	Naoki Shikazono	The University of Tokyo
Jin Taek Chung	Korea University	Kazuhiko Suga	Osaka Metropolitan University
Man Yeong Ha	Pusan National University	Koji Takahashi	Kyushu University
Peixue Jiang	Tsinghua University	Victoria Timchenko	The University of New South Wales
Byung Ha Kang	Kookmin University	Tsuyoshi Totani	Hokkaido University
Yong Jin Kim	Korea Institute of Machinery and Materials	Qiuwang Wang	Xi'an Jiaotong University
Qiang Liao	Chongqing University	Ruzhu Wang	Shanghai Jiao Tong University
Wenxian Lin	James Cook University		

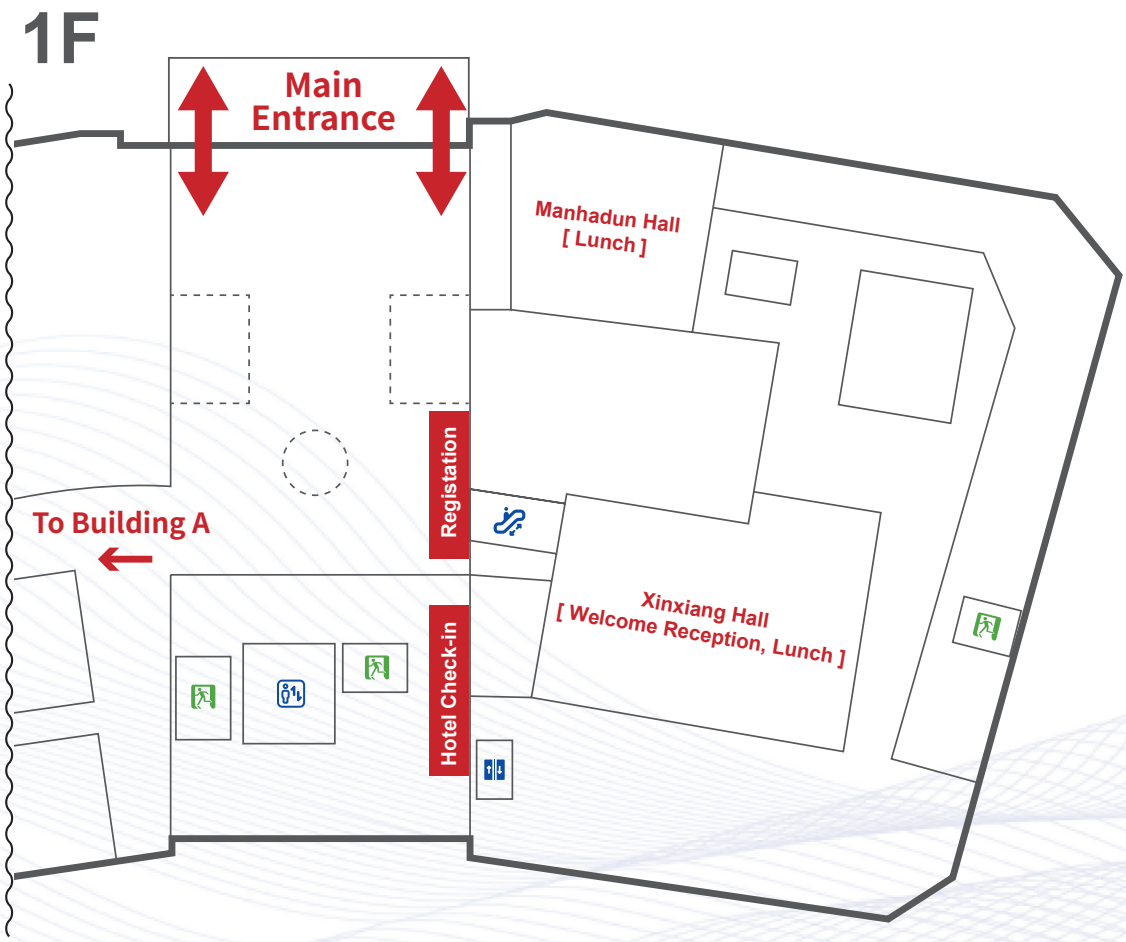
Honorary Advisory Board Members

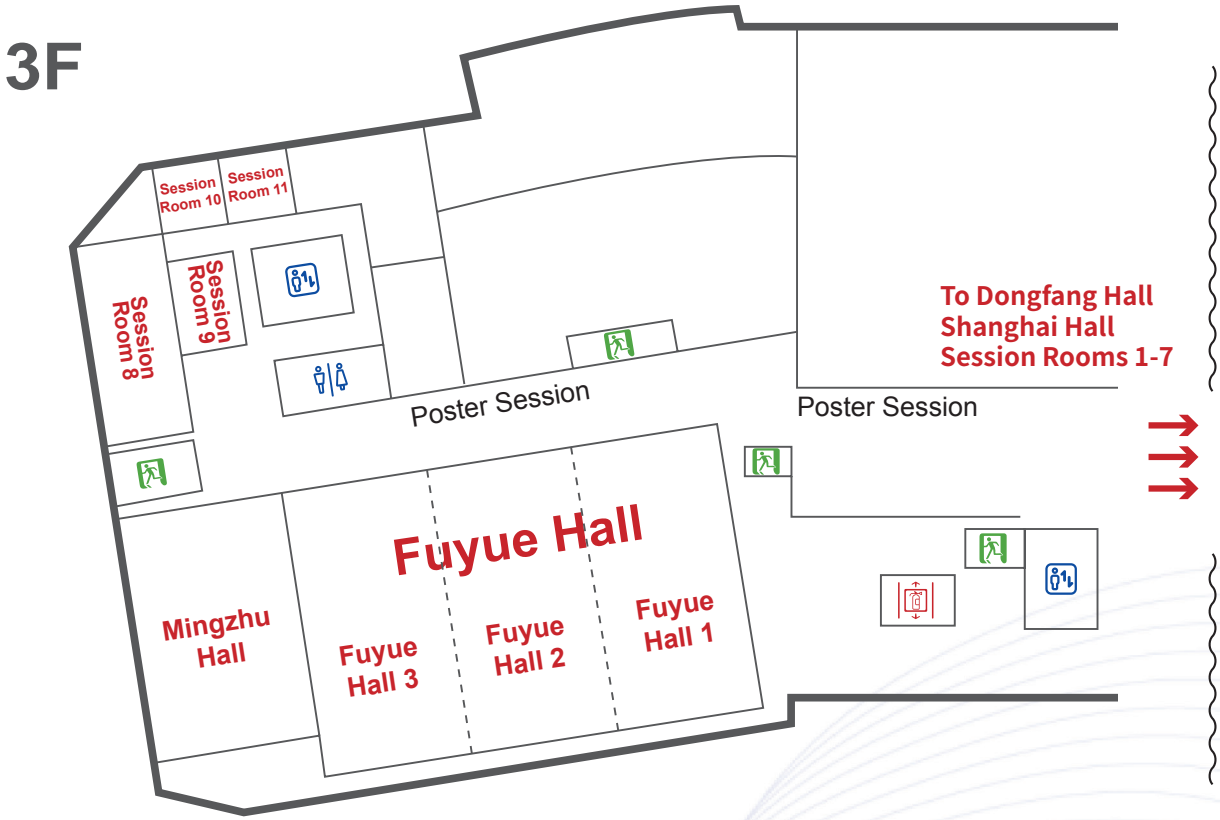
Steve Armfield	The University of Sydney
Tilak Chandratilleke	Curtin University
Cha`o-Kuang Chen	National Cheng Kung University
Ping Cheng	Shanghai Jiao Tong University
Takemi Chikahisa	Hokkaido University
Siaw Kiang Chou	National University of Singapore
Keiko Fujioka	Functional Fluids Ltd.
Zengyuan Guo	Tsinghua University
Masaru Ishizuka	Toyama Prefecture University
Hoyoung Kim	Korea University
Jin Ho Lee	Yonsei University
Joon Sik Lee	Seoul National University
Kwan-Soo Lee	Hanyang University
Tong-Miin Liou	National Tsing Hua University
Kazuyoshi Nakabe	Kyoto University
Ken Okazaki	Tokyo Institute of Technology
Hyun Dong Shin	Korea Advanced Institute of Science and Technology
Wenquan Tao	Xi'an Jiaotong University
Heping Tan	Harbin Institute of Technology
Sundararajan Thirumalachari	Indian Institute of Technology kharagpur
Yimin Xuan	Nanjing University of Aeronautics and Astronautics

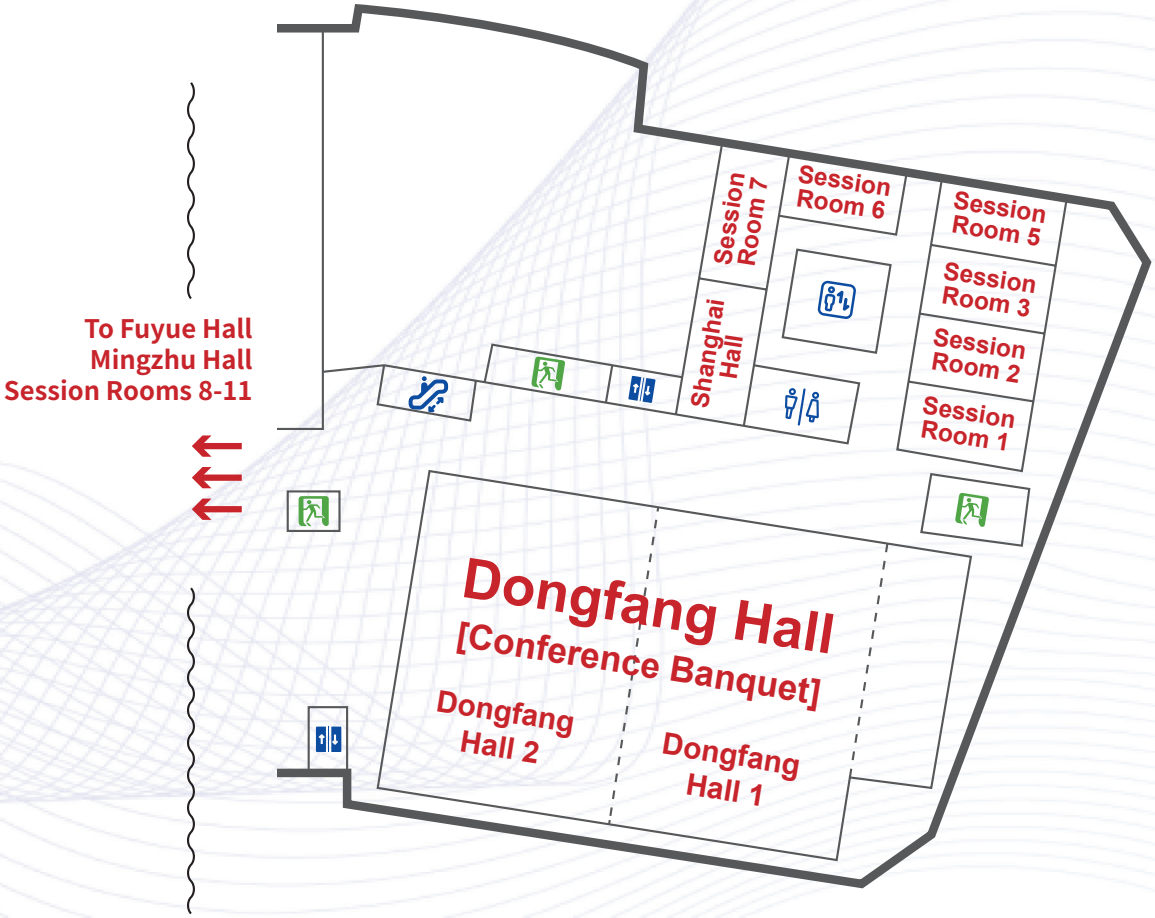
Conference Information

Conference Venue

The Fuyue Hotel is a luxurious and spacious hotel for commercial conference and vacation built to the high standards. Located in the International Ecological Business District of Songjiang New City in Shanghai, the hotel is easily accessible, just 30 minutes' drive from Hongqiao International Airport and one hour from Pudong International Airport. Its advantageous geographical position puts it in close proximity to many of Shanghai's famous attractions, such as Wanda Plaza, Sheshan National Forest Park, Shanghai Film and Television Park, Shanghai Happy Valley, and Maya Water World. The hotel boasts a total construction area of 105,000 square meters, including 730 spacious, comfortable, and tastefully designed guest rooms, complete with floor-to-ceiling windows, deluxe bathrooms, and attentive personal butler services. Guests are sure to have a wonderful experience and feel right at home with the meticulous attention to their every need and the luxurious and warm atmosphere provided by the hotel's facilities.




3F
Session Room 10
Session Room 11
Session Room 9
Session Room 8
Poster Session
Poster Session
To Dongfang Hall
Shanghai Hall
Session Rooms 1-7
Fuyue Hall
Mingzhu Hall
Fuyue Hall 3
Fuyue Hall 2
Fuyue Hall 1


To Fuyue Hall
Mingzhu Hall
Session Rooms 8-11
Session Room 7
Session Room 6
Session Room 5
Session Room 3
Session Room 2
Session Room 1
Shanghai Hall
Dongfang Hall
[Conference Banquet]
Dongfang Hall 2
Dongfang Hall 1

Registration

Participants are recommended to register online through website: https://acts3.sjtu.edu.cn/Passport/Login. Participants also can register on-site during the conference. Registration desk will be set up near the hotel check-in at the Fuyue Hotel and will also serve as an information desk throughout the conference for the convenience of the participants.

Registration Type	Early Bird	Standard
Regular	USD 750 / CNY 5400	USD 850 / CNY 6210
Student	USD 500 / CNY 3600	USD 600 / CNY 4320
Accompanying Person	USD 100 / CNY 720	USD 150 / CNY 1080

Early Bird: Deadline: Friday, May 10, 2024 (by 23:59 CST)

Regular Registrant:

All authors, co-authors, participants from industry, private and governmental research and development laboratories, independent consultants and technical managers, etc. The regular fee includes admission to all sessions, coffee breaks, lunches, welcome reception, banquet, and a conference kit including a program book.

Student:

Graduate or undergraduate university students. The student fee includes admission to all technical sessions, coffee breaks, lunches, welcome reception, banquet, and a conference kit including a program book.

Accompanying Person:

Family members of participants. The accompanying person fee includes admission to welcome reception and conference banquet.

Cancellation Policy:

On or before Saturday, 25 May 2024: Full refund payable less a USD 35 / CNY 252 administration fee.

Between Sunday, 26 May 2024 and Monday, 10 June 2024: 50% of the total registration fee will be refunded, less a USD 35 / CNY 252 administration fee.

On or after Tuesday, 11 June 2024: No refund will be payable.

The opening ceremony will begin at 8:30 on Monday, June 24, 2024. You may come to register during 8:00-22:00 on Sunday, June 23, 2024, at the registration desks at the Fuyue Hotel. Registration is also available from 8:00-18:00 during June 24-27, 2024. If you have pre-registration and paid, your name badge and program will be ready for you to pick up at registration desk. Please wear your name badge throughout the conference. Access to coffee break and conference sessions will be prohibited if a name badge is not visible.

Social Events

Welcome Reception

Dinner and drinks are available for greetings and free talking in an informal environment. All participants are welcome.

Date: June 23 (Sunday)
Time: 18:00-21:00
Place: Xinxiang Hall (1F)

Opening Ceremony

Date: June 24 (Monday)
Time: 08:30-09:15
Place: Fuyue Hall (3F)

Conference Banquet

Food will be served in formal dinner style. Traditional Chinese instruments performance is scheduled during the Conference Banquet.

Date: June 26 (Wednesday)
Time: 18:00-21:00
Place: Dongfang Hall (3F)

Closing Ceremony

Date: June 27 (Thursday)
Time: 15:30-16:00
Place: Mingzhu Hall (3F)

General Information

Certificate of Participation

Certificate of Participation can be requested by e-mail (acts3rd@sjtu.edu.cn) after the conference.

Website

The website of the conference is available for participants' convenience. Conference Program, Map of Venue, etc. could be found on the website: https://acts3.sjtu.edu.cn/

The Conference Proceedings could be downloaded on the website: https://acts3.sjtu.edu.cn/Data/List/Documents

Presentation Guidelines

1. **Plenary Lectures, AUTSE Outstanding Achievement Award Lecture and Nukiyama Memorial Award Lecture** will be allotted 40 minutes for presentation. (35 min. speech + 5 min. Q&A)
2. **Keynote Lectures and AUTSE Young Scientist Award Lectures** will be allotted 30 minutes for presentation. (25 min. speech + 5 min. Q&A)
3. **Oral presentations** will be allotted 15 minutes for presentation. (12 min. speech + 3 min. Q&A)
4. Laptops with MS PowerPoint installed will be provided in each room. **We kindly request that all the presentations be given in English and suggest the aspect ratio of the slides be 16:9 and PowerPoint files be copied into laptops half an hour before the session starts.** Presenters who wish to use any other software are kindly advised to prepare their own laptops.
5. **Poster dimensions requirement and set-up procedures:** Authors should prepare their posters complying with the size of the space. The typical poster size is A0 (1198 mm × 841 mm) and the language of the contents is English. Please print and bring the posters to the venue. Authors are responsible for mounting their posters and collecting their poster afterwards. Scissors, pushpins or tapes will be provided. All posters must be set up 30 minutes before the session, and must remain up until the end of session. Presenters must remain at their posters during the entire time of the assigned session time. After the session ends, posters and materials should be removed. The poster boards will be numbered by the organizers. The number of your poster could be found in the Poster Session.
6. **No Photography Policy:** Taking photographs or videos is prohibited during sessions to protect the works and copyrights of presenters. Your cooperation is greatly appreciated.

Awards

AUTSE Outstanding Achievement Award & AUTSE Young Scientist Award

The Asian Union of Thermal Science and Engineering (AUTSE) Outstanding Achievement Award is awarded to one or two scientists every four years for their life-time achievements in the field of thermal sciences and thermal engineering. And the AUTSE Young Scientist Award is awarded to two or three scientists who are younger than thirty-five years old at the time of the Award presentation and who are active in the field of thermal sciences and thermal engineering.

The Award Ceremony for 2024 AUTSE Outstanding Achievement Award and 2024 AUTSE Young Scientist Award is scheduled on June 24, 09:15-09:50, Fuyue Hall. The Outstanding Achievement Award Lecture is scheduled on June 24, 09:50-10:30, Fuyue Hall. And the Young Scientist Award Lectures are scheduled on June 25-27, 13:30-14:00, Shanghai Hall.

Awardees are as follows:

AUTSE Outstanding Achievement Award:

Wenquan Tao (Xi'an Jiaotong University, China)

AUTSE Young Scientist Award:

Xuancan Zhu (Shanghai Jiao Tong University, China)

Mengqi Liu (Shanghai Jiao Tong University, China)

Kazuma Isobe (Okayama University, Japan)

Nukiyama Memorial Award

The Nukiyama Memorial Award has been established in 2011 by the Heat Transfer Society of Japan to commemorate outstanding contributions by Shiro Nukiyama as an excellent heat transfer scientist. The award shall be bestowed to a scientist under/about fifty years of age, once every two years in the field of Thermal Science and Engineering. The Nukiyama Memorial Award Ceremony is scheduled on June 24, 09:15-09:50. The awardee is Zuankai Wang, The Hong Kong Polytechnic University, China. And the Nukiyama Memorial Award Lecture is scheduled on June 24 13:30-14:10, Fuyue Hall 1.

Best Paper Award

The Best Paper Award will be selected from both oral and poster presentations by the conference chairs and the conference committees. The awardees will be announced at the Conference Banquet (June 26, 18:00-21:00, Dongfang Hall).

Lunch

Day	Time	Menu	Place
June 24	12:15-13:30	Buffet	Xinxiang Hall / Manhadun Hall
June 25	12:00-13:30	Buffet	Xinxiang Hall / Manhadun Hall
June 26	12:00-13:30	Buffet	Xinxiang Hall / Manhadun Hall
June 27	12:05-13:30	Buffet	Xinxiang Hall / Manhadun Hall

Coffee Break

Day	Time	Place
June 24	10:30-11:00	The Corridor of Fuyue Hall and Dongfang Hall
	15:00-15:30	
June 25	10:30-11:00	The Corridor of Fuyue Hall and Dongfang Hall
	15:30-16:00	
June 26	10:30-11:00	The Corridor of Fuyue Hall and Dongfang Hall
	15:00-15:30	
June 27	9:50-10:20	The Corridor of Fuyue Hall and Dongfang Hall
	15:00-15:30	

Wireless Internet

Free Wi-Fi is available for the conference participants in the conference venue. The Wi-Fi SSID is “fuyue” and the password is 88888888.

Electricity

In China, outlets for 220 Volts 50 Hertz are dominant. Please check the power supply before using your equipment.

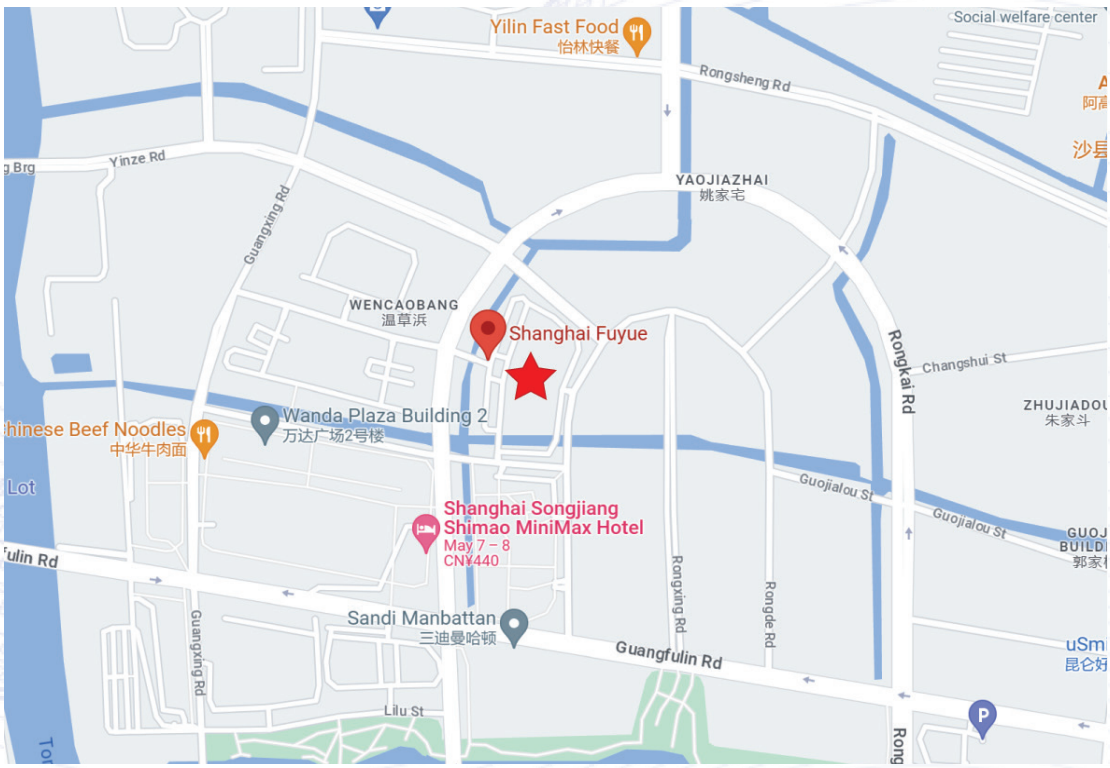
Emergency Phone Number

- 110: Police
- 119: Fire, Rescue Services
- 120: First Aid Services

Transportation

Conference Venue: Shanghai Fuyue Hotel

Address: Lane 208, Rongyue Road, Songjiang District, Shanghai



From Shanghai Hongqiao International Airport

	By Shuttle Bus	By Taxi	By Metro
Duration	~ 45 min	~ 40 min	~1 h 50 min
Fare	Free	~ 120 CNY	7 CNY
Additional fee / Route	None	0 to 7 CNY for using the expressway. No extra charges should be applied.	Line10 -> Line 11 -> Line9 -> Walk for 30 min
Operating hours	Every 1.5 h, from 11:00-23:00, June 23	24 h	(Pick-up time) 05:26 – 22:00 (approx.)

From Shanghai Hongqiao Railway Station

	By Shuttle Bus	By Taxi	By Metro
Duration	~ 45 min	~ 40 min	~1 h 50 min
Fare	Free	~ 120 CNY	7 CNY
Additional fee / Route	None	0 to 7 CNY for using the expressway. No extra charges should be applied.	Line10 -> Line 11 -> Line9 -> Walk for 30 min
Operating hours	Every 2 h, from 13:00-21:00, June 23	24 h	(Pick-up time) 05:26 – 22:00 (approx.)

From Shanghai Pudong International Airport

	By Shuttle Bus	By Taxi	By Metro
Duration	~ 1 h 30 min	~ 1 h 20 min	~ 2h 40 min
Fare	Free	~ 270 CNY	10 CNY
Additional Fee/ Route	None	0 to 29 CNY for using the expressway. No extra charges should be applied.	Line 2 -> Line9 -> Walk for 30 min
Operating hours	Every 1.5 h, from 11:00-23:00, June 23	24 h	(Pick-up time) 06:00 – 21:30 (approx.)

From Shanghai South Railway Station

	By Taxi	By Metro
Duration	~ 40 min	~1 h 30 min
Fare	~ 100 CNY	6 CNY
Additional Fee / Route	0 to 4 CNY for using the expressway. No extra charges should be applied.	Line 15 -> Line9 -> Walk for 30 min
Operating hours	24 h	(Pick-up time) 05:57 - 22:30 (approx.)

From Shanghai Railway Station

	By Taxi	By Metro
Duration	~ 1 h 20 min	~ 1h 45 min
Fare	~ 160 CNY	7 CNY
Additional Fee / Route	0 to 7 CNY for using the expressway. No extra charges should be applied.	Line 1 -> Line9 -> Walk for 30 min
Operating hours	24 h	(Pick-up time) 05:30 - 22:20 (approx.)

City Tours

To enrich your trip to ACTS 2024 Shanghai, travel agency is arranged on-site to offer Shanghai tour packages. If you have any inquiries or wish to reserve a tour, please directly contact the travel agency.

Inquiry

Online: Please contact the conference secretariat by e-mail: acts3rd@sjtu.edu.cn

On-site: Any time if you encounter any issues, you can contact the conference volunteers or the registration desk.

Program Information

Conference Outline

Plenary Lectures

Award Lectures

AUTSE Outstanding Achievement Award Lecture (AUTSE OAA Lecture)
AUTSE Young Scientist Award Lectures (AUTSE YSA Lectures)
Nukiyama Memorial Award Lecture (NMA Lecture)

Panel Discussions

Panel Discussion 1: The Role of Thermal Sciences on Carbon Neutrality
Panel Discussion 2: Thermal Sciences and AI

Keynote Lectures (KLs)

Organized Tracks

Track 01: Bio and Medical Applications
Track 02: Boiling, Evaporation and Condensation
Track 03: Carbon Capture, Utilization and Storage
Track 04: Combustion
Track 05: Computational Methods and Simulations
Track 06: Conduction
Track 07: Convective Heat Transfer
Track 08: Electronic Cooling and Thermal Management
Track 09: Energy Storage
Track 10: Heat Exchangers and Industrial Applications
Track 11: Melting and Solidification
Track 12: Metamaterial and Thermoelectric Devices
Track 13: Micro/Nano Heat Transfer
Track 14: Multiphase Flow
Track 15: Nuclear Energy
Track 16: Porous Media
Track 17: Refrigeration and Cryogenics
Track 18: Solar/Renewable Energy
Track 19: Thermal Radiation
Track 20: Thermocatalysis, Thermochemistry and Energy Conversion
Track 21: Thermophysical Properties and Measurements

Plenary Lectures

Lectures	Presenters	Date	Time (GMT+8)	Venue
Plenary Lecture 1	Gang Chen	Tuesday, June 25, 2024	08:30-09:10	Fuyue Hall
Plenary Lecture 2	Sergey Alekseenko	Tuesday, June 25, 2024	09:10-09:50	
Plenary Lecture 3	Khellil Sefiane	Tuesday, 25 June, 2024	09:50-10:30	
Plenary Lecture 4	Qiming Zhang	Wednesday, June 26, 2024	08:30-09:10	
Plenary Lecture 5	Tianshou Zhao	Wednesday, June 26, 2024	09:10-09:50	
Plenary Lecture 6	Min Soo kim	Wednesday, June 26, 2024	09:50-10:30	
Plenary Lecture 7	Koji Takahashi	Thursday, June 27, 2024	08:30-09:10	
Plenary Lecture 8	Chao Sun	Thursday, June 27, 2024	09:10-09:50	

Plenary Lectures

Plenary Lecture 1

Tuesday, June 25, 2024 | Fuyue Hall | 08:30-09:10
Chair: Xing Zhang (Tsinghua University)

Rethinking Evaporation and Condensation

Gang Chen
Massachusetts Institute of Technology
United States of America

Abstract:

Although ubiquitous in nature and industrial processes, transport processes at the interface during evaporation and condensation are still poorly understood. Experiments have shown temperature discontinuities at the interface during evaporation and condensation but the experimentally reported interface temperature jump varies by two orders of magnitude. Even the direction of such temperature jump is still being debated. In this talk, I will first discuss a thermomolecular emission for thermal evaporation, analogous to the thermionic emission mechanism. Starting from the kinetic theory, we derive interfacial mass flux and heat flux conditions, which are used to solve the coupled problem between the liquid and the vapor phase during evaporation and condensation. Our model shows that when evaporation or condensation happens, an intrinsic temperature difference develops across the interface, due to the mismatch of the enthalpy carried by vapor at the interface and the bulk region. The vapor temperature near the interface cools below the saturation temperature on the liquid surface during evaporation and heats up above the latter during condensation. However, many existing experiments have shown an opposite trend to this prediction. We explain this difference as arising from the reverse heat conduction in the vapor phase. Our model results compare favorably with experiments on both evaporation and condensation. We show that when the liquid layer is very thin, most of the applied temperature difference between the solid wall and the vapor phase happens at the liquid-vapor interface, leading to saturation of the evaporation and the condensation rates and the corresponding heat transfer rate. This result contradicts current belief that the evaporation and condensation rates are inversely proportional to the liquid film thickness. For the two parallel plate problem with evaporation on one side and condensation on the other, we will explain several paradoxical predictions including inverted temperature profile in the vapor phase. The talk will conclude with recent progress in understanding super-thermal solar interfacial evaporation, introducing the newly discovered photomolecular effect.

[1] G. Chen, “On the molecular picture and interfacial temperature discontinuity during evaporation and condensation,” Int. J. Heat & Mass Transfer, 191, 122845, 2022.
[2] G. Chen, “Interfacial cooling and heating, temperature discontinuity and inversion in evaporation and condensation,” Int. J. Heat & Mass Transfer, https://doi.org/10.1016/j.ijheatmasstransfer.2023.124762.
[3] G. Chen, “On paradoxical phenomena during evaporation and condensation between two parallel plates,” J. Chem. Phys., 10.1063/5.0171205, 2023.

Plenary Lectures

Plenary Lecture 2

Tuesday, June 25, 2024 | Fuyue Hall | 09:10-09:50
Chair: Xing Zhang (Tsinghua University)

Novel Technologies of Low-Emission Combustion of Water-Fuel Mixtures

Sergey Alekseenko
Kutateladze Institute of Thermophysics SB RAS
Russia

Abstract:

This paper proposes new technologies for burning organic fuels that can significantly reduce environmental problems and switch to low-carbon energy in the future without abandoning organic fuels. The main idea of the proposed combustion technologies is to add water or water vapor to the fuel. Three main approaches are considered. (1) LIQUID FUEL COMBUSTION WITH SUPERHEATED STEAM SUPPLY. This method is based on the interaction of liquid fuel with a high-speed gas flow, as a result of which a finely dispersed gas droplet flow is formed. When using superheated water vapor as a dispersing gas, the process of steam gasification of thermal decomposition products and incomplete combustion of fuel with the formation of synthesis gas (a mixture of CO and H_2) is provided in the combustion zone. A significant reduction in NO_X and CO emissions has been shown with high fuel combustion completeness. This combustion method is promising for the implementation of low-emission combustion of liquid hydrocarbons, including diesel fuel, used engine oil, fuel oil, crude oil. (2) COMBUSTION OF COAL-WATER SLURRY. Coal-water slurry (CWS) is a mixture of coal and water with small additives of plasticizer. The technology of producing CWF (up to 65% coal) based on a ball mill and a cavitation generator has been developed. The size of the carbon particles is about 50-70 microns. A method has been developed for burning CWF in a vortex chamber using an original pneumatic nozzle (sprayer). The sprayer is made for dispersion of any liquid products including CWF. The principle of sprayer operation is based on application of Coanda effect and cumulative jets. It is shown that the CWF technology has a number of advantages in comparison with other methods of burning solid fuels: explosion and fire safety; the possibility of burning a wide range of fuels (low-grade coal, shale, coal sludge and coal enrichment waste); a high degree of burnout of the combustible mass; high environmental characteristics, which consist in a significant reduction in nitrogen oxides in the combustion products, carbon monoxide, benz (a) pyrene and practically zero emission of solid particles. (3) CONVERSION OF COAL AND ORGANIC WASTES IN SUPERCRITICAL WATER. Supercritical water (SCW: T > 374ºC, P > 22.1 MPa) is the cheapest and environmentally friendly solvent of organic substances, coal and gases. It serves as a donor of hydrogen and oxygen, and acts catalytically on the oxidation of fuels. SCW can be decisive when solving the problem of wet biowaste disposal through their involvement as a renewable fuel in the energy sector. Another important application of SCW is in the processing of low-grade coal, including brown coal and coal enrichment waste. The results of research are presented and recommendations are given for processing low-grade coal, municipal wastewater, swine manure, poultry manure and sludge-lignin in a supercritical water-oxygen fluid in the flow regime. The proposed approaches can also be used in the future in conjunction with the Allam cycle to create waste-free technologies for processing solid and liquid organic fuels with zero CO_2 emissions.

Plenary Lectures

Plenary Lecture 3

Tuesday, June 25, 2024 | Fuyue Hall | 09:50-10:30
Chair: Xing Zhang (Tsinghua University)

Vapour Mediated Interactions of Volatile Droplets

Khellil Sefiane
The University of Edinburgh
United Kingdom

Abstract:

Evaporation of multiple droplets ensues ubiquitously in nature and industry. Vapour mediation caused by neighbouring droplets is a demonstrated phenomenon which shows that droplets can interact with each other via vapor, i.e. the “shielding effect”. However, interactions between pure and binary droplets in confined environments remains unexplored.

In this talk, we first experimentally investigate the evaporation of binary sessile droplets on hydrophilic glass slides at different spacings in a confined enclosed chamber. The results show that a confined environment significantly attenuates droplet evaporation, which intensifies with decreasing spacing between droplets. Compared to the case in open environment, the suppression of evaporation, or shielding effect, is more pronounced in confined environment. The lifetimes of confined droplets are extended by up to 82% in the closest case studied. Such strong evaporation suppression not only results from the intensified local shielding effect but also from an increase of the far field vapor accumulation within the confined environment.

Furthermore, we examine experimentally the motion of two adjacent droplets, pure liquid or a binary mixture, without direct contact. The droplet is repelled or attracted by the adjacent droplet which acts as a vapour source, depending on its initial concentration as well as the composition in the vapour, even for a pure liquid. The observation is explained by a theoretical model that combines evaporation and adsorption processes, which unifies the mechanism for both directions of motion (attraction and repulsion) for both binary mixtures and pure liquid droplets. Good qualitative and quantitative agreement is achieved between the theoretical model and experimental observations. A critical concentration is proposed to determine the transition between attractive and repulsive motion, this being a criterion to predict the droplet motion.

Plenary Lectures

Plenary Lecture 4

Wednesday, June 26, 2024 | Fuyue Hall | 08:30-09:10
Chair: Sung Jin Kim (Korea Advanced Institute of Science and Technology)

Electrocaloric Cooling -- Present and Future Perspective

Qiming Zhang
The Pennsylvania State University
United States of America

Abstract:

Our society is highly dependent on cooling for air conditioning (AC) and refrigeration. Currently, modern cooling is supported by a 19th century technology: vapor compression cycle (VCC)-based cooling. Refrigerants used in the VCC cooling are strong greenhouse gases and thus are among the leading causes of global warming. On top of the negative environmental impact, AC and refrigeration are one of the largest energy users, consuming more than 25% of electricity generated in the developed countries. Caloric cooling, such as these based on magnetocaloric effect (MCE), electrocaloric effect (ECE), elastocaloric effect (eCE/BCE), are environmentally benign and have potential of higher efficiency, and thus have emerged as attractive and promising alternatives to the VCC cooling. The caloric effects are the reversible temperature and entropy change of solid-state materials under magnetic (MCE), electric (ECE), and elastic stress (eCE/BCE) simulations. The world-wide active electrocaloric (EC) materials research since the late 2000s has revealed giant ECE in several ferroelectrics and their composites. These EC materials, coupled with direct utilization of electric stimulation in driving the EC bodies, have enabled design and demonstrations of EC device prototypes, which featured high scalability and compact device size, as well as high efficiency and cooling power density, attractive for distributed thermal management. These EC materials and device studies further advanced understanding of EC materials and requirements for practical EC cooling device systems. This talk will present the advancements in the EC materials and solid-state EC cooling devices, especially, the recent breakthroughs in the EC materials that generate giant ECE at ultra-low electric fields and related EC devices. The talk will also cover the challenges and opportunities in EC materials and transition to commercial EC cooling.

Plenary Lectures

Plenary Lecture 5

Wednesday, June 26, 2024 | Fuyue Hall | 09:10-09:50
Chair: Sung Jin Kim (Korea Advanced Institute of Science and Technology)

Flow Cells for Long-Duration Energy Storage

Tianshou Zhao
Southern University of Science & Technology
China

Abstract:

Flow cells are those in which a flowable storage medium (e.g.: hydrogen, methanol, ammonia, liquid electrolytes, etc.) allows decoupling power and energy. This talk will show that flow cells are scable, safe, and particularly flexible in storage duration and site selections. Therefore, flow cells will become game-changing technologies to facilitate the widespread deployment of renewables. In particular, we will show that common scientific issues and practical challenges pertaining to flow cell technologies can be addressed by an interdisciplinary approach combining electrochemistry and engineering thermophyiscs.

Plenary Lectures

Plenary Lecture 6

Wednesday, June 26, 2024 | Fuyue Hall | 09:50-10:30
Chair: Sung Jin Kim (Korea Advanced Institute of Science and Technology)

Dynamic Model Development and Model Predictive Control for Variable Refrigerant Flow (VRF) Heat Pump System

Min Soo Kim
Seoul National University
Korea

Abstract:

To cope with global warming, it is necessary to reduce fossil fuel usage, thereby highlighting the importance of heat pumps as alternatives for heating. Concurrently, variable refrigerant flow (VRF) systems, utilized in both commercial and residential applications, have gained widespread adoption. These systems offer significant advantages such as high energy efficiency, quiet operation, design and installation flexibility, and cost-effectiveness. However, VRF systems typically exhibit nonlinear time-varying dynamics. This complexity has led to the predominant use of simplified controls such as on/off, proportional-integral-differential (PID), and fuzzy logic control in the systems. Additionally, irrespective of the number of active indoor units, these systems often maintain a fixed refrigerant pressure set-point of indoor units, which reduces energy efficiency. To address these challenges, our study aims to develop a dynamic model for VRF heat pump systems through thermodynamic modeling and formulate a control strategy that adjusts the refrigerant pressure set-point based on cooling or heating load. By utilizing the moving boundary method, the dynamic behavior of the heat exchanger is represented with minimal variables, integrating it with other component models to construct an entire nonlinear system model. Furthermore, a predictive model for estimating cooling or heating load is proposed using on/off cycle data and sensor data from indoor units. Simulation based on the nonlinear model demonstrates the effectiveness of the proposed variable refrigerant pressure set-point control strategy in enhancing the seasonal coefficient of performance (SCOP). Additionally, a model predictive control (MPC) was applied to maintain consistent refrigerant pressure when multiple indoor units suddenly shut down during VRF heat pump operation. Experimental validation of this MPC controller on a real VRF system demonstrates reduced overshoot and settling time of refrigerant pressure compared to PID control. This approach to adjust evaporating pressure during cooling and condensing pressure during heating will enhance the SCOP of the system and contribute to the energy saving, supporting efforts toward carbon neutrality.

Plenary Lectures

Plenary Lecture 7

Thursday, June 27, 2024 | Fuyue Hall | 08:30-09:10
Chair: Taku Ohara (Tohoku University)

Nanoscopic Insights into Droplets, Bubbles, and Solid Surfaces

Koji Takahashi
Kyushu University
Japan

Abstract:

In the past decades, many attempts were made to improve the phase change heat transfer using nanostructures or nanomaterials. Well-known instances are micro-nano hybrid pillar surface for droplet condensation and surface coating of hydrophilic nanoparticles for preventing dryout during boiling. However, most experiments are just trial and error and we have no detailed strategy for controlling of the liquid and vapor transport around such nanoscale structures. Even for macroscopic droplets, we cannot predict the dynamic contact angle hysteresis because that is caused by the nanoscale surface heterogeneity, whose effect on three phase contact line is still veiled. This talk treats recent progress on experimental investigation of solid-liquid interfacial phenomena including three-phase contact line to raise nanoscopic insights into droplets and bubbles on solid surfaces. The employed methods are mainly microscopies with nanometer-scale resolution, represented by atomic force microscopy (AFM) and transmission electron microscopy (TEM), whose techniques for liquid are improving year by year. Optical microscopy is also advantageous for its excellent temporal resolution when observing quick motion of condensed microdroplets, which sometimes suggests the existence of precursor liquid film less than 20 nm thickness. AFM can directly capture such thin liquid film and also thin gas phase at the liquid solid interface. By using both AM and FM modes of AFM, we were enabled to categorize four kinds of gas phases; interfacial nanobubble, micro-pancake, disordered, and ordered absorbed gas molecules. AFM observation of their shape change due to temperature indicates the transport of gas molecules from micro-pancake into nearby nanobubble and this mechanism was confirmed by the TEM observation of two nanobubbles in water using a liquid cell with SiN windows. Graphene is recently used in place of SiN window for TEM observation and gives the highest resolution of water sample. Dynamic motion of bubble interface in graphene liquid cell was investigated and it was confirmed that the flat surface of graphene induces no pinning except of the contaminant particles. For both bubbles and drops, the pinning working at their growth or shrinkage stage affects their contact angles. Glycerol nanodroplets on an ideally homogeneous graphene surface exhibit the same contact angles as those in macroscale, whereas size-dependent contact angles were observed on a SiO_2 surface with angstrom-scale heterogeneity, suggesting a breakage of Young's equation. In this way, graphene is useful to identify the effect of sub-nano to nanoscale surface roughness on contact lines, precursor films, interfacial gas phases, and so on. Not only such advantage for experimental technique but future perspective of graphene for thermal engineering is also discussed.

Plenary Lectures

Plenary Lecture 8

Thursday, June 27, 2024 | Fuyue Hall | 09:10-09:50
Chair: Taku Ohara (Tohoku University)

Explosive Boiling of Drops Near a Solid Surface and Inside a Turbulent Flow

Chao Sun
Tsinghua University
China

Abstract:

In this talk, we will discuss two problems. The first problem is about the evaporation dynamics of Leidenfrost drops. The gasification of multicomponent drops is relevant in various energy-related technologies. An interesting phenomenon associated with this process is the self-induced explosion of the drop, which promotes drop atomization. We study a unique explosive gasification process of a suspension (solid-liquid) droplet and a tri-component (liquid-liquid) droplet in a levitated Leidenfrost state. As the droplet evaporates, microparticles accumulate at the droplet-air interface and form a particle shell, resulting in reduced evaporation rate and contact with the substrate. For the tri-component droplet consisting of water, ethanol, and oil (ouzo), the evaporation process is even richer. The preferential evaporation of the most volatile component, ethanol, triggers nucleation of the oil micro-droplets in the remaining drop, and finally leads to the drop explosion. These phenomena illustrate the rich evaporation dynamics of Leidenfrost drops. The second problem is about turbulent flow with boiling drops. Turbulence is known for its ability to vigorously mix fluid and transport heat. We have conceptualized a kind of “active particle” turbulence, which far exceeds the limits of classical thermal turbulence. By adding a minute concentration of a heavy liquid to a water-based turbulent convection system, a remarkably efficient biphasic dynamics is born. We find that the heat transfer enhancement is dominated by the kinematics of the active elements (bubbles and drops) and their induced-agitation.

Award Lectures

Lectures	Presenters	Date	Time (GMT+8)	Venue
AUTSE Outstanding Achievement Award Lecture	Wenquan Tao	Monday, June 24, 2024	09:50-10:30	Fuyue Hall
AUTSE Young Scientist Award Lecture 1	Kazuma Isobe	Tuesday, June 25, 2024	13:30-14:00	Shanghai Hall
AUTSE Young Scientist Award Lecture 2	Xuancan Zhu	Wednesday, June 26, 2024	13:30-14:00	
AUTSE Young Scientist Award Lecture 3	Mengqi Liu	Thursday, June 27, 2024	13:30-14:00	
Nukiyama Memorial Award Lecture	Zuankai Wang	Monday, June 24, 2024	13:30-14:10	Fuyue Hall 1

Award Lectures

AUTSE Outstanding Achievement Award Lecture

Monday, June 24, 2024 | Fuyue Hall | 09:50-10:30
Chair: Gang Chen (Massachusetts Institute of Technology)

Multiscale Numerical Simulation of Boiling Heat Transfer: State of the Art and Challenges

Wenquan Tao
Xi'an Jiaotong University
China

Abstract:

Boiling heat transfer is a typical multiscale problem. Bubble nucleation happens at the microscopic scale, and its growth is usually at the mesoscopic scale; whereas, bubble coalescence, detachment, and development are generally macroscopic behaviors. Usually, different methods, including the MDS, LBM, and FVM are adopted to simulate the boiling heat transfer at different scales. In the 1st part of the lecture, a brief review of the most recent advances in MDS, LBM and FVM for simulating boiling heat transfer will be presented, including the determination of the nucleation time and site by the PK norm, the improved MRT model with a novel force scheme, and the FVM method VOSET for capturing phase change interface.

In the second part of the lecture the coupling between different scale methods will be discussed. The majority of research on multi-scale coupling simulations has primarily focused on single-phase problems, with limited publications dedicated to boiling heat transfer. Although qualitatively speaking, the three-level numerical methods—MDS, LBM, and FVM—can complement each other to achieve an accurate and reasonable boiling heat transfer simulation, say, predicting from bubble nucleation to the departure from the wall and up-flow of a bubble; However, the coupling between MDS-LBM, MDS-FVM and LBM-FVM meet many difficulties because of the inherent characteristics of the numerical methods at different scales , and these difficulties will be briefly presented.

Finally, it is pointed out that the multi-scale numerical investigation of boiling heat transfer is still in its early stages. The realization of coupling MDS, LB, and CFD methods for simulating the full process of boiling heat transfer requires tremendous further researches.

Bio:

Wen-Quan Tao is a Professor in Key Laboratory of Thermo-Fluids Science & Engineering of MOE, and Int. Joint Research Laboratory of Thermal Science & Engineering, Xi'an Jiaotong University, China. He was born in 1939, 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 the National Outstanding Teachers in 2003 and the member of Chinese Academy of Science in 2005. He was the associate editors of the ASME Journal of Heat Transfer, and Int J Heat Mass Transfer. Presently he is the associate editor of the journal of Computers & Fluids. His textbook of *Numerical Heat Transfer and Heat Transfer* (co-authored with late Professor SM Yang) has been cited for more than 20000 times both home and abroad. He has supervised more than 160 graduate students. His recent research interests include multiscale simulations of fluid flow and heat transfer problems, enhancement techniques of heat transfer, improvement of hydrogen fuel cell performance, cooling techniques of data center, and energy storage technologies.

Award Lectures

AUTSE Young Scientist Award Lecture 1

Tuesday, June 25, 2024 | Shanghai Hall | 13:30-14:00
Chairs: Jie Chen (Tongji University), Bai Song (Peking University)

Spectral Control of Far- and Near-Field Radiation Transfer

Kazuma Isobe
Okayama University
Japan

Abstract:

A body emits thermal radiation at various wavelengths depending on its temperature and emissivity. Spectral control of thermal radiation is essential in improving thermophotovoltaic power generation and radiative cooling performances. In this decade, researchers have tried to modulate the spectral emissivity of a body artificially using a micro or nanometer-sized structure called “meta-surface.” Especially, a metal–insulator–metal multilayer, periodical grating, pillar, and cavity arrays are promising geometries. These meta-surfaces also affect near-field radiation spectra at a hundred nanometers thickness of vacuum gap between two bodies. It is because meta-surfaces excite limited wavenumbers of surface plasmon polaritons at their surface. This talk will describe how these meta-surfaces affect radiative heat flux spectra and their application benefit.

Award Lectures

AUTSE Young Scientist Award Lecture 2

Wednesday, June 26, 2024 | Shanghai Hall | 13:30-14:00
Chairs: Rong Chen (Chongqing University), Yutaka Tabe (Hokkaido University)

Elevated Temperature Adsorptive Separation for Hydrogen Purification

Xuancan Zhu
Shanghai Jiao Tong University
China

Abstract:

The reactive separation process based on the coupling of water gas shift (WGS) catalysts and elevated temperature CO_2 adsorbents is able to produce high purity hydrogen directly from H_2-rich gas. This purification technology avoids the sensible heat loss of syngas and the heat regeneration, thus being significantly important to the mitigation of the carbon emission pressure, the development of fuel cell-based energy system, and the reduction of energy consumption in coal chemical industries. In this talk I will report the potassium promoted magnesium-aluminum layered double oxide (K-LDO) based CO/CO_2 purification technology. First, the high-pressure adsorption kinetics of K-LDO is discussed, and a non-equilibrium Elovich-type adsorption/desorption model is built. In situ techniques are adopted to illustrate the elevated temperature CO_2 adsorption mechanism of K-LDO. To further increase the CO_2 adsorption performance of K-LDO, the aqueous miscible organic solvent treatment (AMOST) is introduced during the co-precipitation process. In the reactor-scale study, the trace CO/CO_2 purification ability of the adsorption column after adding high temperature WGS catalysts is discussed. The effect of operating parameters and the self-purification phenomenon are investigated. A composite column model by coupling the CO_2 adsorption and WGS catalysis kinetics, the column mass and momentum balance, and the dynamic boundary conditions is proposed. To achieve continuous hydrogen production, a two-train elevated temperature pressure swing adsorption (ET-PSA) with an 8-column 13-step and a 2-column 7-step processes is built. By adding the high-pressure steam rinse and low-pressure steam purge steps, the system achieves both high H_2 purity (>99.999%) and H_2 recovery ratio (>95%). When applied in an integrated gasification fuel cell system, the calculated CO/CO_2 purification energy consumption of ET-PSA is 1.11–1.13 MJ/kg, which is 35.1%–36.2% lower than that of the Selexol process.

Award Lectures

AUTSE Young Scientist Award Lecture 3

Thursday, June 27, 2024 | Shanghai Hall | 13:30-14:00

Chairs: Tao Ren (Shanghai Jiao Tong University), Kaichen Dong (Tsinghua University)

Nonreciprocal Thermal Radiation Using Magnetized Epsilon-Near-Zero Nanostructures

Mengqi Liu
Shanghai Jiao Tong University
China

Abstract:

Thermal emitters/absorbers play an irreplaceable role in several important areas, including but not limited to solar photovoltaics, radiative cooling, thermal camouflage, far/near-field thermophotovoltaics, thermal sources, photothermal conversion and so on. The majority of thermal emitters/absorbers obey Kirchhoff's law of thermal radiation, whereby spectral directional absorptivity and emissivity are identical according to Lorentz reciprocity. This restriction introduces an intrinsic loss in a plethora of energy technologies and prevents us from controlling emission and absorption independently. This talk will first give a basic introduction of nonreciprocal thermal photonics, followed by the generalization of Kirchhoff's law of thermal radiation. Then, the underlying physics and manipulation methods using magnetized epsilon-near-zero nanostructures to diversely control angular/spectral nonreciprocal thermal emission/absorption will be introduced. In addition, several nonreciprocal thermal emitters/absorbers with single, dual, and broadband performance have been experimentally demonstrated. In the end, a brief outlook on the development of nonreciprocal thermal photonics will be discussed.

Award Lectures

Nukiyama Memorial Award Lecture

Monday, June 24, 2024 | Fuyue Hall 1 | 13:30-14:10
Chairs: Jinliang Xu (North China Electric Power University), Hao Wang (Peking University)

Tackling the Centuries-Old Leidenfrost Effect

Zuankai Wang
The Hong Kong Polytechnic University
China

Abstract:

From water droplets rolling around on a hot pan without quickly evaporating to splitting molten iron with bare hands, behind these unrelated phenomena lies the Leidenfrost effect discovered in 1756: liquids evaporate from high-temperature surfaces to form a continuous air film blocks the contact between solid and liquid. Although this effect shows broad application prospects in fields such as drag reduction and liquid mixing, it is also a century-old problem that has plagued the field of high-temperature heat dissipation, and even indirectly led to the Fukushima nuclear power plant accident in Japan. How to break this century-old physical effect is a major challenge for many applications.

This seminar will focus on how to use bionic concepts, especially by the heterogeneous integration of materials, thermal-fluids, manufacturing, energy, and other fields, to develop textured materials that fundamentally suppress the century-old Leidenfrost effect for efficient liquid cooling. I will also demonstrate how the heterogeneous design concept can be extended for efficiency enhancements in water harvesting, condensation, energy harvesting, boiling, and other applications.

Bio:

Zuankai Wang is the Associate Vice President (Research and Innovation), Kuok Group Professor in Nature-Inspired Engineering, Chair Professor in the Department of Mechanical Engineering, and Director of Research Center for Nature-Inspired Science and Engineering at The Hong Kong Polytechnic University (PolyU). He received his BSc from Jilin University, his MSc from the Shanghai Institute of Microsystem and Information Technology, and his PhD from the Rensselaer Polytechnic Institute. Before joining PolyU, Prof. Wang was a Chair Professor at the Department of Mechanical Engineering and was the Associate Dean in the College of Engineering at the City University of Hong Kong. He is the Executive Editor-in-Chief of Droplet (Wiley).

Prof. Wang is a Fellow of the Hong Kong Academy of Engineering Sciences, the Royal Society of Chemistry, and the International Society of Bionic Engineering. He has won numerous awards, including the Falling Walls Science Breakthroughs of Year 2023 (Engineering and Technology), Croucher Senior Research Fellowship, Research Grant Council Senior Research Fellowship, BOCHK Science and Technology Innovation Prize, Green Tech Award, Xplorer Prize, and the 35th World Cultural Council Special Recognition Award. He was named as “Highly Cited Researcher” by Clarivate Analytics (2022, 2023).

Panel Discussions

Panel Discussion 1

The Role of Thermal Sciences on Carbon Neutrality

Monday, June 24, 2024 | Mingzhu Hall | 15:30-17:00


Chang-Ying Zhao


Gang Chen


Ruzhu Wang


Naoki Shikazono


Christos Markides

Moderator:

Chang-Ying Zhao (Shanghai Jiao Tong University, China)

Panelists:

Gang Chen (Massachusetts Institute of Technology, United States of America)
Ruzhu Wang (Shanghai Jiao Tong University, China)
Naoki Shikazono (The University of Tokyo, Japan)
Christos Markides (Imperial College London, United Kingdom)

Abstract:

Achieving carbon neutrality has become one of the most urgent challenges of our time, which calls for a concerted effort across multiple scientific disciplines. Thermal sciences, encompassing heat transfer, thermodynamics, and fluid dynamics, play a pivotal role in green energy revolution and achieving carbon neutrality, including but not limited to the area of solar energy harvesting, renewable energy utilization, thermal storage, solid-state hydrogen storage, etc. This panel focuses on discussing how advancements in thermal science are driving innovations in energy efficiency, renewable energy integration, and sustainable industrial processes for achieving carbon neutrality. In the first part, each invited scientist will give a very brief talk on a specific topic based on his research area which will present the current status of our research, existing problems and challenges, and future outlooks. Then, the second part is an open discussion between the invited scientists and the audience to inspire further innovation in the quest for carbon neutrality.

Panel Discussions

Panel Discussion 2

Thermal Sciences and AI

Wednesday, June 26, 2024 | Mingzhu Hall | 15:30-17:00


Bingyang Cao


Qun Chen


Min Soo Kim


Junichiro Shiomi


Kui Jiao

Moderator:

Bingyang Cao (Tsinghua University, China)

Panelists:

Qun Chen (Tsinghua University, China)

Min Soo Kim (Seoul National University, Korea)

Junichiro Shiomi (The University of Tokyo, Japan)

Kui Jiao (Tianjin University, China)

Abstract:

We have witnessed the revolutionary impacts of artificial intelligence (AI) in various areas in the last decade. The intersection of thermal sciences and artificial intelligence is ushering in a new era of innovation and efficiency. AI technologies, particularly various machine learning algorithms, have been widely adopted in different thermal problems, like energy system optimization, materials or structures designs in manipulating thermal conduction or radiation, and so on. This panel will share the latest advances in research and development, discuss the pros and cons, and explore future perspectives on thermal sciences and AI. Panelists will showcase the pioneering work at the intersection of AI and thermal sciences, and share their perspectives in this area and the audience will also participate in the discussion.

Keynote Lectures

Keynote Lecture 1

Modelling of Transport Phenomena in SOFC Systems by Making Use of Interactive Computational-Experimental Methodology

Janusz Szmyd
AGH University of Krakow, Poland
Monday, June 24, 2024 | Fuyue Hall 2 | 13:30-14:00

Abstract:

At the current level of energy consumption, the industrial-scale reserves of fossil fuels around the globe are sufficient for around 100 years more. The international projects involving fusion (ITER) or the exploitation of hydrates may yield answers allowing for practical, applicable solutions within 50 years, with actual implementation then following by the end of the 21st century. In the meantime, if global energy security is to be assured and levels of pollution reduced, it will be advisable to bring “third-generation” power-supply technologies into full(er) use in the upcoming years and Solid Oxide Fuel Cell (SOFC) has the potential to become one of the most important types of an energy conversion device.

However, high-temperature operation, thermal management of the SOFC system becomes an important issue. The temperature distribution is a critical factor in terms of cell lifespan, including degradation of electrodes microstructure. Proper thermal management requires detailed modelling, including numerical analysis of the transport phenomena within an SOFC system. Various mathematical models have been developed to solve transport equations coupled with electrochemical processes to describe the reaction kinetics accounting for internal reforming chemistry in SOFCs. In recent years, the SOFC technology has made significant progress – notably, in considering electrodes’ microstructure morphology, as well as in providing miniaturized and efficient methane steam reforming. A number of contributions on these critical topics will be discussed. The objective of this talk is to summarize the present status of the SOFC modelling efforts and their impact on understanding and optimization of SOFC systems by making use of Interactive Computational-Experimental Methodology.

Keynote Lectures

Keynote Lecture 2

Liquid-Film Boiling Heat Transfer and Spray Cooling on Hierarchical Wicking Surfaces

Ronggui Yang
Peking University, China
Monday, June 24, 2024 | Fuyue Hall 3 | 13:30-14:00

Abstract:

With the ever-increasing integration and performance improvement of electronics, information systems and energy systems, high flux thermal management has become critical for many industrial sectors. Liquid film boiling which takes advantage of both capillary evaporation and nucleate boiling was recently proposed to enhance simultaneously the heat transfer coefficients (HTC) and critical heat flux (CHF). In this talk, we will present our efforts in modeling the boiling incipience, heat transfer coefficient, and critical heat flux of liquid film boiling. We will also present our recent work in developing hierarchical ordered perforated surface for highly efficient liquid film boiling. A CHF up to 693.1 W/cm^2 and an HTC of 974.9 kW/m^{2}K with a heating area of 5×5 mm^2 is obtained, exceeding the state-of-the-art heat transfer performance of liquid film boiling and capillary evaporation. Spray cooling can significantly enhance the heat transfer performance of liquid film boiling, by coupling it with forced convection of injected spray droplets. We designed and fabricated novel 3D-ordered hierarchical micro/nano-structured surface to achieve superior spray cooling heat transfer performance with a peak heat flux of 1273 W/cm² and heat transfer coefficient of 443.7 kW/(m²·K) on a 1 × 1 cm² heating surface.

Keynote Lectures

Keynote Lecture 3

Superhydrophobic Photothermal Materials for Anti-Icing and Deicing

Rong Chen
Chongqing University, China
Monday, June 24, 2024 | Session Room 1 | 13:30-14:00

Abstract:

Icing on the surface of outdoor equipment is a common and unavoidable phenomenon, which brings a lot of inconvenience and economic loss and even threatens the people's security. Photothermal materials can convert solar energy into heat to increase the surface temperature, thereby making the accumulated ice and snow on the surface melt. The superhydrophobic photothermal materials by endowing photothermal materials with superhydrophobicity are found to possess the ability of anti-icing and de-icing, which provides a new way to address the issue of surface icing. Herein, we develop various superhydrophobic photothermal materials with micro-nano structures for anti-icing and de-icing. The synergistic mechanism of photothermal conversion and superhydrophobic properties to promote anti-icing and de-icing is revealed. The methods to enhance the anti-icing and de-icing performance of superhydrophobic photothermal materials have also been proposed. It is expected that superhydrophobic photothermal materials can be applied to outdoor equipment surfaces for high-efficiency anti-icing/deicing in the near future.

Keynote Lectures

Keynote Lecture 4

Theoretical Modeling and Key Technology Research on Thermal Management System of Electronics under High-Temperature Environment

Xiaobing Luo
Huazhong University of Science and Technology, China
Monday, June 24, 2024 | Session Room 2 | 13:30-14:00

Abstract:

In fields such as oil exploration, defense industry and aerospace, electronics are often exposed to high-temperature environments. For example, the logging tool that explores the distribution of oil and gas resources underground is often required to operate at ambient temperatures of more than 200 °C for several hours. The internal electronics cannot tolerate such high temperatures and require thermal management. Therefore, a thermal management system centered on thermal insulation, heat storage, and enhanced heat transfer was proposed to protect the electronics. Firstly, Theoretical modeling of complex heat transfer processes in the thermal management system, such as convection heat transfer, radiation heat transfer, phase transition process, etc., was carried out for system design; then, key technologies such as thermal insulation technology, heat storage technology, enhanced heat transfer technology, and thermal optimization technology, were developed for device design; finally, a variety of thermal management systems for logging tools were successfully developed by theoretical modeling and key technologies. These logging tools have achieved remarkable results in actual downhole operations. In addition, the developed thermal management skeleton has been sold on a large scale. This thermal management system can be extended to more fields involving high-temperature environments.

Keynote Lectures

Keynote Lecture 5

Enhancing Natural Convection Heat Transfer through a Vertical Channel with a Confined Circular Cylinder

Chengwang Lei
The University of Sydney, Australia
Monday, June 24, 2024 | Session Room 3 | 13:30-14:00

Abstract:

Natural convection through a heated vertical channel has many applications in industrial and domestic systems. Examples include thermal flows through industrial panel radiators and between plate fins of heat sinks etc. In this study, we investigate a passive strategy for enhancing natural convection heat transfer through a vertical channel. The strategy involves a rigidly or elastically mounted circular cylinder placed horizontally in a flow channel formed by two isothermally heated vertical plates. A two-dimensional numerical simulation is conducted over a range of Rayleigh numbers, blockage ratios (the ratio of cylinder diameter to channel width), and cylinder positions relative to the channel height. The thermal flow behaviours behind the cylinder and in the channel are examined, and the heat transfer performance is evaluated.

For the rigidly mounted cylinder case, three distinct wake flow regimes are observed at different Rayleigh numbers and blockage ratios, including steady symmetric, unsteady periodic, and unsteady asymmetric flow regimes. The steady symmetric and unsteady periodic flows are observed at all blockage ratios, whereas the unsteady asymmetric flow is only observed at the highest blockage ratio of 0.75 considered in this study and high Rayleigh numbers in the order of 108 and above. It is found that the presence of the cylinder significantly enhances mixing and turbulence in the channel, and in turn enhances heat transfer through the channel. Greater than 60% heat transfer enhancement relative to the unblocked channel may be achieved in the unsteady periodic flow regime at certain configuration.

It is also observed that, at relatively low Rayleigh numbers, the presence of a rigidly mounted cylinder results in a steady symmetric wake behind the cylinder, and consequently the heat transfer through the channel is depressed. An attempt is then made to replace the rigidly mounted cylinder with an elastically mounted cylinder, aiming to enhance heat transfer by vortex induced vibration at low Rayleigh numbers. A single degree of freedom system in which the circular cylinder is constrained to oscillate in the lateral direction only is considered. Different blockage ratios up to 1/3 are examined at a fixed Rayleigh number of ~2.0×107 and a fixed mass ratio of 10. It is found that both the amplitude of the cylinder oscillation and the heat transfer enhancement depend on the blockage ratio and are non-monotonic functions of the reduced velocity. Further, the reduced velocity at which the maximum oscillation amplitude occurs decreases with increasing blockage ratio, whereas the maximum heat transfer enhancement increases with increasing blockage ratio.

The present investigation has demonstrated the potential of using flow confinement to enhance heat transfer through vertical heated channels. Further numerical simulations over extended parameter ranges and corresponding experimental measurements are ongoing.

Keynote Lectures

Keynote Lecture 6

Clean Fuel Production through Solar Thermochemical Conversion: New Mechanism and Method Exploration

Qibin Liu
Institute of Engineering Thermophysics, CAS, China
Monday, June 24, 2024 | Shanghai Hall | 13:30-14:00

Abstract:

Solar thermochemical fuel production is a promising way to large scale utilization of renewable energy and achieve sustainable development, because it stores the instable and intermittent solar energy into stable chemical energy of fuel. However, the problem of high reaction temperature, large irreversible loss and low efficiency hinders its development and application.

This presentation focuses on some typical solar thermochemical processes, including solar thermochemical water-splitting cycles and mid-and low temperature solar methanol decomposition. A new mechanism of decreasing temperature for thermochemical cycle is clarified, through which a new cycle is established with the highest temperature lower than 1000°C. For mid-and low temperature solar methanol decomposition, we develop a large scale inear solar-to-fuel conversion reactor, and obtain a high performance. We hope related discussions can provide some alternative ways to decreasing reaction temperature and achieve efficient solar-to-fuel conversion.

Keynote Lectures

Keynote Lecture 7

Multi-Scale Modeling and Investigation on Performance Characteristics and Degradation Mechanism of Proton Exchange Membrane Fuel Cells

Zhiguo Qu
Xi'an Jiaotong University, China
Monday, June 24, 2024 | Session Room 5 | 13:30-14:00

Abstract:

Revealing the performance characteristics and degradation of the proton exchange membrane fuel cell (PEMFC) via modeling and simulation is of primary importance for its commercialization development, which is a typical multi-scale problem and can be roughly clarified into component-, cell-, stack-, and system-levels. At component level, we developed a series coupled gas/liquid transport-electrochemical reaction model based on realistic electrode structure to regulate the water and thermal states inside electrodes, including the gas diffusion layer (GDL) and catalyst layer (CL), and the degradation process inside the CL and PEM induced by the Pt catalyst degradation and precipitation was also numerically investigated via a one-dimensional (1D) model. Besides, the conventional 3D cell-level model was extended to commercial-scale fuel cells (~360 cm^2) for fuel cell vehicle (FCV) applications, which includes full cell structure morphology, and a topology-optimized algorithm was implemented in the design and optimization of coolant channel structure. Moreover, a 3D stack model was developed for the air-cooled fuel cell stack incorporating the full fan morphology, and the temperature distribution inside the stack and polarization curve were validated against the experimental data simultaneously. And a high-precision and fast-response stack design software was developed by combining a 1D PEMFC model and an artificial neural network (ANN) model. A system-level fast simulation software including detailed BOP components was introduced to provide guidance for control algorithms and efficient operation of systems. The modeling and simulation work at these four levels are believed to play a vital role in the R&D of PEMFC.

Keynote Lectures

Keynote Lecture 8

Pore Level Behavior of Thermal Radiation and Coupled Effects with Convection in Porous Foams at High Temperature.

Xinlin Xia
Harbin Institute of Technology, China
Monday, June 24, 2024 | Session Room 6 | 13:30-14:00

Abstract:

High porosity open cell foams made of high temperature metals and ceramics have been found wide application in many engineering fields involved high temperature, such as volumetric solar receivers, thermal chemical reactor driven by solar energy, foam combustor, recycle of high temperature waste heat, and so on. In the applications, the energy is usually transferred and transformed by thermal radiation and its coupled effects with gas convection. Therefore the knowledge on thermal radiation and coupled effects with convection in porous foams at high temperature is fundamental. In this report, the research progress on the topic achived by our team is presented. The main content include the structure characterization of open cell foams and the thermal radiation modelling of porous medium, the pore level simulation method and transfer behavior of thermal radiation in foams, and the radiative property of skeleton ligament and the predicted radiative property data of foams at high temperature, as well as the coupled behavior and effects of thermal radiation with gas convection. At last, the unsolved issues and challenge on the topic are presented. And a little useful reference is wished to be presented to our colleagues.

Keynote Lectures

Keynote Lecture 9

Exploring Heat Transfer and Pressure Drop Characteristics in Fluid Flow through Open-Cell Porous Metals with Tens-of-PPI Porosity

Ji Hwan Jeong
Pusan National University, Korea
Monday, June 24, 2024 | Session Room 7 | 13:30-14:00

Abstract:

Open-cell porous metals are characterized by high surface area-to-volume ratios and tortuous intricate flow paths, offer significant potential for enhancing convective heat transfer in various applications, including electronic device cooling, fuel cell electrodes, and compact heat exchangers. With a rich history spanning over 150 years, diverse research areas in porous metals have paved the way for their utilization in multiple fields. This presentation delves into the thermo-fluidic characteristics of working fluids within porous metals, a crucial aspect for the tailored design of these materials for specific applications. Key parameters such as single and two-phase pressure loss coefficients, convective heat transfer coefficient, fin efficiency, and boiling and condensation heat transfer coefficients play pivotal roles in optimizing porous metal designs.

Over the past decade, our research group has undertaken an extensive exploration of open-cell porous metals, focusing on quantifying their thermo-fluidic performance. This includes in-depth studies on single-phase pressure drop, two-phase pressure drop, and the development of convective heat transfer models. The presentation aims to provide a concise overview of these research endeavors and share valuable insights and lessons learned from the outcomes.

Keynote Lectures

Keynote Lecture 10

TDA (Thermal Design Automation): Realizing Multiscale Thermal Managements for Electronic System

Bingyang Cao
Tsinghua University, China
Monday, June 24, 2024 | Session Room 8 | 13:30-14:00

Abstract:

Thermal managements have been becoming a bottleneck in the further development of modern electronic systems due to decreasing chip process sizes, increasing integration densities, and higher demands on computing power. To overcome the challenges, multiscale thermal managements from nanoscale to macroscale are much necessary for electronic systems. TDA (Thermal Design Automation) is introduced in this presentation from concept and roadmap to development and applications. The talk covers the following four aspects: (1) Non-Fourier heat transport and thermophysical properties of nanostructures in electronics; (2) Thermal spreading at transistor level and system level. (3) Thermal management materials for electronics. (4) Development and applications of TDA (Thermal Design Automation). The TDA framework is expected to benefit the integration of thermal management technologies at different scales and the electrothermal codesign of electronics.

Keynote Lectures

Keynote Lecture 11

Surface-Plasmon-Enhanced Heat Transfer on a Thin Metallic Film

Bong Jae Lee
Korea Advanced Insitute of Science and Technology, Korea
Monday, June 24, 2024 | Session Room 9 | 13:30-14:00

Abstract:

Surface plasmon polartions (SPPs) are a type of surface electromagnetic wave that is coupled to free electrons in metals that can be thermally excited and act as heat carriers. Thermally excited SPPs exist in a wide range of spectral regions and have been used to tune near-field thermal radiation in lossy metals and heavily doped semiconductors. This presentation will discuss our most recent results [1-3] about the surface-plasmon-enhanced in-plane thermal conductivity of a thin metal film deposited on a glass substrate.

[1] D. Kim, S. Choi, J. Cho, M. Lim, and B.J. Lee, Phys. Rev. Lett. 130, 176302 (2023).
[2] D. Kim, J. Nam, and B.J. Lee, Phys. Rev. B 108, 205418 (2023).
[3] K.H. Yun, D. Kim, B.J. Lee, arXiv:2401.14677 (2024).

Keynote Lectures

Keynote Lecture 12

Supercritical Pseudo-Boiling: Theory, Experiment and Applications

Jinliang Xu
North China Electric Power University, China
Tuesday, June 25, 2024 | Fuyue Hall 1 | 13:30-14:00

Abstract:

Pseudo-boiling was proposed in 1950~1960s, but for a long history, supercritical heat transfer has been treated with the single-phase fluid assumption. Recent advances regarding pseudo-boiling focusses on the investigation of the fluid characteristics while crossing the Widom line. Supercritical fluid (SF) is regarded as either liquid-like (LL) state, or gas-like (GL) state. Here, we proposed the three-regime model, by adding an additional two-phase-like (TPL) regime, except LL regime and GL regime, based on molecular dynamics simulation. The PTL regime is a mixture of LL fluid and GL fluid. In the TPL regime, nano-voids are observed, having two distinct characteristics: (1) Particles are sparsely distributed to have gas density inside the void, but are densely populated to have liquid density outside the void. (2) Voids have curved interfaces, which are called “bubble-like”. We further established a multi-phase framework in macroscopic scale. In the TPL regime, a set of non-dimensional parameters are proposed to reflect the interactions of mass, momentum and energy between LL and VL phases. The pseudo-vapor mass quality (x) is newly defined to characterize the vapor mass content in the mixture. Our multi-phase theory successfully explains the unconventional phenomena in supercritical pressures. It is found that the measured heat transfer coefficients in the TPL regime ($0<x<1$) significantly deviated from those based on the single-phase fluid theory, but can be predicted by the multi-phase theory.

It is known that evaporation and boiling are two distinct heat transfer modes in subcritical pressures. We experimentally identified that both evaporation-like (EL) and boiling-like (BL) heat transfer occurring under supercritical pressures by heating a platinum (Pt) wire or a nickel-chromium (NiCr) wire. Out results showed that only the EL mode exists for the Pt wire. The vapor-like film thickness was quantitatively determined by processing the high speed image files. But for the NiCr wire, both the EL mode and the BL mode are observed. The bubble-like pattern is clearly viewed in macroscopic scale, and the vapor-liquid interface is tracked in time series. The bubble-like structure is caused by the spatio-temporal instability. Hence, the small-perturbation theory is introduced to explain the instability induced bubble-like structure. We further characterized the quantitative contribution of the pseudo-boiling to the total heat transfer rate. Comparative experiments were conducted on subcritical boiling and supercritical pseudo-boiling using fine NiCr wires as both heating and temperature sensing elements. The applied heat flux q is decoupled into an evaporation part q_e, and a boiling part q_b: $q=q_e+q_b$. The pseudo-boiling contribution is characterized as q_b/q, which is varied in a range of 19%~65%, indicating the important pseudo-boiling effect during the heat transfer process. In summary, we established a multiphase framework for flow and heat transfer in supercritical pressures. We directly observed the vapor-liquid interface and bubble-like pattern in macroscopic scale, and quantitatively characterized the pseudo-boiling contribution.

Keynote Lectures

Keynote Lecture 13

Engineering Complex Thermophysical Properties by Materials Informatics

Junichiro Shiomi
University of Tokyo, Japan
Tuesday, June 25, 2024 | Fuyue Hall 2 | 13:30-14:00

Abstract:

Materials informatics (MI) is to develop or study materials with the aid of informatics or machine learning. A typical approach is to train a black box model that relates basic descriptors (structure, composition, etc) and FoM (target properties) and predict or design a material with the largest FoM. At Thermal Energy Engineering Lab (TEEL) at University of Tokyo, together with the collaborators, we have been working on MI for heat transfer since 2015. One of the initial works was to design binary multilayered nanostructure to minimize or maximize thermal conductance by coupling thermal transport calculation and Bayesian optimization, which showed excellent efficiency. Later, the search space has been greatly expanded by utilizing quantum annealing. We have applied the methodology to computationally design and experimentally realize aperiodic superlattice that optimally impedes coherent thermal transport and multilayer metamaterial with wavelength-selective thermal radiation. More recently, we have extended the machine-learning approach to that for amorphous and polymers, aiming to functionalize them in terms of the thermal and sometimes dielectric properties. There, the final properties are quite sensitive to the process parameters, therefore, the above approach of serially connecting optimal design and experimental realization of materials is not sufficient. To this end, we have been developing a semi-automated MI system, where experimental fabrication and measurement are included in the optimization loop. In the talk, I will introduce the recent development in the above topics carried out by TEEL and the collaborators.

Keynote Lectures

Keynote Lecture 14

Centrifugal Granulation Assisted Thermal Energy Recovery to Harvest Ultrahigh Temperature Waste Heat from Molten Slag

Xun Zhu
Chongqing University, China
Tuesday, June 25, 2024 | Fuyue Hall 3 | 13:30-14:00

Abstract:

Waste heat accounts for nearly 40% of the total energy consumption industry and most waste heat is not harvested due to technical challenges. One major waste heat source is the molten slag emitted from the metallurgical industry, which features ultrahigh temperatures of 1500 Kelvin and above. Unfortunately, the ultrahigh temperature waste heat was not tapped. To address this issue, we developed the centrifugal-granulation-assisted thermal energy recovery (CGATER) method which breaks up the molten slag into small droplets first and then cools down the droplet with air or water. In this talk, we will introduce the basic working principle of CGATER, discuss the experimental and modelling efforts in CGATER development, and highlight the remaining challenges to further deploy the CGATER for large-scale implementation in the metallurgical industry. Regarding the technical availability and potential benefit, CGATER is believed to be one of the best options to harvest the ultrahigh temperature waste heat from molten slags.

Keynote Lectures

Keynote Lecture 15

Thermal Transport through Nanowires – beyond the Classical Size Effect

Deyu Li
Vanderbilt University, United States of America
Tuesday, June 25, 2024 | Mingzhu Hall | 13:30-14:00

Abstract:

Thermal transport properties of various nanowires have attracted extensive attention in the past few decades. Beyond the classical size effect due to scattering of energy carriers at the nanowire surface, various novel nanoscale effects have been discovered, which lead to more exotic thermal properties.

One interesting effect is the coupling between the mechanical and thermal properties of nanowires. For example, acoustic softening occurs for thin silicon nanowires with significantly reduced Young's modulus, which leads to considerably reduced thermal conductivity [1,2]. On the other hand, elastic stiffening with an enhanced Young's modulus can happen in other types of nanowires, which manifests its effects on both electrical and thermal transport properties of silver nanowires, resulting in an interesting trend for the silver nanowire Lorenz number [3].

More interesting phenomena occur in quasi-one-dimensional (quasi-1D) van der Waals (vdW) crystal nanowires that are composed of covalently bonded atomic chains assembled together via weak interchain vdW interactions. For example, quasi-1D $NbSe_3$ nanowires demonstrate a non-monotonic diameter dependence of the nanowire thermal conductivity, which is not consistent with the classical size effect [4]. Further studies show that for nanowires of <26 nm diameter, the thermal conductivity becomes divergent with the wire length up to the maximum measured length of 42.5 microns. Analyses indicate that these intriguing observations are due to 1D phonon-dominant transport, which is triggered by a >5 fold enhancement of the Young's modulus from the bulk value in thin $NbSe_3$ nanowires. Importantly, this observation provides the first solid experimental evidence for superdiffusive transport along 1D lattices, a classical anomaly in thermal physics that can be traced back to the Fermi-Pasta-Ulam-Tsingou (FPUT) paradox that was first predicted in 1955.

Beyond electrons and phonons, various kinds of surface polaritons can also play significant roles in thermal transport along nanowires because of the large surface-area-to volume ratio. For example, for nanowires made of polar molecules, surface phonon polaritons (SPhPs), hybrid quasi-particles resulting from coupling between infrared photons and optically active phonons, have been predicted to contribute to heat conduction along polar thin films and nanowires. However, experimental attempts taking advantage of the ultralong SPhP decay length only suggested a low SPhP thermal conductivity of <0.5 W/mK. Through introducing an Au coating at the ends of the 3C-SiC nanowires as the SPhP launcher, it was found that the SPhPs could lead to a room temperature thermal conductivity of ~6 W/mK. More astonishingly, the extracted pre-decay thermal conductance is over two orders of magnitude higher than the Landauer limit derived based on the equilibrium Bose-Einstein distribution functions [5]. This intriguing behavior indicates that far-from-equilibrium SPhPs with a much higher number density can be stimulated from a thermal source, in sharp contrast to the conventional wisdom that without non-equilibrium heat sources such as lasers involved, thermal transport can be treated under the near-equilibrium approximation with well-defined local temperatures.

[1] Wingert et al. Nano letters 15, 2605-2611 (2015).
[2] Yang et al. Nanoscale 8, 17895-17901 (2016).
[3] Zhao et al. Nano Letters 20, 7389-7396 (2020).
[4] Yang et al. Nature Nanotechnology 16, 764-768 (2021).
[5] Pan et al. Nature 623, 307-312 (2023).

Keynote Lectures

Keynote Lecture 16

Thermophysical Properties under Extreme Conditions by Ultrafast-Laser Time Domain Thermoreflectance Method

Dawei Tang
Dalian University of Technology, China
Tuesday, June 25, 2024 | Session Room 1 | 13:30-14:00

Abstract:

The study of thermal transport under extreme conditions, such as high-pressures, high-temperatures, ultrafast process, high-magnetic fields or nanoscale space, has become the central topic in the fields of thermophysics, superconductor physics, geophysics, ultra-precision machining, material science and etc. However, obtaining accurate thermal properties under these conditions were challenging. The time domain thermoreflectance (TDTR) method based on ultrafast laser is a powerful and noncontact technique for the thermal characterizations with various scenarios. In this talk, we will present our recent developments in this field. We have established a diamond anvil (DAC) and combined it with an upgraded TDTR to achieve precise measurement of thermal transport with femtosecond time resolution under ultra-high pressure and high temperature conditions. The studied material systems include earth matter, functional materials, nanostructures, and interfaces. The first principles method was used to simulate the thermal transport of various material systems under ultra-high pressure and wide temperature range conditions, and the pressure and temperature dependence of thermal properties were obtained. By comparing and analyzing theoretical predictions and experimental measurement results, the physical mechanisms of heat transport under different extreme conditions have been revealed.

Keynote Lectures

Keynote Lecture 17

Photon Tunneling Mediated Heat Transfer in Particle Networks: From Particle Scale to Continuum Scale

Junming Zhao
Harbin Institute of Technology, China
Tuesday, June 25, 2024 | Session Room 2 | 13:30-14:00

Abstract:

Photon tunneling will induce heat flux several orders of magnitude larger than the limit set by black body radiation, which usually happens when two objects are in the near field, i.e., at a distance comparable to or smaller than the thermal wavelength. It is thus very appealing to think of using the mechanism to enhance heat transfer. The doping of nanoparticles in bulk material is promising to introduce the photon tunneling modes in heat transfer. When a complex system of particles, usually an array or cluster of particles, are considered, strong many-body interaction will occur, which will bring both enhancement or inhibition of exchanged radiation heat flux, and hence influence the heat transfer characteristics. Due to nonlocal heat transfer mode and other complex physics, the conventional heat conduction equation might not be valid in such system. In this presentation, we will report the recent progress and our recent works on the heat transfer in nanoparticle networks mediated by photon tunneling, focusing on the particle scale physics and homogenization theory.

Keynote Lectures

Keynote Lecture 18

Two-Phase Spray Flamelet/Progress Variable Model for Spray Combustion

Kun Luo
Zhejiang University, China
Tuesday, June 25, 2024 | Session Room 3 | 13:30-14:00

Abstract:

Spray combustion involves many coupled multi-scale and multi-physical processes including atomization, evaporation, chemical reaction, heat and mass transfer, etc. Strong turbulence-chemistry interactions in spray combustion lead to the demand for accurate turbulent combustion models. Among various combustion models, flamelet models are promising solutions with high computational efficiency. Many flamelet models have been proposed and extended to spray combustion modeling. One popular approach is based on the gaseous flamelet library, however, the accuracy is not guaranteed for gas-liquid two-phase spray combustion. The other approach is based on the two-phase spray flamelet library considering the influence of droplet evaporation on the flamelet structure. However, issues about the non-monotonicity of the mixture fraction and the high dimensionality of the spray flamelet library create great difficulties for the application and promotion of these models. In this work, a new two-phase spray flamelet/ progress variable (TSFPV) model considering the effect of droplet evaporation is developed. An additional mixture fraction (named carrier mixture fraction) is defined to avoid the problem related to the non-monotonicity of the spray flame structure. Evaporation source term models based on the empirical formula and physical derivation are developed and applied to the calculation of one-dimensional counterflow flames to establish the spray flamelet library with appropriate dimensionality. To evaluate the accuracy of the TSFPV model, the counterflow spray flame, laminar spray-air mixing layer, and turbulent spray reactive jet in cross-flow are selected as the target configurations. The a priori and a posteriori studies are conducted by comparing the modeling results with the detailed chemistry results. Then, large eddy simulations are carried out for laboratory flame configurations with different types of inlet streams, such as the Sydney turbulent lifted spray flame, Delft spray flame, and Cambridge swirling spray flame. The performance of the model is evaluated by comparing the simulation results with the experimental data. The TSFPV model is well-validated and exhibits sound performance on different flame configurations, which illustrates the potential for spray combustion modeling.

Keynote Lectures

Keynote Lecture 19

Latent Heat Transportation with Hard-Shell Micro-Encapsulated Phase Change Materials

Hiroshi Suzuki
Kobe University, Japan
Tuesday, June 25, 2024 | Session Room 5 | 13:30-14:00

Abstract:

Silica hard-shell micro-encapsulated phase change materials has been developed in order to apply to latent heat transportation systems. Silica microcapsules have advantages on the thermostability, mechanical toughness, chemical resistances and small adhesiveness onto walls of flow systems compared with polymer-shell microcapsules. In this lecture, the thermal characteristics of silica hard-shell microcapsules containing inorganic hydrates will be discussed. From the results, it is found that the super-cooling phenomena of inorganic hydrates disappears in microcapsules. From this, these microcapsules can be applied to many applications not only to latent heat transportation but also to many kinds of thermal storage systems. Thus, the present microcapsules containing phase change materials are promising materials for low-carbon society realization.

Keynote Lectures

Keynote Lecture 20

Heat Transfer in Nanostructured Semiconductors: A Photonic Perspective

Masahiro Nomura
The University of Tokyo, Japan
Tuesday, June 25, 2024 | Session Room 6 | 13:30-14:00

Abstract:

Heat conduction control in a semiconductor membrane by nanostructuring will be discussed from the viewpoint of photonics. We classify the systems by similarity, difference, and hybridization of phonons and phonons, and explain characteristic thermal phonon transport in each system. We also discuss the potential for engineering thermal phonon behavior.

Light propagation in ray optics and thermal phonon transport at the nanoscale share similarities due to their ballistic nature. Artificial crystals for photons and phonons, those are photonic crystals and phononic crystals, exploit the wave properties of electromagnetic and elastic waves to achieve unique light and mechanical vibration propagation characteristics [1]. By considering these similarities and differences between photons and phonons, recent studies have demonstrated how strategically designed nanostructures can manipulate heat transport more effectively [2]. The ballistic behavior of phonons within their mean free path (MFP) allows for advanced heat flux control, such as directional heat flow and heat focusing. This phenomenon, termed "Ray phononics" due to its resemblance to ray optics, utilizes aligned nanoholes in a membrane to selectively transmit phonons in a specific k-vector direction, maintaining directionality within the MFP [3].

Furthermore, the interaction and hybridization of photons and phonons offer exciting possibilities. Phonons can influence the emission of single photons from a quantum dot embedded in a high-Q optical micro/nanocavity [4, 5]. One example of hybridization is the formation of surface phonon polaritons (SPhPs). By "shaking hands" with photons, phonons can achieve significantly higher travel speeds (by four orders of magnitude) as SPhPs at a surface polar material or in polar membranes. Additionally, photon-like SPhPs, around the light-line in the band diagram, significantly suppress phonon scattering, leading to enhanced thermal conduction in thin polar membranes. The thermal conductivities of SiN nanofilms below the thickness of 50 nm are increased as the temperature increases thanks to the increased contribution of SPhP heat transfer. This dramatic change in thermal transport properties opens new avenues for thermal management in thin films [6].

Regarding the different transport properties of photons and phonons, in contrast to light, phonons exhibit hydrodynamic behavior, a phenomenon rarely observed in optics. This collective behavior, arising from interactions within phononic systems, leads to intriguing thermal transport phenomena such as phonon Poiseuille flow [7] and second sound [8]. We experimentally investigate phonon Poiseuille flow in microscale graphite ribbons with both natural (1.1% ^{13}C) and purified (0.02% ^{13}C) carbon isotope concentrations. We measure the thermal conductivity of the graphite ribbons in a wide temperature range of 10-300 K. At 90 K, isotope scattering plays an important role in phonon transport, resulting in an enormous enhancement of the thermal conductivity of purified graphite ribbon compared to that of the natural one with the same width of 5.5 μm by more than 100% [7]

[1] J. Ravichandran, et al., Nat. Mater., 13, 168 (2014).
[2] M. Nomura, et al., Mater. Today Phys. 22, 100613 (2022). [Review paper]
[3] R. Anufriev and M. Nomura, Mater. Today Phys. 15, 100272 (2020).
[4] M. Nomura, Nat. Nanotechnol., 11, 496 (2016).
[5] M. Nomura, et al., Nat. Phys. 6, 279 (2010).
[6] Y. Wu, et al., Sci. Adv. 6, eabb4461 (2020).
[7] X. Huang, et al., Nat. Commun., 14, 2044 (2023).
[8] S. Huberman, et al., Science., 364, 375 (2019).

Keynote Lectures

Keynote Lecture 21

Measuring and Understanding Thermochemical Process in Combustion: From Regular to Extreme Conditions and Homogenous to Multiphase Circumstances

Yuyang Li
Shanghai Jiao Tong University, China
Tuesday, June 25, 2024 | Session Room 7 | 13:30-14:00

Abstract:

Thermochemical process governs combustion characteristics and performance, making its measurements and understanding significant for better control combustion energy conversion in practical energy and power devices. In our group, measurement methods for combustion chemistry applicable to a wide range of conditions, including high-temperature/high pressure (HTP) flame propagation measurement methods and highly sensitive methods for measuring combustion intermediates, were developed to satisfy the extended research needs from regular to extreme conditions and macroscale to microscale. Highly-predictive/widely-applicable kinetic models for both gaseous fuels and liquid fuels were developed and comprehensively validated against various types of experimental data covering wide ranges of conditions, which provided deep insight into the governing mechanisms in different combustion thermochemical processes. The understanding of combustion chemistry under homogenous circumstances was further applied to study and regulate practical combustion characteristics and performance. From homogenous to complex flow, swirl combustion characteristics and emission behaviors of renewable low-carbon fuels such as ammonia, biogas, dimethyl ether, and H2-rich fuels were investigated and regulated for better gas turbine applications. From pure gaseous phase to multiphase, spray dynamics, droplet impact and combustion, and soot formation and oxidation were also explored. These studies deepened our understanding of the driven forces in combustion thermochemical processes and facilitated a better utilization of combustion energy in practical devices, especially for low-carbon fuels.

Keynote Lectures

Keynote Lecture 22

Electrostatic Adsorption and Ion Transport in Microporous Structure for High Power Supercapacitor Energy Storage

Zheng Bo
Zhejiang University, China
Tuesday, June 25, 2024 | Session Room 8 | 13:30-14:00

Abstract:

Energy storage technologies with power density up to 104 W/kg is essentially required in many applications. Supercapacitor is a typical high-power energy storage technology. It is based on a solid-liquid electrostatic adsorption principle, where charged porous electrode (such as activated carbon) is used to adsorb ions from electrolyte. Micropores less than 2 nm contribute the vast majority of the specific surface area of porous materials, and thus the electrostatic adsorption and ion transport in microporous structure is key to enhance the power performance of supercapacitors. However, ion distribution in the nano-confined space of micropores owns a series of special effects, such as size effect and edge effect, which is quite complex and hard to be precisely described. Meanwhile, ion transport in micropores is quite selective, and the laws of entropy production and the selectivity of ion transport remain unclear. This presentation will present our research results on the spatial ion distribution and ion transport during the electrostatic adsorption in nano-confined spaces, which is useful for guiding the design of microporous electrode of supercapacitors and advancing the energy storage performance.

Keynote Lectures

Keynote Lecture 23

Investigation of Wall Chemical Effects in Hydrogen/Ammonia Flames toward Green Combustion Systems

Yuji Suzuki
The University of Tokyo, Japan
Tuesday, June 25, 2024 | Session Room 9 | 13:30-14:00

Abstract:

Flame-wall interaction (FWI) plays an important role in the near-wall flame behavior of internal combustion engines and gas turbines. The ignition process and emission can be significantly changed due to the FWI. In microscale combustors, the FWI becomes more significant due to the large surface to volume ratio, resulting in flammability and flame stability problems. Flame quenching due to heat loss to the wall has been intensively studied, but it was only recently that strong wall chemical effect was observed through OH planar laser induced fluorescence (OH-PLIF) measurements of a methane/air premixed flame in micro channels. They found that the near-wall OH concentration is significantly affected by the surface materials at high wall temperatures (≥800 ºC). In the present study, the adsorption of H in the wall radical quenching was examined through the measurement of H atom concentration using microscopic two-photon absorption LIF (TALIF).

Keynote Lectures

Keynote Lecture 24

Solar-Driven Valorization for CO_2, Biomass, and Waste Plastics: A Study on Carbon Emission Reduction from Concentrated Solar Power (CSP)

Yong Shuai
Harbin Institute of Technology, China
Wednesday, June 26, 2024 | Fuyue Hall 1 | 13:30-14:00

Abstract:

Concentrated Solar Power (CSP) can drive thermochemical reactions such as CO_2 reduction, biomass gasification, and waste plastics pyrolysis, thereby addressing carbon emissions in energy supply processes for thermochemical reactions. This study summarizes our work in solar thermochemical processes, including two-step CO_2 reduction to produce syngas, biomass gasification for high-purity hydrogen formation, and waste plastic pyrolysis for liquid fuels production. Our research focuses on the role of porous media in solar thermochemical processes. Porous media serve as both solar radiation absorbers and catalysts for thermochemical reactions. We conducted extensive studies on porous catalysts, investigating their structural parameters and material types to determine the optimal catalysts for different thermochemical reactions. Additionally, we carried out numerical studies to optimize solar thermochemical reactors to enhance the energy conversion efficiency. Specifically, we developed numerical models for solar thermochemistry at different wavelengths to improve the accuracy of the simulated results. Due to the fluctuating nature of real solar energy density, we also investigated the use of molten salt as a thermal energy storage medium to reduce the impact of solar variability. This approach is particularly aimed at driving temperature-sensitive thermochemical reactions such as waste plastics pyrolysis. This study shows the potential of CSP to drive various thermochemical reactions across different temperature ranges (500–1300 °C), providing valuable insights into the utilization of solar energy.

Keynote Lectures

Keynote Lecture 25

Freezing Dynamics and Morphology of Deposited and Impact Droplets on a Cold Surface

Chun Yang
Nanyang Technological University, Singapore
Wednesday, June 26, 2024 | Fuyue Hall 2 | 13:30-14:00

Abstract:

Icing of structures is a major hazard from aviation (e.g. aircrafts), to energy production (e.g. wind turbines), maritime (e.g. shipping, offshore oil rigs), and thermal systems (e.g., heat pumps, cold storage). Icing is usually resulted from a droplet impacting/depositing onto a cold surface and then freezing on the surface. In the past decades, the use of coatings of various materials for mitigating icing or de-icing, has been explored. Often wettability of coatings is used as a key indicator for its effectiveness in aiding with de-icing or mitigating the icing. This is due to the facts that wettability of a surface influences how a droplet will remain or can be removed from a surface and also surface wettability will determine the nucleation sites for ice or frost to form, which in turn will cause freezing of the water on the surface. Therefore, the phenomenon of droplet freezing on a substrate surface exhibits the strong coupling of multi-physics including droplet impact dynamics, surface wetting, and substrate cooling with phase change. This talk will discuss the freezing characteristics of deposited and impacting water droplets and nanofluids droplets under the effects of surface wettability, substrate temperature, and impact velocity. Both experimental and numerical simulation results will be reported.

Keynote Lectures

Keynote Lecture 26

Direct Evaluation and Optimization of Heat Exchangers on Cycle Efficiency in Brayton Cycles for Power and Energy Storage

Guihua Tang
Xi'an Jiaotong University, China
Wednesday, June 26, 2024 | Fuyue Hall 3 | 13:30-14:00

Abstract:

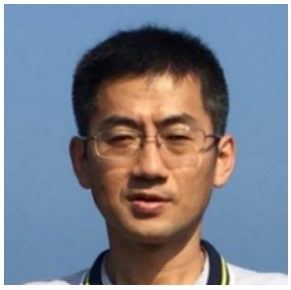
The performance of heat exchangers has significant effect on the cycle efficiency in the Brayton cycles for both power and energy storage systems. However, it remains challenging for the existing methods such as the performance evaluation criteria (PEC) and exergy/entropy analysis. In addition, the coupling analysis just provides the solutions for the cases under specific operation parameters of a specific cycle layout, in addition to high computational cost and technical complexity. In this talk, we present an approach, the performance recovery coefficient (PRC), to evaluate the effects of heat exchanger performances on the cycle efficiency simply using the component-scale parameters, avoiding complex coupling analysis. Evaluation and optimization for both heaters and recuperators in Brayton cycles for both power generation and integrated power generation and storage are then demonstrated under various layouts, parameters and working fluids.

References:

1. Li XL, Tang GH, Yang DL, Fan YH. Performance evaluation of heater and recuperator in Brayton cycles for power and energy storage, Applied Thermal Engineering, 2024, 244: 122739.
2. Li XL, Tang GH, Fan YH, Yang DL, A performance recovery coefficient for thermal-hydraulic evaluation of recuperator in supercritical carbon dioxide Brayton cycle, Energy Conversion Management 2022, 256: 115393.

Keynote Lectures

Keynote Lecture 27



Energy Conversion and Heat Transfer Based on Phase Change at Nanoporous Membranes

Zhichun Liu
Huazhong University of Science and Technology, China
Wednesday, June 26, 2024 | Session Room 1 | 13:30-14:00

Abstract:

This report presents our group's recent progress in the field of energy conversion and heat transfer based on fluid phase change at nanoporous membranes. First, we studied heat conversion and water desalination via thermo-osmosis and capillary evaporation. Furthermore, we investigated how to enhance the performance of thermo-osmotic systems through multiscale simulation and experiment methods. Besides, we proposed a nano heat pump based on the reverse thermo-osmosis effect. Finally, we developed a high flux heat sink that employs a venting membrane to improve the heat transfer and pressure drop, which would be an effective approach to address the high heat flux dissipation problem.

Keynote Lectures

Keynote Lecture 28

Thermal Coupled and Photovoltaic Electrolysis Integrated Solar Hydrogen Production

Dengwei Jing
Xi'an Jiaotong University, China
Wednesday, June 26, 2024 | Session Room 2 | 13:30-14:00

Abstract:

Large-scale hydrogen production from solar energy is one of the most attractive solutions to simultaneously address the urgent issues of energy crisis and environment pollution. At present, the widely considered solar hydrogen production scheme is photovoltaic power generation plus water electrolysis in a separated mode. However, the energy conversion efficiency of most commercial solar cells is generally around 20%, and other energy is wasted in the form of heat dissipation, which has a serious impact on the efficiency and life of photovoltaics. Based on the theory of orderly energy conversion, our team integrates and optimizes the PV power generation and hydrogen production processes, and establishes the theory and method of efficient regulation and control of "field-flow synergy" of the complex multiphase hydrogen production system with photothermal coupling through in-depth research on energy flow migration and light/thermal/chemical field interaction under variable working conditions under unsteady solar radiation. Hydrogen production efficiency for the whole wavelength and high-efficiency hybrid solar energy conversion and utilization system attains 25.2%. The results have been evaluated by other researchers in their publication as "innovative", "rare" and "very attractive", for many times. An expert group of 7 academicians organized by the Chinese Renewable Energy Society unanimously agreed that the overall technology of the project has reached the international leading level. The related core technologies have been successfully applied in the field of aerospace and national defense, and civilian technologies have also been promoted and applied in Shaanxi, Xinjiang, Inner Mongolia, Guangdong and other provinces in China.

Refercnes:

Zhu Y.Z., Ma B.C., He B.C., Ma X.Y., Jing D.W., Applied Energy, 2023,334:120733.
Liu Z, Zhou J, Li Y, Zhuo X, Shi XJ, Jing D.W., Fundamental Research, 2022, 2:222-229.
Wang X., Liu M.C., Jing D.W., Mohamad A., Prezhdo O., Nano Letters,2020,20(12):8965-8971.

Keynote Lectures

Keynote Lecture 29

Collaborative Research of Thermo-Fluids and Materials Developments in Fuel Cells and Flow Batteries

Shohji Tsushima
Osaka University, Japan
Wednesday, June 26, 2024 | Session Room 3 | 13:30-14:00

Abstract:

Fuel cells and redox flow batteries are expected to become more popular to achieve a decarbonized society. Both are electrochemical reaction devices that involve heat and mass transfer with electrochemical reactions, and thus the design and fabrication of the associated field is the key to high performance. In this talk, recent advances in our collaborative research of thermo-fluids and materials developments in polymer electrolyte membrane fuel cells and redox flow batteries are presented with an emphasis on fundamental understandings of the transport phenomena of reactants and products in these devices and their optimized designs and fabrications.

Keynote Lectures

Keynote Lecture 30

From Contact Line Corrugations to Rewritable Nanofilm Printing

Hao Wang
Peking University, China
Wednesday, June 26, 2024 | Session Room 5 | 13:30-14:00

Abstract:

An important reason for the century-long debate concerning wetting dynamics is the lack of decisive information about the contact line. The contact line cannot be treated as a geometric line but is rather a region with complex structures. This talk first introduces our recent findings about nano corrugations along the contact line on “smooth” solids and how it makes the previous line tension measurements based on the modified Young’s equation go wrong. This talk then introduces a largely unexplored ion beam induced film wetting (IBFW) technology for open surface rewritable nanofluidics, which is related to the nano corrugations. The IBFW technology eliminates the complicated surface fabrication procedures to achieve nanoscale flow in a controllable and rewritable manner. By combining with electrochemical deposition, various solid materials with desired patterns can be produced. Significances of solid details on the contact line structures are repetitively seen.

Keynote Lectures

Keynote Lecture 31

Tailoring Thermal Radiation Based on Topological Photonic Structures

Boxiang Wang
Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences / Shanghai Jiao Tong University, China
Wednesday, June 26, 2024 | Session Room 6 | 13:30-14:00

Abstract:

Topological photonic modes are promising in mediating long-range radiative heat transfer, whose topological protection enables their robust existence and transport. Tailoring these topological photonic modes permits a fascinating degree of freedom in modulating many-body radiative heat transfer. In this presentation, I will report on our recent explorations on tailoring thermal radiation with topological photonic structures. Firstly, I will show topological phonon polaritons (TPhPs) can be realized in one-dimensional (1D) dimerized silicon carbide (SiC) nanoparticle chains, which mimic the topological property of the Su-Schrieffer-Heeger (SSH) model. Secondly, I will demonstrate similar TPhPs are also found in a family of quasiperiodic 1D chains, including the extended off-diagonal Aubry-André-Harper (AAH) chain and the Fibonacci chain, as well as the intermediate one, that is, the interpolating Aubry-André-Fibonacci (IAAF) chain. Thirdly, I will discuss the implications of TPhPs on radiative heat transfer. It is shown that the presence of topological gaps and midgap TPhPs can substantially enhance radiative heat transfer for an array much longer than the wavelength of radiation. Finally, I will present our experimental exploration and observation of midinfrared topological photonic modes in a lattice mimicking the 2D SSH model. We fabricate the topological structure and provide an experimental observation of transverse electric-like edge modes in mid-infrared by using the scattering-type scanning near-field optical microscope. These results are expected to offer a useful route for tailoring near-field radiative heat transfer based on the concept of topological physics.

Keynote Lectures

Keynote Lecture 32

Molecular Understanding and Realization of Scalable Barocaloric Cooling Using Bulk Plastic Crystals

Shangchao Lin
Shanghai Jiao Tong University, China
Wednesday, June 26, 2024 | Session Room 7 | 13:30-14:00

Abstract:

Nowadays, the cooling and refrigeration sectors consume about 20% of the total electricity worldwide and shows a conflicting increase in demand as the global temperature rises. The barocaloric effect is a new solid-state phase changing effect that can release or absorb heat driven by hydrostatic pressure, which resembles the working principle of liquid-vapor phase transition in conventional refrigerants. Despite the emerge of many colossal barocaloric materials with great potentials to replace the environmentally unfriendly refrigerants, scalable and cyclic reversible cooling device based on the barocaloric effect has not been demonstrated yet. Here, we develop an experimental barocaloric cooling prototypes using bulk amounts of low-cost plastic crystals neopentylglycol (NPG) with high device-level scalability. Large quasi-adiabatic temperature changes in NPG of 20.8 K for heating and -16.7 K for cooling are achieved in the cyclic pressurization-depressurization processes from ambient pressure to 231 MPa. A maximum temperature drop of 3.8 K and cooling energy of 900 J in water as the heat exchanging medium for cooling are observed in the cooling prototype. Using molecular dynamics simulations to understand the atomistic mechanism behind this unique solid-state phase transition process, outstanding coefficients of performance (COP) of 14 and 7.5 and cooling energy density of 90 and 30 kJ/kg are estimated at a large temperature span of 5 K for the reverse Stirling and reverse Brayton cooling cycles, respectively.

Keynote Lectures

Keynote Lecture 33

Sorption Thermal Battery for Plus Energy Building Application

Yong Tae Kang
Korea University, Korea
Wednesday, June 26, 2024 | Session Room 8 | 13:30-14:00

Abstract:

A key strategy to realize the plus-energy building beyond the net-zero energy building is to employ the renewable energy so that the amount of generated energy is larger than that of energy consumption. It is inevitable to apply the high-performance energy storage system for the effective usage of renewable energy due to the mismatch between the supply and demand. This study suggests a daily sorption thermal battery to store the thermal energy in the form of the chemical potential difference, which can compensate the incompatibility of the renewable thermal energy. The sorption thermal battery involves van der Waals interaction between the sorbent and the sorbate. If the sorbate obtains sufficient momentum to overcome the bonds with the sorbent, the sorbate changes its phase so that the thermal storage is achieved by separating the sorbate from the sorbent, which is called “charging process”. The discharge of the sorption thermal battery provides the useful energy for application when the sorbate undergoes the phase change that releases heat upon contact with the sorbent. This type of the thermal energy storage system doesn’t require the thermal insulation to prevent the heat loss of the storage tanks and has an advantage of the small volume with high energy storage density. There are two strategies suggested in this study to apply the daily sorption thermal battery for plus-energy building: one is an absorption thermal battery using the H_2O-LiBr as working fluid, the other is an adsorption thermal battery employing the composite adsorbent consisting of LiOH salt hydrate impregnated into Zeolite 13X and H_2O as a sorbate. The absorption thermal battery can supply the cooling output to relieve the cooling demand that can operate repeatedly with the same performance without any additional manipulation. The numerical investigation is conducted to optimize the discharging process of absorption thermal battery in the aspect of the mass flow rate and the total charge amount of the LiBr solution, in which the optimized point derives the minimum value of difference between the cooling output of absorption thermal battery and the cooling demand of the building. The optimum solution charge and solution flow rate are quantified based on the four different building types (residential, hotel, hospital, and office) and the most suitable cooling load response is observed in the case of the hotel. The building cooling demand can be relieved as much as 91.31% with optimized absorption thermal battery and the energy storage density is estimated as 101.99 kWh/m^3 under the solution charge of 1440 kg and the solution flow rate of 0.51 kg/s. The maximum COP and energy storage density are estimated as 0.74 and 207.73 kWh/m^3 with the solution charge of 1440 kg and the solution flow rate of 1.0 kg/s. The adsorption thermal battery with composite adsorbent of LiOH salt hydrate and Zeolite 13X can serve the hot water supply with temperature of 55^{o}C to the plus-energy building and it achieves the energy storage density of 2219.21 kJ/kg by measuring with the simultaneous thermogravimetric analyzer. This result should be applicable to the reactor-scale. However, since adsorption only takes place on the surface of the adsorbent, the adsorbent with a large ratio of surface area to volume will assist to maximize the amount of the water vapor adsorbed. The hydrodynamic resistance is also considered to guarantee the inner surfaces of the composite adsorbent to be accessible for the water vapor, which means a large specific volume, sufficient passages between the composite adsorbent, and a large amount of heat released. The experimental investigation is conducted with cylindrical reactor filling with composite adsorbent to observe the breakthrough curve and temperature distribution of the reactor. The breakthrough curve is also predicted with the numerical investigation by varying the length of the reactor, the velocity of the water vapor flow, and the relative humidity of the inlet water vapor so that the appropriate charging time and length of the reactor for the daily adsorption thermal battery can be estimated.

Keynote Lectures

Keynote Lecture 34

Personalized Laser Treatment of Ota's Nevus with External Skin Cooling

Bin Chen
Xi'an Jiaotong University, China
Wednesday, June 26, 2024 | Session Room 9 | 13:30-14:00

Abstract:

Ota's Nevus is a dermal melanocytic hamartoma that presents as bluish hyperpigmentation on the face, with incidence in Asians about 0.02 ~ 0.8% and a 5:1 female-to-male ratio. At present, laser therapy has become the main treatment strategy based on the selective photothermolysis. The principle of laser therapy is to breakup and vaporize the hyperplastic melanin granules in dermis to bleach the skin, while avoiding the normal melanin in epidermis from unwanted thermal damage.Aiming to the personalized laser therapy, a local thermal non-equilibrium model was employed to optimize laser wavelength, pulse duration, and energy density under different melanin depth and volume fraction. The validation of the model can be proved through statistics of available clinical data, because high cure rates are always achieved when clinical energy density and pulse duration falls into theoretical prediction. To pretect epidermis with normal melanin from unwanted thermal injury, two-phase flashing cryogen spray cooling (CSC) coupled with cold air jet (CAJ) was introduced to aided laser threapy. Our work demonstrates that the intermittent R1234yf spray with the frequency of 55% and duty cycle of 50% results in nearly double the heat transfer coefficient compared to continuous spray cooling.

Keynote Lectures

Keynote Lecture 35

Colossal Electrocaloric Cooling Effect in High-Entropy Ferroelectric Working Bodies

Xiaoshi Qian
Shanghai Jiao Tong University, China
Thursday, June 27, 2024 | Fuyue Hall 1 | 13:30-14:00

Abstract:

Cooling and heating play crucial roles in various industries, such as household air-conditioning, refrigeration, thermal management for buildings, electric vehicles, battery management systems, aviation, and space operations. Electrocaloric (EC) refrigeration has emerged as a promising solid-state solution for efficient and environmentally friendly thermal management. However, existing materials commonly used in EC refrigeration require high electrical fields to achieve significant cooling effects. This reliance on high fields presents reliability issues and limits the applicability of EC refrigeration. Here, we present recent advancements in relaxor ferroelectric polymers based on poly(vinylidene fluoride) (PVDF) that have tripled the electrocaloric effect at low fields. Our research demonstrates that these polymers exist in a loosely correlated, high-entropy state, which enables a lower energy barrier for field-induced phase transitions. The resulting low-field, large electrocaloric effect exhibits an extended lifetime of over one million cycles.

Key Reference:

S. Zheng et al., Science, 382, 1020-1026 (2023)
X. Qian et al., Science, 380, eadg0902 (2023)
X. Qian et al., Nature, 600, 664–669 (2021)
X. Chen et al., Science 375, 1418-1422 (2022)
G. Hou et al., Nat. Nanotech., https://doi.org/10.1038/s41565-023-01490-4 (2023)

Keynote Lectures

Keynote Lecture 36

Gas Diffusion and Effective Diffusivity Through Saturated or Unsaturated Microporous Media

Moran Wang
Tsinghua University, China
Thursday, June 27, 2024 | Fuyue Hall 2 | 13:30-14:00

Abstract:

Study of diffusion transport mechanism is very important for analysis and optimization of material microstructure and designs. In this lecture, we will introduce a numerical method for accurate and efficient predictions of gas diffusion and the effective diffusivity through microporous materials [1-3]. A random generation-growth algorithm is highlighted for reproducing multiphase microstructures, statistically equivalent to the actual systems, based on the geometrical and morphological information obtained from measurements and experimental estimations [4]. A high-efficiency DSMC-LBM numerical solver is developed for the corresponding gas diffusion equations, with energy conservation and continuities at numerous interfaces [1, 3]. Various applications are provided to validate the feasibility, effectiveness and robustness of this new methodology by comparing the predictions with existing experimental data, accounting for effects from element size, Knudsen number, internal morphology and saturation [1, 2]. For given composition and structure, this numerical methodology is in essence a model with prior validity, without resorting to ad hoc empirical treatment. Therefore, it is useful for design and optimization of new materials, beyond just analyzing the existing ones [4].

References:

1.Y. Guo, X. He, W. Huang and M. Wang. Microstructure Effects on Effective Gas Diffusion Coefficient of Nanoporous Materials. Transport in Porous Media, 2019, 126: 431-453.
2.X.T. He, Y.Y. Guo, M. Li, N. Pan and M. Wang. Effective gas diffusion coefficient of fibrous materials by mesoscopic modeling. International Journal of Heat and Mass Transfer, 2017, 107: 736-746.
3.Z.Y. Wang, X. Jin, X. Wang, L. Sun, M. Wang. Pore-scale geometry effects on gas permeability in shale. Journal of Natural Gas Science and Engineering, 2016, 34: 948-957.
4.M. Wang, N. Pan. Predictions of Effective Physical Properties of Complex Multiphase Materials. Material Science and Engineering-R: Reports, 2008, 63(1): 1-30.

Keynote Lectures

Keynote Lecture 37

Solar Thermochemical CO_2 to Fuel Conversion

Xianglei Liu
Nanjing University of Aeronautics and Astronautics, China
Thursday, June 27, 2024 | Fuyue Hall 3 | 13:30-14:00

Abstract:

The conversion of greenhouse gases carbon dioxide into fuels using abundant solar energy has emerged as an effective solution to address global energy and environment problems. However, most investigations only focus on catalysts designs while overlooking their mismatching with reactors, severely inhibiting scalable solar-fuel conversion performances. Here, we propose to synergy plasmonic meta-nanoalloy catalysts with butterfly wing mimic bench-scale reactors for highly efficient and stable solar-driven upgrading greenhouse gases into syngas. Unique catalysts are proposed to exhibit high solar-fuel efficiency of 43.4% and near-perfect H_2/CO ratio of 0.97 due to plasmonic activation of both the first C-H bonding of CH_4 and C-O bonding of CO_2 by hot electrons injection induced by localized surface plasmon resonance (LSPR) of trimetallic nanoalloys. Depositing catalysts on foam reactors is a prerequisite for scalable applications but usually suffers from local overheating and high energy losses, due to non-uniform Gaussian-distribution of concentrated solar flux and limited penetration depth of solar light. The synergy of plasmonic catalysis reactions with light transport, reactants flow, and fluid-solid energy exchange is successfully achieved by butterfly wing mimic dual-gradient foam reactors. Subsequently, bench-scale solar-driven greenhouse gases upgrading system without external heating is demonstrated to possess solar-fuel efficiency of 40.44% with stable operation over more than 100 h, providing new routes for for scalable applications of solar-driven greenhouse gases upgrading techniques.

Keynote Lectures

Keynote Lecture 38

Thermal Transport in a 2D Amorphous Material

Bai Song
Peking University, China
Thursday, June 27, 2024 | Mingzhu Hall | 13:30-14:00

Abstract:

Amorphous materials such as glass have captured human imagination for thousands of years and continue to be of great interest. Among all the recent advances, the synthesis of 2D amorphous materials (carbon) down to a single atomic layer is especially noteworthy, which offers unprecedented opportunities for achieving deeper insights, unusual properties, and novel applications. A parallel may be found in 2D crystals which proved genuinely revolutionary soon after graphene was discovered in 2004. However, apart from scarce structural, mechanical, and electrical characterizations of 2D amorphous carbon, there remains a compelling need to explore thermal transport in amorphous materials at the 2D limit. Here, we focus on one important scientific question of particular interest: how would thermal transport in amorphous materials vary upon transition from 3D to 2D? As an exmample, we probe thermal transport in 2D amorphous carbon. The measured cross-plane thermal conductivity (k) for van der Waals stacked multilayers at room temperature is among the lowest reported to date. Meanwhile, an unexpectedly high in-plane k is obtained for freestanding monolayers which is a few times larger than what is predicted by conventional wisdom for 3D amorphous carbon with similar sp^2 fraction. Our molecular dynamics simulations reveal the role of disorder and highlight the impact of dimensionality. Amorphous materials at the 2D limit open up new avenues for understanding and manipulating heat at the atomic scale.

Keynote Lectures

Keynote Lecture 39

Topology Optimization of Heat and Mass Transfer Processes

Li Chen
Xi'an Jiaotong University, China
Thursday, June 27, 2024 | Session Room 1 | 13:30-14:00

Abstract:

Optimizing structures to enhance heat and mass transfer process is a hot research topic. Generally, structural optimization can be classified as size and shape optimization. Researchers also learn from the nature, and bio-inspired structures are also designed. However, size, shape and bio-inspired structural optimizations all depend on existing structures. Topology optimization, with the highest freedom, can design structures with required objectives and defined constraints. It can result in novel structures beyond prior experience and greatly improve the heat and mass transfer processes. Our group have developed numerical methods for topology optimization based on the density method and the level-set method. The method has been applied to design structures for thermal cloak, natural convective heat transfer, forced convective heat transfer, diffusion-reaction process, and reactive flow, with improved performance obtained.

Keynote Lectures

Keynote Lecture 40

Research on Key Thermal-Hydraulic Characteristics of Advanced Helical Fuel for Small Modular Reactor

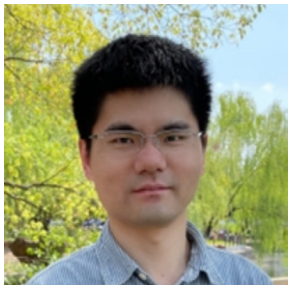
Yao Xiao
Shanghai Jiao Tong University, China
Thursday, June 27, 2024 | Session Room 2 | 13:30-14:00

Abstract:

Helical fuel is an innovative design that combines the advantages of rod and plate fuel elements, featuring a large heat transfer area, short heat conduction path, strong swirling mixing, and no need for grid support. These characteristics can significantly enhance core power density, which is important for the development of advanced small modular reactors. However, its unique cross-helical structure results in mass and energy transfer characteristics that differ significantly from traditional fuel elements, rendering conventional measurement and analysis methods unsuitable. This research conducts both experimental and theoretical studies on the key thermal-hydraulic characteristics of helical fuel. It includes experimental measurements of two-phase flow and mixing, as well as boiling critical characteristics, and establishes a three-dimensional two-phase numerical analysis method and a refined sub-channel transient safety analysis model. The findings provide fundamental experimental data, theoretical insights, and analytical tools for the optimization design and transient safety analysis of helical fuel.

Keynote Lectures

Keynote Lecture 41



Modeling of Liquid-Vapor Phase Change Heat Transfer: From Nanoscale to Macroscale

Shuai Gong
Shanghai Jiao Tong University, China
Thursday, June 27, 2024 | Session Room 3 | 13:30-14:00

Abstract:

Liquid-vapor phase change is one of the most efficient processes to transfer energy in nature and industrial applications. Due to its high heat-transfer capability, liquid-vapor phase-change processes such as boiling and evaporation have been widely used for thermal management of high-power-density electronics in recent years. In this talk, I will introduce our recent progresses on the modeling of the multiscale liquid-vapor phase change heat transfer processes. On the nanoscale, we propose a mesoscopic approach for steady/transient nanoscale evaporation heat transfer characteristics. By incorporating a mean-field approximation of solid-fluid interaction which is analytically derived by integrating the molecular level interaction, we successfully capture the disjoining pressure effect and elucidate its suppression effect on nanoscale evaporation heat transfer. We demonstrate that solid-fluid interaction plays dominant roles on the interfacial transport during nanoscale evaporation, and vapor transport resistance has nonnegligible influences on the evaporation heat/mass transport in nano-confined spaces. On the microscale to macroscale, we propose a high-fidelity numerical approach for simulating nucleate boiling heat transfer by considering microlayer evaporation and contact angle hysteresis effect. We demonstrate that our simulated transient bubble shape, bubble growth rate, and bubble departure diameter agree very well with the experiments in literature. Notably, we compare our simulated transient and local temperature distribution beneath the bubble with experiments and show very good agreement as well. The multiscale heat transfer mechanisms elucidated are helpful for the design of cooling strategies for next generation ultrahigh heat flux electronics.

Keynote Lectures

Keynote Lecture 42

Thermal Transport and Phonon Physics in Two-Dimensional Materials

Jie Chen
Tongji University, China
Thursday, June 27, 2024 | Session Room 6 | 13:30-14:00

Abstract:

Two-dimensional materials exhibit peculiar thermal transport properties, and thus have attract substantial recent interests. In this talk, I will present the recent advances in my group on the thermal transport and phonon physics in two-dimensional nanomaterials from the following three aspects. First, I shall discuss the novel phonon transport mechanisms, including the phonon hydrodynamics, the coherent phonon transport in periodic nanostructures, and a generalized decay law for thermal phonons. Then, I will discuss the interfacial heat transfer mechanisms in 2D heterogeneous systems, including inter-layer twist angle and moiré superlattice. Finally, I will briefly discuss the advantages of atomic simulations combined with machine learning techniques for studying heat conduction in realistic materials.

Keynote Lectures

Keynote Lecture 43

The Sorption Kinetics and Refrigeration Performance of GO@MIL-101(Cr) Composite-ammonia Working Pairs

Liwei Wang
Shanghai Jiao Tong University, China
Thursday, June 27, 2024 | Session Room 7 | 13:30-14:00

Abstract:

In the design of MOF composites and the mechanism and characteristics of ammonia sorption, the design strategy of composites with hierarchical pore structure was proposed, and the mechanism of ammonia sorption performance improvement of composites was clarified. GO@MIL-101(Cr) composites was prepared by GO flakes and MIL-101(Cr) particles to form the interface pores, resulting in an ammonia sorption capacity exceeding 0.8 $g \cdot g^{-1}$ due to substantial hydrogen bond networks. A high-precision thermodynamic and kinetic models based on the GO@MIL-101(Cr)-ammonia working pair was proposed and constructed. The comprehensive performances of this working pair under extreme temperatures in summer refrigeration, seasonal thermal energy storage, and diurnal thermal storage in winter were evaluated. The working pair displayed efficient refrigeration in high-temperature climates and high-efficiency heating supply in low-temperature environments.

Keynote Lectures

Keynote Lecture 44

Study of High-Efficient Thermal Energy Storage Mechanism and Dynamic Regulation Methods

Mingjia Li
Beijing Institute of Technology, China
Thursday, June 27, 2024 | Session Room 8 | 13:30-14:00

Abstract:

The mechanism of highly efficient thermal energy storage and effective regulation methods of quality of energy are vital scientific issues to deliver an efficient utilization of large-scale storage in microgrids. The bottleneck problems are composed of the low thermal conductivity of phase-change thermal storage materials, the limited application ranges of design methods of phase-change thermal storage devices, and the difficulty in adjusting the energy grade regulation of the thermal energy storage and utilization system. Thus, this study is presented and composed of the following three aspects of the "material-device-system". First, various types of high energy-density thermal storage materials and the innovation method are developed. Second, an interpretable machine learning method is proposed for the quick design of thermal storage devices. The dynamic attenuation of the thermocline is considered to demonstrate the multi-scale constitutive relation of thermal storage materials and the macroscale parameters of thermal storage devices. Third, a novel regulation method of various typical energy storage systems is further conducted. The fast response performance of thermal energy storage can be realized with the load command of the microgrid. Some related thermal energy storages developed by our research team are produced and applied in the commercial markets.

Based on the research, the systematic incremental methodology of thermal energy storage is obtained. The traditional customs of cascade utilization of thermal energy storage and electrical energy storage can be broken through. Different types of energy storage systems can be finally compared at the equivalent level, and the optimal capacity optimization of various storage systems is obtained under the same load command.

The results provide theoretical guidance and application value to understand the key basic scientific problems of regulation control of large-scale thermal storage systems, and to develop efficient and flexible new types of thermal storage systems.

Keynote Lectures

Keynote Lecture 45

Heat and Mass Transfer in Ionic Thermoelectrics

Weigang Ma
Tsinghua University, China
Thursday, June 27, 2024 | Session Room 9 | 13:30-14:00

Abstract:

Ionic thermoelectrics have attracted wide attention as they exhibited high ionic thermopower. Different from traditional electronic thermoelectrics, in the ionic thermoelectrics the charge carriers are free cations and anions, and the mass transfer process dominates ionic thermoelectrics while coupling with heat transfer. In this talk, the essence of ionic thermoelectrics will be discussed from the perspective of heat and mass transfer. Considering that the movement of ions relies on the interaction with the polar group of polymers combining with the segmental motion of polymer chains, all-solid-state PVDF-HFP/NaTFSI/PC with high thermopower of +20 mV K^{-1} has been successfully developed. Meanwhile, the p-n conversion in all-solid-state PhNP from +20 to −6 mV K^{-1} was achieved. Furthermore, it is found that the movement of ions is affected by the interface of the ionic thermoelectric materials and the electrode. A reversible bipolar thermopower behavior of the same ionic thermoelectric material by adjusting ion-electrode interactions with giant p-type (+20.2 mV K^{-1}) and n-type (−10.2 mV K^{-1}) thermopowers was achieved. Moreover, the developed ionic thermoelectric generator successfully produced cyclic energy under a constant heat condition by utilizing the bipolar thermopower property, which is significant for expanding the applications of ionic thermoelectrics in the real world. At last, we have built the governing equations of ionic thermoelectrics including temperature, voltage, and ionic concentration fields considering the heat and mass transfer, and the expression of c Seebeck coefficient and figure of merit of ionic thermoelectrics have been derived.

Program at a Glance

<table>
<tr><th>Time/Date</th><th>June 23</th><th>June 24</th><th>June 25</th><th>June 26</th><th>June 27</th></tr>
<tr><td>08:00-08:30</td><td rowspan="17">Registration</td><td colspan="4">Registration</td></tr>
<tr><td>08:30-09:00</td><td rowspan="2">Opening Ceremony</td><td rowspan="2">Plenary Lecture 1</td><td rowspan="2">Plenary Lecture 4</td><td rowspan="2">Plenary Lecture 7</td></tr>
<tr><td>09:00-09:30</td></tr>
<tr><td>09:30-10:00</td><td rowspan="2">Award Ceremony</td><td rowspan="3">Plenary Lecture 2</td><td rowspan="3">Plenary Lecture 5</td><td rowspan="3">Plenary Lecture 8</td></tr>
<tr><td>10:00-10:30</td></tr>
<tr><td>10:30-11:00</td><td rowspan="2">AUTSE
OAA Lecture</td><td rowspan="2">Plenary Lecture 3</td><td rowspan="2">Plenary Lecture 6</td><td>Coffee Break</td></tr>
<tr><td>11:00-11:30</td><td>Coffee Break</td><td>Coffee Break</td><td>Coffee Break</td><td rowspan="3">Oral
Sessions</td></tr>
<tr><td>11:30-12:00</td><td rowspan="2">Oral
Sessions</td><td rowspan="2">Oral
Sessions</td><td rowspan="2">Oral
Sessions</td></tr>
<tr><td>12:00-13:30</td><td>Lunch Break</td><td>Lunch Break</td><td>Lunch Break</td><td>Lunch Break</td></tr>
<tr><td>13:30-14:00</td><td>Keynote Lectures/
NMA Lecture</td><td>Keynote Lectures/
AUTSE YSA Lecture</td><td>Keynote Lectures/
AUTSE YSA Lecture</td><td>Keynote Lectures/
AUTSE YSA Lecture</td></tr>
<tr><td>14:00-14:30</td><td rowspan="2">Oral
Sessions</td><td rowspan="3">Oral
Sessions</td><td rowspan="2">Oral Sessions/
Executive Board
Members Meeting
(14:00-15:30,
Invited Only)</td><td rowspan="2">Oral
Sessions</td></tr>
<tr><td>14:30-15:00</td></tr>
<tr><td>15:00-15:30</td><td>Coffee Break</td><td>Coffee Break</td><td>Coffee Break</td></tr>
<tr><td>15:30-16:00</td><td rowspan="4">Panel Discussion 1/
Poster Session 1</td><td>Coffee Break</td><td rowspan="4">Panel Discussion 2/
Poster Session 3</td><td>Closing Ceremony</td></tr>
<tr><td>16:00-16:30</td><td rowspan="3">Poster Session 2</td><td rowspan="3"></td></tr>
<tr><td>16:30-17:00</td></tr>
<tr><td>17:00-17:30</td></tr>
<tr><td>17:30-18:00</td><td rowspan="2">Welcome
Reception</td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2">Conference
Banquet</td></tr>
<tr><td>18:00-</td></tr>
</table>

Timetable for Plenary, Keynote and Panel Discussions

Conference Rooms	Fuyue Hall			Mingzhu Hall	Session Room 1	Session Room 2
June 24 AM	Opening Ceremony					
	Award Ceremony					
	Wenquan Tao (AUTSE Outstanding Achievement Award Lecture)					
June 24 PM	Zuankai Wang (Nukiyama Memorial Award Lecture) Fuyue Hall 1	Janusz Szmyd (Keynote Lecture 1) Fuyue Hall 2	Ronggui Yang (Keynote Lecture 2) Fuyue Hall 3	**Gang Chen, Ruzhu Wang, Chang-Ying Zhao, Naoki Shikazono, Christos Markides (Panel Discussion 1)**	Rong Chen (Keynote Lecture 3)	Xiaobing Luo (Keynote Lecture 4)
June 25 AM	**Gang Chen (Plenary Lecture 1)**					
	Sergey Alekseenko (Plenary Lecture 2)					
	Khellil Sefiane (Plenary Lecture 3)					
June 25 PM	Jinliang Xu (Keynote Lecture 12) Fuyue Hall 1	Junichiro Shiomi (Keynote Lecture 13) Fuyue Hall 2	Xun Zhu (Keynote Lecture 14) Fuyue Hall 3	Deyu Li (Keynote Lecture 15)	Dawei Tang (Keynote Lecture 16)	Junming Zhao (Keynote Lecture 17)
June 26 AM	**Qiming Zhang (Plenary Lecture 4)**					
	Tianshou Zhao (Plenary Lecture 5)					
	Min Soo Kim (Plenary Lecture 6)					
June 26 PM	Yong Shuai (Keynote Lecture 24) Fuyue Hall 1	Chun Yang (Keynote Lecture 25) Fuyue Hall 2	Guihua Tang (Keynote Lecture 26) Fuyue Hall 3	**Bingyang Cao, Qun Chen, Min Soo Kim, Junichiro Shiomi, Kui Jiao (Panel Discussion 2)**	Zhichun Liu (Keynote Lecture 27)	Dengwei Jing (Keynote Lecture 28)
June 27 AM	**Koji Takahashi (Plenary Lecture 7)**					
	Chao Sun (Plenary Lecture 8)					
June 27 PM	Xiaoshi Qian (Keynote Lecture 35) Fuyue Hall 1	Moran Wang (Keynote Lecture 36) Fuyue Hall 2	Xianglei Liu (Keynote Lecture 37) Fuyue Hall 3	Bai Song (Keynote Lecture 38)	Li Chen (Keynote Lecture 39)	Yao Xiao (Keynote Lecture 40)

Timetable for Plenary, Keynote and Panel Discussions

Conference Rooms	Session Room 3	Shanghai Hall	Session Room 5	Session Room 6	Session Room 7	Session Room 8	Session Room 9
June 24 AM							
June 24 PM	Chengwang Lei (Keynote Lecture 5)	Qibin Liu (Keynote Lecture 6)	Zhiguo Qu (Keynote Lecture 7)	Xinlin Xia (Keynote Lecture 8)	Ji Hwan Jeong (Keynote Lecture 9)	Bingyang Cao (Keynote Lecture 10)	Bong Jae Lee (Keynote Lecture 11)
June 25 AM							
June 25 PM	Kun Luo (Keynote Lecture 18)	Kazuma Isobe (AUTSE Young Scientist Award Lecture 1)	Hiroshi Suzuki (Keynote Lecture 19)	Masahiro Nomura (Keynote Lecture 20)	Yuyang Li (Keynote Lecture 21)	Zheng Bo (Keynote Lecture 22)	Yuji Suzuki (Keynote Lecture 23)
June 26 AM							
June 26 PM	Shohji Tsushima (Keynote Lecture 29)	Xuancan Zhu (AUTSE Young Scientist Award Lecture 2)	Hao Wang (Keynote Lecture 30)	Boxiang Wang (Keynote Lecture 31)	Shangchao Lin (Keynote Lecture 32)	Yong Tae Kang (Keynote Lecture 33)	Bin Chen (Keynote Lecture 34)
June 27 AM							
June 27 PM	Shuai Gong (Keynote Lecture 41)	Mengqi Liu (AUTSE Young Scientist Award Lecture 3)		Jie Chen (Keynote Lecture 42)	Liwei Wang (Keynote Lecture 43)	Mingjia Li (Keynote Lecture 44)	Weigang Ma (Keynote Lecture 45)

Session Timetable

Monday, June 24, 2024

Conference Rooms	Fuyue Hall 1	Fuyue Hall 2	Fuyue Hall 3	Mingzhu Hall	Session Room 1	Session Room 2	Session Room 3
08:30-09:15	Opening Ceremony						
09:15-09:50	Award Ceremony						
09:50-10:30	AUTSE OAA Lecture Wenquan Tao						
10:30-11:00	Coffee Break						
Sessions				Track 02-1 Chair(s): Yao Zhao	Track 05-1 Chair(s): Li Chen	Track 18-1 Chair(s): Xinjing Zhang	Track 07-1 Chair(s): Yu Rao
11:00-11:45				O-0591	O-0595	O-0304	O-0225
				O-0485	O-0316	O-0398	O-0619
				O-0579	O-0351	O-0029	O-0211
11:45-12:15				O-0560	O-0388	O-0449	O-0031
				O-0548		O-0481	O-0253
12:15-13:30	Lunch Break						
Sessions	Track 02-2 Chair(s): Jinliang Xu, Hao Wang	Track 18-2 Chair(s): Qiuwang Wang, Shuhei Inoue	Track 13-2 Chair(s): Deyu Li, Xiangfan Xu		Track 03-1 Chair(s): Mingjia Li, Tao Ren	Track 08-2 Chair(s): Hong Qi, Lin Qiu	Track 07-2 Chair(s): Ying Chen, Kazuya Tatsumi
13:30-14:00	NMA Lecture Zuankai Wang	KL 1 Janusz Szmyd	KL 2 Ronggui Yang		KL 3 Rong Chen	KL 4 Xiaobing Luo	KL 5 Chengwang Lei
14:00-15:00	O-0515	O-0506	O-0183		O-0537	O-0098	O-0204
	O-0677	O-0219	O-0077		O-0279	O-0107	O-0255
	O-0534	O-0438	O-0135		O-0015	O-0026	O-0081
		O-0605	O-0036		O-0290		O-0119
15:00-15:30	Coffee Break						
15:30-16:00	Panel Discussion 1 Chang-Ying Zhao (Moderator), Gang Chen, Ruzhu Wang, Naoki Shikazono, Christos Markides (Mingzhu Hall)						
16:00-16:30							
16:30-17:00							
17:00-17:30							

Session Timetable

Monday, June 24, 2024

Conference Rooms	Shanghai Hall	Session Room 5	Session Room 6	Session Room 7	Session Room 8	Session Room 9	Corridor outside Fuyue Hall
08:30-09:15							
09:15-09:50							
09:50-10:30							
10:30-11:00	Coffee Break						
Sessions	Track 08-1 Chair(s): Menglong Hao	Track 10-1 Chair(s): Zhiguo Qu	Track 13-1 Chair(s): Xin Qian	Track 04-1 Chair(s): Wang Han	Track 09-1 Chair(s): Dingding Ye	Track 21-1 Chair(s): Bong Jae Lee	
11:00-11:45	O-0756	O-0288	O-0246	O-0535	O-0642	O-0387	
	O-0064	O-0599	O-0580	O-0124	O-0424	O-0039	
	O-0447	O-0513	O-0035	O-0566	O-0621	O-0679	
11:45-12:15	O-0262	O-0568	O-0109	O-0174	O-0576	O-0817	
	O-0050	O-0457	O-0092	O-0241	O-0635	O-0600	
12:15-13:30	Lunch Break						
Sessions	Track 09-2 Chair(s): Yong Tae Kang, Yurong He	Track 10-2 Chair(s): Hiroshi Suzuki, Liang Chen	Track 19-1 Chair(s): Gang Pei,Cunhai Wang	Track 17-1 Chair(s): Naoki Shikazono, Yonghua Huang	Track 06-1 Chair(s): Yanhui Feng, Takushi Saito	Track 21-2 Chair(s): Masamichi Kohno, Weigang Ma	
13:30-14:00	KL 6 Qibin Liu	KL 7 Zhiguo Qu	KL 8 Xinlin Xia	KL 9 Ji Hwan Jeong	KL 10 Bingyang Cao	KL 11 Bong Jae Lee	
14:00-15:00	O-0058	O-0108	O-0829	O-0133	O-0111	O-0330	
	O-0229	O-0160	O-0622	O-0690	O-0431	O-0732	
	O-0489	O-0209	O-0540	O-0633	O-0687	O-0634	
	O-0814	O-0083	O-0028	O-0046	O-0644	O-0816	
15:00-15:30	Coffee Break						
15:30-16:00	Panel Discussion 1 Chang-Ying Zhao (Moderator), Gang Chen, Ruzhu Wang, Naoki Shikazono, Christos Markides (Mingzhu Hall)						Poster Session 1
16:00-16:30							
16:30-17:00							
17:00-17:30							

Session Timetable

Tuesday, June 25, 2024

Conference Rooms	Fuyue Hall 1	Fuyue Hall 2	Fuyue Hall 3	Mingzhu Hall	Session Room 1	Session Room 2	Session Room 3
08:30-09:10	Plenary Lecture 1 Gang Chen						
09:10- 09:50	Plenary Lecture 2 Sergey Alekseenko						
09:50-10:30	Plenary Lecture 3 Khellil Sefiane						
10:30-11:00	Coffee Break						
Sessions				Track 02-3 Chair(s): Lu Qiu	Track 05-2 Chair(s): Seong Hyuk Lee	Track 18-3 Chair(s): Ligang Wang	Track 07-3 Chair(s): Zhexi Wen
11:00-11:30				O-0393	O-0323	O-0818	O-0394
				O-0258	O-0044	O-0096	O-0581
11:30-12:00				O-0212	O-0340	O-0638	O-0452
				O-0414	O-0161	O-0841	O-0333
12:00-13:30	Lunch Break						
Sessions	Track 02-4 Chair(s): Chun Yang, Liang Gong	Track 08-4 Chair(s): Ronggui Yang, Chaoyang Zhang	Track 18-4 Chair(s): Janusz Szmyd, Zhenyuan Xu	Track 13-4 Chair(s): Hua Bao, Jiayue Yang	Track 16-1 Chair(s): Moran Wang, Fei He	Track 19-2 Chair(s): Qiang Cheng, Boxiang Wang	Track 14-1 Chair(s): Ikuya Kinefuchi, Dengwei Jing
13:30-14:00	KL 12 Jinliang Xu	KL 13 Junichiro Shiomi	KL 14 Xun Zhu	KL 15 Deyu Li	KL 16 Dawei Tang	KL 17 Junming Zhao	KL 18 Kun Luo
14:00-14:45	O-0317	O-0040	O-0239	O-0463	O-0201	O-0208	O-0072
	O-0326	O-0137	O-0056	O-0199	O-0247	O-0544	O-0297
	O-0154	O-0559	O-0079	O-0132	O-0086	O-0501	O-0232
14:45-15:30	O-0366	O-0141	O-0518	O-0180	O-0526	O-0655	O-0636
	O-0315	O-0284	O-0088	O-0454	O-0640	O-0110	O-0334
	O-0307	O-0178	O-0427	O-0575	O-0658	O-0168	O-0423
15:30-16:00	Coffee Break						
16:00-16:30							
16:30-17:00							
17:00-17:30							
17:30-18:00							

Session Timetable

Tuesday, June 25, 2024

Conference Rooms	Shanghai Hall	Session Room 5	Session Room 6	Session Room 7	Session Room 8	Session Room 9	Corridor outside Fuyue Hall
08:30-09:10							
09:10-09:50							
09:50-10:30							
10:30-11:00	Coffee Break						
Sessions	Track 08-3 Chair(s): Guoqing Xin	Track 10-3 Chair(s): Gaosheng Wei	Track 13-3 Chair(s): Kazuma Isobe	Track 04-2 Chair(s): Weiwei Cai	Track 09-3 Chair(s): Qinghua Yu	Track 21-3 Chair(s): Zhen Liu	
11:00-11:30	O-0243	O-0057	O-0224	O-0616	O-0047	O-0238	
	O-0578	O-0045	O-0215	O-0302	O-0073	O-0624	
11:30-12:00	O-0497	O-0130	O-0153	O-0280	O-0126	O-0723	
	O-0085	O-0565	O-0227	O-0203	O-0157	O-0131	
12:00-13:30	Lunch Break						
Sessions	Track 13-5 Chair(s): Jie Chen, Bai Song	Track 10-4 Chair(s): Gota Kikugawa, Dong-Chuan Mo	Track 12-1 Chair(s): Rujun Ma, Masahiro Nomura	Track 04-3 Chair(s): Jun Hayashi, Yuyang Li	Track 09-4 Chair(s): Qibin Liu, Qiye Zheng	Track 21-4 Chair(s): Xinlin Xia, Dong-Wook Oh	
13:30-14:00	AUTSE YSA Lecture 1 Kazuma Isobe	KL 19 Hiroshi Suzuki	KL 20 Masahiro Nomura	KL 21 Yuyang Li	KL 22 Zheng Bo	KL 23 Yuji Suzuki	
14:00-14:45	O-0250	O-0511	O-0185	O-0531	O-0100	O-0718	
	O-0025	O-0300	O-0574	O-0425	O-0542	O-0429	
	O-0054	O-0469	O-0118	O-0278	O-0470	O-0367	
14:45-15:30	O-0546	O-0573	O-0692	O-0508	O-0610	O-0143	
	O-0030	O-0305	O-0034	O-0475	O-0343	O-0049	
	O-0777			O-0158	O-0220	O-0038	
15:30-16:00	Coffee Break						
16:00-16:30							Poster Session 2
16:30-17:00							
17:00-17:30							
17:30-18:00							

Session Timetable

Wednesday, June 26, 2024

Conference Rooms	Fuyue Hall 1	Fuyue Hall 2	Fuyue Hall 3	Mingzhu Hall	Session Room 1	Session Room 2	Session Room 3
08:30-09:10	Plenary Lecture 4 Qiming Zhang						
09:10-09:50	Plenary Lecture 5 Tianshou Zhao						
09:50-10:30	Plenary Lecture 6 Min Soo Kim						
10:30-11:00	Coffee Break						
Sessions				Track 02-5 Chair(s): Zhichun Liu	Track 03-2 Chair(s): Lanlan Jiang	Track 20-1 Chair(s): Yang Yang	Track 07-4 Chair(s): Jianfei Zhang
11:00-11:30				O-0349	O-0558	O-0061	O-0318
				O-0395	O-0589	O-0245	O-0596
11:30-12:00				O-0510	O-0389	O-0524	O-0347
				O-0719	O-0826		O-0051
12:00-13:30	Lunch Break						
Sessions	Track 20-2 Chair(s): Chengwang Lei, Yaoxin Zhang	Track 11-1 Chair(s): Zhen Li, Tatsunori Asaoka	Track 05-3 Chair(s): Tomoya Houra, Nuo Yang		Track 13-7 Chair(s): Wei Yu, Ruoyu Dong	Track 14-2 Chair(s): Kun Luo, Xiangyang Liu	Track 16-2 Chair(s): Hiroshi Iwai, Takuto Ataki
13:30-14:00	KL 24 Yong Shuai	KL 25 Chun Yang	KL 26 Guihua Tang		KL 27 Zhichun Liu	KL 28 Dengwei Jing	KL 29 Shohji Tsushima
14:00-14:30	O-0059	O-0017	O-0598		O-0432	O-0362	O-0641
	O-0169	O-0617	O-0392		O-0628	O-0486	O-0162
14:30-15:00	O-0103	O-0348	O-0407		O-0075	O-0594	O-0496
	O-0356	O-0291	O-0603		O-0123	O-0572	O-0623
15:00-15:30	Coffee Break						
15:30-16:00	Panel Discussion 2 Bingyang Cao (Moderator), Qun Chen, Min Soo Kim, Junichiro Shiomi, Kui Jiao (Mingzhu Hall)						
16:00-16:30							
16:30-17:00							
17:00-17:30							
18:00-20:00	Conference Banquet (Dongfang Hall)						

Session Timetable

Wednesday, June 26, 2024

Conference Rooms	Shanghai Hall	Session Room 5	Session Room 6	Session Room 7	Session Room 8	Session Room 9	Corridor outside Fuyue Hall
08:30-09:10							
09:10-09:50							
09:50-10:30							
10:30-11:00	Coffee Break						
Sessions	Track 08-5 Chair(s): Yong Ren	Track 10-5 Chair(s): Qian Fu	Track 13-6 Chair(s): Cunlu Zhao	Track 04-4 Chair(s): Qian Wang	Track 09-5 Chair(s): Jun Yan	Track 01-1 Chair(s): Dan Huang	
11:00-11:30	O-0213	O-0122	O-0184	O-0552	O-0298	O-0434	
	O-0237	O-0256	O-0276	O-0649	O-0435	O-0468	
11:30-12:00	O-0055	O-0563	O-0530	O-0653	O-0549	O-0593	
	O-0020	O-0236	O-0067	O-0312	O-0195	O-0441	
12:00-13:30	Lunch Break						
Sessions	Track 03-3 Chair(s): Rong Chen, Yutaka Tabe	Track 02-6 Chair(s): Shoji Mori, Haiwang Li	Track 19-3 Chair(s): Junming Zhao, Run Hu	Track 17-2 Chair(s): Wei Rao, Limei Shen	Track 09-6 Chair(s): Zheng Bo, Leping Zhou	Track 01-2 Chair(s): Atsuki Komiya, Haishan Cao	
13:30-14:00	AUTSE YSA Lecture 2 Xuancan Zhu	KL 30 Hao Wang	KL 31 Boxiang Wang	KL 32 Shangchao Lin	KL 33 Yong Tae Kang	KL 34 Bin Chen	
14:00-14:30	O-0520	O-0293	O-0477	O-0186	O-0070	O-0376	
	O-0551	O-0014	O-0669	O-0386	O-0629	O-0509	
14:30-15:00	O-0228	O-0426	O-0272	O-0371	O-0711	O-0377	
	O-0532	O-0471	O-0446	O-0648	O-0265	O-0664	
15:00-15:30	Coffee Break						
15:30-16:00	Panel Discussion 2 Bingyang Cao (Moderator), Qun Chen, Min Soo Kim, Junichiro Shiomi, Kui Jiao (Mingzhu Hall)						Poster Session 3
16:00-16:30							
16:30-17:00							
17:00-17:30							
18:00-20:00	Conference Banquet (Dongfang Hall)						

Session Timetable

Thursday, June 27, 2024

Conference Rooms	Fuyue Hall 1	Fuyue Hall 2	Fuyue Hall 3	Mingzhu Hall	Session Room 1	Session Room 2	Session Room 3
08:30-09:10	Plenary Lecture 7 Koji Takahashi						
09:10- 09:50	Plenary Lecture 8 Chao Sun						
09:50-10:20	Coffee Break						
Sessions				Track 02-7 Chair(s): Wenxiao Chu		Track 14-3 Chair(s): Fang Liu	Track 15-1 Chair(s): Tenglong Cong
10:20-11:05				O-0296		O-0601	O-0467
				O-0283		O-0176	O-0405
				O-0397		O-0240	O-0439
11:05-12:05				O-0275		O-0335	O-0089
				O-0338		O-0406	O-0462
				O-0068		O-0145	O-0504
				O-0313			O-0363
12:05-13:30	Lunch Break						
Sessions	Track 12-2 Chair(s): Yoichi Murakami, Jie Xu	Track 16-3 Chair(s): Youjun Lv, Qin-Yi Li	Track 20-3 Chair(s): Zhonghao Rao, Ruming Pan	Track 13-9 Chair(s): Yanan Yue, Ruiqiang Guo	Track 05-4 Chair(s): Lin Chen, Xiaokun Gu	Track 15-2 Chair(s): Jun Sun, Hanyang Gu	Track 02-8 Chair(s): Qing Li, Zhaoguang Wang
13:30-14:00	KL 35 Xiaoshi Qian	KL 36 Moran Wang	KL 37 Xianglei Liu	KL 38 Bai Song	KL 39 Li Chen	KL 40 Yao Xiao	KL 41 Shuai Gong
14:00-14:30	O-0287	O-0166	O-0365	O-0053	O-0188	O-0375	O-0090
	O-0353	O-0385	O-0299	O-0286	O-0604	O-0500	O-0400
14:30-15:00	O-0561	O-0270	O-0248	O-0173	O-0019	O-0428	O-0577
		O-0268	O-0214	O-0418	O-0632	O-0550	O-0331
15:00-15:30	Coffee Break						
15:30-16:00	Closing Ceremony						

Session Timetable

Thursday, June 27, 2024

Conference Rooms	Shanghai Hall	Session Room 5	Session Room 6	Session Room 7	Session Room 8	Session Room 9
08:30-09:10						
09:10-09:50						
09:50-10:20	Coffee Break					
Sessions	Track 06-2 Chair(s): Xiaokun Gu	Track 11-2 Chair(s): Shuai Gong	Track 13-8 Chair(s): Shengying Yue		Track 09-7 Chair(s): Xuancan Zhu	Track 01-3 Chair(s): Qian Wang
10:20-11:05	O-0129	O-0149	O-0390		O-0350	O-0460
	O-0459	O-0269	O-0167		O-0200	O-0383
	O-0545	O-0503	O-0737		O-0525	O-0585
11:05-12:05	O-0115	O-0231	O-0458		O-0226	O-0159
	O-0472	O-0831	O-0197		O-0097	O-0498
	O-0672	O-0222	O-0152		O-0128	O-0464
		O-0156	O-0384			O-0146
12:05-13:30	Lunch Break					
Sessions	Track 19-4 Chair(s): Tao Ren, Kaichen Dong		Track 13-10 Chair(s): Lin Yang, Shenghong Ju	Track 17-3 Chair(s): Honghyun Cho, Shangchao Lin	Track 09-8 Chair(s): Minsung Kim, Jun Yan	Track 21-5 Chair(s): Zhen Chen, Jie Zhu
13:30-14:00	AUTSE YSA Lecture 3 Mengqi Liu		KL 42 Jie Chen	KL 43 Liwei Wang	KL 44 Mingjia Li	KL 45 Weigang Ma
14:00-14:30	O-0263		O-0374	O-0430	O-0590	O-0151
	O-0618		O-0490	O-0631	O-0611	O-0306
14:30-15:00	O-0022		O-0114	O-0147	O-0065	O-0251
	O-0181		O-0368	O-0230	O-0207	
15:00-15:30	Coffee Break					
15:30-16:00	Closing Ceremony					

Oral Sessions

Monday AM

Mingzhu Hall

Subject: Track 02-1 Boiling, Evaporation and Condensation
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Yao Zhao (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0591	**Machine Learning of Bubble Behavior and Heat Transfer Characteristics for Pool Boiling Performance** Ken Tsukahara, Akiko Kaneko, Kenta Hatanaka, Tomohide Yabuki, Biao Shen* The University of Tsukuba, Japan
11:15-11:30	O-0485	**Flow Induced Vibration for Enhancing the Subcritical Flow Boiling in Vertical Microchannels** Mohammed Ibrahim*, Chuangde Zhang, Methma Rajamuni, Li Chen, John Young, Fang-Bao Tian University of New South Wales, Australia
11:30-11:45	O-0579	**From Heterogenous Nucleation to Film Boiling on a Thin-Film Microheater Subjected to Rapid Pulse Heating** Yigao Lv, Xin Li, Wenxiao Chu*, Qiuwang Wang Xi'an Jiaotong University, China
11:45-12:00	O-0560	**High Fidelity Simulations of Nucleate Boiling Heat Transfer Considering Microscale Effects** Zhongxiao Liu, Shuai Gong*, Ping Cheng Shanghai Jiao Tong University, China
12:00-12:15	O-0548	**Quenching Performance of Stainless-Steel Rod with the Nickel Honeycomb Porous Plate** Huacheng Zhang, Shinichiro Yasukochi, Yutaro Umehara, Shoji Mori* Kyushu University, Japan

Oral Sessions

Monday AM

Session Room 1

Subject: Track 05-1 Computational Methods and Simulations
Time: Monday, June 24, 2024 11:00-12:00
Chair(s): Li Chen (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0595	**Multiscale Numerical Simulation of Laser Induced Deposition Process** Siyu Liu*, Yongsen He, Rui Wang Shanghai Jiao Tong University, China
11:15-11:30	O-0316	**The Hole Layout Optimization of Multi-Row Film Cooling Plate Based on Expectation Maximization Algorithm** Junjie Huang, Yanjia Wang, Jianqin Zhu, Zeyuan Cheng* Beihang University, China
11:30-11:45	O-0351	**Numerical Analysis of Dynamic Response of a Fine-Wire Temperature Sensor** Tomoya Houra*, Masato Tagawa Nagoya Institute of Technology, Japan
11:45-12:00	O-0388	**Predicting Temperature of Li-ion Battery Using Long Short-Term Memory** Jihye Han, Junyong Seo, Jihoon Kim, Yongrack Koo, Miran Ryu, Bong Jae Lee* Korea Advanced Institute of Science and Technology, Korea

Oral Sessions

Monday AM

Session Room 2

Subject: Track 18-1 Solar/Renewable Energy

Time: Monday, June 24, 2024 11:00-12:15

Chair(s): Xinjing Zhang (Institute of Engineering Thermophysics, Chinese Academy of Sciences)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0304	**The Influence of Ru/CNT Catalyst Amount on the Glucose Gasification Efficiency** Mengli Zhang*, Mizuki Kodama, Ali Mohammed Ahmed Mohammed, Shuhei Inoue, Takashi Noguchi, Yukihiko Matsumura Hiroshima University, Japan
11:15-11:30	O-0398	**Investigation of Black Like Spectral Modulation** Jiacheng Hao, Dan Zhang* Xi'an Jiaotong University, China
11:30-11:45	O-0029	**Multi-Objective Optimization of Channel Structure for a Proton Exchange Membrane Water Electrolysis Cell Base on Two-Phase Multi-Physics Model** Yubin Zhuang, Pan Cui, Rui Long, Wei Liu, Zhichun Liu* Huazhong University of Science and Technology, China
11:45-12:00	O-0449	**Research on a Novel Solar Spectral Beam Splitting and Concentrating Photovoltaic/Photothermal System** Gaosheng Wei*, Hongxu Du North China Electric Power University, China
12:00-12:15	O-0481	**Study on Photothermal-Catalytic Characteristics of Methanol Steam Reforming for Hydrogen Production Based on Fresnel Lens** Xiuqin Zhang, Feng Wang*, Delun Guan Chongqing University, China

Oral Sessions

Monday AM

Session Room 3

Subject: Track 07-1 Convective Heat Transfer
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Yu Rao (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0225	**Application of Flow Intermittency in Serpentine Channels for Heat Transfer Enhancement** Guanqing Xiong, Zhaoguang Wang* University of Michigan-Shanghai JIao Tong University Joint Institute, China
11:15-11:30	O-0619	**Plume Swirls Boost Convective Heat Dissipation in Stacks** Yuanshen Lu*, Mohamad Javad Vashahri Ghamsari The University of Queensland, Australia
11:30-11:45	O-0211	**Numerical Study on the Turbulent Heat Transfer and Flow Characteristics of a Circular Tube Equipped with Rotors** Gen Ou, Qinglin Du, Zhichun Liu, Wei Liu* Huazhong University of Science and Technology, China
11:45-12:00	O-0031	**Research on the Application of Gill Crack in Double Wall Cooling Configuration** Yigang Luan, Limin Zhang, Xue Wu, Lianfeng Yang, Tao Sun* Harbin Engineering University, China
12:00-12:15	O-0253	**Numerical Study on Heat Transfer Characteristics of S-CO_2 in Non-Uniformly Heated Tubes under Heaving Motions** Shuaishuai Wang, Zhexi Wen*, Jiaqi Cheng, Yaru Zhang, Qing Li Central South University, China

Oral Sessions

Monday AM

Shanghai Hall

Subject: Track 08-1 Electronic Cooling and Thermal Management
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Menglong Hao (Southeast university)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0756	**Efficient Thermal Management of High-Power Electronics via Jet-Enhanced HU-type Manifold Microchannel** Zhihu Wu, Bai Song*, Wei Xiao Peking university, China
11:15-11:30	O-0064	**Experimental Study of Boiling Characteristcs in a Novel Hybrid Microjet/ Radial Expanding Microchannel Heat Sink For Hot Spot Cooling** Huiying Wu*, Xia Hua Shanghai Jiaotong university, China
11:30-11:45	O-0447	**Topology-Optimization of Heat Sinks for Enhnaced Electronic Cooling Performance** Subhani Shaik, Younghwan Joo, Junghwan Kook, Duckjong Kim* Gyeongsang National University, Korea
11:45-12:00	O-0262	**Study on Rapid Prediction of Temperature Dynamics And System Performance of Avionics Under Variable Temperature Boundaries** Jiaqi Yang, Mingjia Li* Xi'an Jiaotong University, China
12:00-12:15	O-0050	**Bioinspired Radiative Cooling Coating for Thermal Management of High Power Electronic Modules** Yong Li*, Hui Yang, Ren Yue Technical Institute of Physics and Chemistry, CAS, China

Oral Sessions

Monday AM

Session Room 5

Subject: Track 10-1 Heat Exchangers and Industrial Applications
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Zhiguo Qu (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0288	**Regulation of Micro-Ribs on Heat Transfer and Flow Resistance Characteristics of Supercritical Pressure Hydrocarbon Fuel in Mini-Channel** Xin Li, Xingyu Zhou, Heyang Wang, Silong Zhang*, Wen Bao, Naigang Cui Harbin Institute of Technology, China
11:15-11:30	O-0599	**Design, Numerical Investigation and Experimental Testing of Novel Cryogenic PCHE** Zixin Zhang, Liang Chen* Xi'an Jiaotong University, China
11:30-11:45	O-0513	**Numerical Simulation and Experimental Study of Microminiature Refrigerator** Chenbin Yang, Zhiyuan Jiang, Guobin Zhang, Zhiguo Qu, Jianfei Zhang* Xi'an Jiaotong University, China
11:45-12:00	O-0568	**Performance Changes in Ground Source Heat Pump and Air Source Heat Pump According to Global Warming** Jin Yeong Seo, Dongchan Lee* University of Seoul, Korea
12:00-12:15	O-0457	**Experimental Study on the Performance of Additively Manufactured Microchannel Heat Exchanger** Yueliang Zhang, Yu Rao*, Yuexuan Lv, Kirttayoth Yeranee, Xiyuan Su Shanghai Jiao Tong University, China

Oral Sessions

Monday AM

Session Room 6

Subject: Track 13-1 Micro/Nano Heat Transfer
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Xin Qian (Huazhong University of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0246	**Molecular Simulations of Gas Diffusivity and Solubility in Humidified PVAm/PVA Blend Membranes** Kohei Sato*, Daisuke Fukumitsu, Ikuya Kinefuchi The University of Tokyo, Japan
11:15-11:30	O-0580	**Effects of Atomic Structures on Thermal Transport Across Silicon–Water Interface Based on Molecular Dynamics** Kunio Fujiwara*, Kentaro Nishi, Yuki Motokawa, Masahiko Shibahara Osaka University, Japan
11:30-11:45	O-0035	**Remarkable Suppression of Thermal Transport by Inhomogeneous Strain** Lin Yang*, Shengying Yue, Yi Tao, Shuo Qiao, Zhaohe Dai, Bai Song, Jinlong Du, Deyu Li, Peng Gao Peking University, China
11:45-12:00	O-0109	**A Molecular Dynamics Study of Near-Enhanced Energy Transfer and Plasmonic Nanobubble Generation Induced by Ultrashort Pulsed Light** Qingchun Dong, Wei An* Tongji University, China
12:00-12:15	O-0092	**Tuning Thermal Transport Across Carbon Nanotube Contacts by Morphological Control** Dawei Li, Qin-Yi Li*, Koji Takahashi Kyushu University, Japan

Oral Sessions

Monday AM

Session Room 7

Subject: Track 04-1 Combustion
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Wang Han (Beihang University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0535	**Ignition in Shock Tube with Controlled Expansion Rate Using a Driver Insert** Yaqin Tan, Rémy Mével* Tsinghua University, China
11:15-11:30	O-0124	**Wall Heat Flux Modelling in Turbulent Premixed Combustion** Kunlin Li, Lipo Wang* Shanghai Jiao Tong University, China
11:30-11:45	O-0566	**Large Eddy Simulation of Turbulent Partially Premixed Dimethyl Ether Jet Flame Using the Direct Moment Closure Model Coupled with Acceleration Algorithm** Yicun Wang, Runzhi Liu, Tai Jin, Kun Luo*, Jiangkuan Xing, Jianren Fan Zhejiang University, China
11:45-12:00	O-0174	**Numerical Study on Flame Structure and Dynamics of Steam-Diluted Hydrogen-Oxygen Combustion in Multi-Cluster Burner** Shan Jiang*, Ye Wang, Sayaka Suzuki, Masayasu Shimura, Mamoru Tanahashi Tokyo Institute of Technology, China
12:00-12:15	O-0241	**A Numerical Study on Flame Stability Enhancement of a Miniature Tubular Combustor by Filling Convex Porous Media** Guangyao Yang, Aiwu Fan* Huazhong University of Science and Technology, China

Oral Sessions

Monday AM

Session Room 8

Subject: Track 09-1 Energy Storage
Time: Monday, June 24, 2024 11:00-12:15
Chair(s): Dingding Ye (Chongqing University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0642	**Study on the Coupled Hydrothermal Heat Transfer Characteristics of Frozen and Thawed Soil on the Slope of Pit Thermal Energy Storage** Yong Li* Xi'an University of Architecture and Technology, China
11:15-11:30	O-0424	**Experimental Evaluation of an Open Three-Phase Sorption Thermal Battery Coupled with Sorbent Circulation** Jintong Gao, Jinfang You, Ruzhu Wang, Zhenyuan Xu* Shanghai Jiao Tong University, China
11:30-11:45	O-0621	**Airduct Optimization for Thermal Management in Battery Containers to Achieve Perfectly Uniform Temperature Distributions** Yi Ding, Wenxiao Chu, Qiuwang Wang* Xi'an Jiaotong University, China
11:45-12:00	O-0576	**Improving All-Vanadium Redox Flow Batteries in Flow-Through Cells through Topology Optimization of Porous Electrodes** Poramet Aiemsathit, Pengfei Sun, Mehrzad Alizadeh, Yossapong Laoonual, Patcharawat Charoen-amornkitt*, Takahiro Suzuki, Shohji Tsushima King Mongkut's University of Technology Thonburi, Thailand
12:00-12:15	O-0635	**Thermodynamic Performance Analysis of Community Zero-Emission Distributed Energy System Based on Photovoltaic-Electrolysis-Fuel Cell** Pengcheng Liao, Li Chen*, Xingbao Lyu, Wenjing Ning Xi'an Jiaotong University, China

Oral Sessions

Monday AM

Session Room 9

Subject: Track 21-1 Thermophysical Properties and Measurements

Time: Monday, June 24, 2024 11:00-12:15

Chair(s): Bong Jae Lee
(Korea Advanced Institute of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0387	**Measurement of The Cross-Plane Conductivity of Li-Ion Battery Pouch Cell** Minjoo Kim, Bong Jae Lee* Korea Advanced Institute of Science and Technology, Korea
11:15-11:30	O-0039	**Investigations of Contact Thermal Resistance at the Probe-Sample Interface in Scanning Thermal Microscopy Based on the Fractal Network Model** Yifan Li* Shanghai Polytechnic University, China
11:30-11:45	O-0679	**A Universal Sensitivity Matrix Reduction Technique (Smart) for Reliable Multivariate Fits in the Frequency Domain Thermoreflectance Technique** Wee-Liat Ong*, Jing Tu Zhejiang University, China
11:45-12:00	O-0817	**Big MEMS for Thermal Measurement** Haiyu He, Yuxi Wang, Zhiyao Jiang, Bai Song* Peking University, China
12:00-12:15	O-0600	**Thermal and Electrical Properties of Si and Ge Processed by High-Pressure Torsion (HPT)** Masamichi Kohno*, Keisuke Matsuda, Ryo Senno, Taisuke Matsuura, Marina Takaira, Han Meng, Junichiro Shiomi, Yoshifumi Ikoma Kyushu University, Japan

Oral Sessions

Monday PM

Fuyue Hall 1

Subject: Track 02-2 Boiling, Evaporation and Condensation

Time: Monday, June 24, 2024 13:30-14:55

Chair(s): Jinliang Xu (North China Electric Power University), Hao Wang (Peking University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:10	Nukiyama Memorial Award Lecture	**Tackling the Centuries-old Leidenfrost Effect** Zuankai Wang The Hong Kong Polytechnic University, China
14:10-14:25	O-0515	**Ordered Bubble-Like Structure Due to the Resonance Effect During Supercritical Pseudo-Boiling** Xiaotian He, Jinliang Xu* North China Electric Power University, China
14:25-14:40	O-0677	**About Liquid Nanofilm, Structure, Disjoining Pressure, and Applications** Hao Wang* Peking University, China
14:40-14:55	O-0534	**Effects of Pore Size Distribution on Boiling Incipience of Ae-3000 from Honeycomb Porous Plates** Feifei Wu*, Yutaro Umehara, Atsuroh Etoh, Shoji Mori Kyushu University, Japan

Oral Sessions

Monday PM

Fuyue Hall 2

Subject: Track 18-2 Solar/Renewable Energy

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Qiuwang Wang (Xi'an Jiaotong University), Shuhei Inoue (Kindai University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 1	**Modelling of Transport Phenomena in SOFC Systems by Making Use of Interactive Computational-Experimental Methodology** Janusz Szmyd AGH University of Krakow, Poland
14:00-14:15	O-0506	**Low-Carbon Economic Scheduling of Electricity-Gas-Heat Integrated Energy System Considering Uncertainty and Demand-Side Response** Zhai Rongrong*, Zhao Yingxin North China Electric Power University, China
14:15-14:30	O-0219	**Innovative Approaches to Eco-Friendly Air Conditioning: A Focus on Adsorption Hybrid Systems** Mahdi Koushaeian, Jae Dong Chung* Sejong University, Korea
14:30-14:45	O-0438	**Investigation of Carbon Tax Impact on Renewable Energy Development by the Cge Model** Lili Jiao, Bowen Wang*, Kui Jiao Tianjin University, China
14:45-15:00	O-0605	**Experimental Study on Dynamic Response Performance of the Pemwe under Start-Stop Conditions** Qinghui Zeng, Xiaohong Yang*, Hongliang Xu, Zhitong Liu, Fanhang Yuan, Feng Ji, Yuan Jin Inner Mongolia University of Technology, China

Oral Sessions

Monday PM

Fuyue Hall 3

Subject: Track 13-2 Micro/Nano Heat Transfer

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Deyu Li (Vanderbilt University),
Xiangfan Xu (Tongji University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 2	**Liquid-Film Boiling Heat Transfer and Spray Cooling on Hierarchical Wicking Surfaces** Ronggui Yang Peking University, China
14:00-14:15	O-0183	**Phonon Polariton-Mediated Heat Conduction** Zhiliang Pan, Deyu Li* Vanderbilt University, United States
14:15-14:30	O-0077	**Flow Boiling in Manifold Microchannel Heat Sink** Wei Li*, Tianwen Li, Yuhao Lin, Nae-Hyun Kim Zhejiang University, China
14:30-14:45	O-0135	**GIFTBTE: An Efficient Deterministic Solver for Non-Gray Phonon Boltzmann Transport Equation** Hua Bao*, Yue Hu, Ru Jia, Jiaxuan Xu, Yufei Sheng, Yongxing Shen, Minhua Wen, James Lin Shanghai Jiao Tong Univeristy, China
14:45-15:00	O-0036	**Cross-Sectional Effects on Nanorod Diffusion in Polymer Melts** Jia Zhang, Jiuling Wang, Ruoyu Dong* Beihang University, China

Oral Sessions

Monday PM

Session Room 1

Subject: Track 03-1 Carbon Capture, Utilization and Storage

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Mingjia Li (Beijing Institute of Technology), Tao Ren (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 3	**Superhydrophobic Photothermal Materials for Anti-Icing and Deicing** Rong Chen Chongqing University, China
14:00-14:15	O-0537	**Photothermocatalytic Performance of CH_4-CO_2 Reforming on G-C_3N_4/Mxene/Conice-Ldh Composite Catalysts** Xu Ma, Weiwei Yang*, Xinyuan Tang, Yaling He Xi'an Jiaotong University, China
14:15-14:30	O-0279	**Amine-Functionalized Layered Double Hydroxide Family for Direct Air Capture of Carbon Dioxide** Xuancan Zhu* Shanghai Jiao Tong University, China
14:30-14:45	O-0015	**Completely Passive Capture of Carbon Dioxide from Air** Jian Zeng*, Hsinhan Tsai, Jeffrey Long, Ravi Prasher, Sean Lubner The Hong Kong University of Science and Technology (Guangzhou), China
14:45-15:00	O-0290	**Synthesis and Characterization of Cau-10 Capsule and Its Usage in Direct Air Capture for CO_2 Adsorption** Lirong Li, Zhiping Xiao, Jiaying Wu, Zhigang Li* Yangzhou University, China

Oral Sessions

Monday PM

Session Room 2

Subject: Track 08-2 Electronic Cooling and Thermal Management

Time: Monday, June 24, 2024 13:30-14:45

Chair(s): Hong Qi (Harbin Institute of Technology),
Lin Qiu (University of Science and Technology Beijing)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 4	**Theoretical Modeling and Key Technology Research on Thermal Management System of Electronics under High-Temperature Environment** Xiaobing Luo Huazhong University of Science and Technology, China
14:00-14:15	O-0098	**Electrohydrodynamic Enhancement of Heat Transfer on a Charge Injection Pump for Different Thermal Boundaries** Gao Xuelin, Liu huayuan, Luo kang*, Wu jian, Yi hongliang Harbin Institute of Technology, China
14:15-14:30	O-0107	**Investigation on Transient Performances of Pressure Drop Oscillation and Impact of Compressible Volume** Erhui Jiang, Xingjian Luan, Wen Wang*, Jianyin Miao, Hongxing Zhang Shanghai Jiao Tong University, China
14:30-14:45	O-0026	**Thermal Performance of Stacked Manifold Jet-Impingment Microchannel Heat Sink** Yu Zhang, Liang Chen*, Xiao Zhang, Yu Hou Xi'an Jiaotong University, China

Oral Sessions

Monday PM

Session Room 3

Subject: Track 07-2 Convective Heat Transfer

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Ying Chen (Guangdong University of Technology), Kazuya Tatsumi (Kyoto University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 5	**Enhancing Natural Convection Heat Transfer through a Vertical Channel with a Confined Circular Cylinder** Chengwang Lei The University of Sydney, Australia
14:00-14:15	O-0204	**Heat Transfer Enhancement for TPMS-Filled Cooling Channel by Flow Intermittency** Jiale Shen, Qiang Zhang, Zhaoguang Wang* Shanghai Jiao Tong University, China
14:15-14:30	O-0255	**Heat Transfer for Forced Convection of Helium Gas in a Minichannel with Different Length** Qiusheng Liu*, Narihiro Suzuo, Makoto Shibahara Kobe University, Japan
14:30-14:45	O-0081	**Experimental Study of Flow Boiling in Copper-Based Countercurrent-Connected Microchannels** Chaoyang Zhang*, Fangju Hong, Boqiao Huang, Dahai Wang Shanghai Jiao Tong University, China
14:45-15:00	O-0119	**Analysis on Heat Transfer Mechanism of N-Decane under Supercritical Pressure in a Horizontal Mini-Channel** Dongxia Dang*, Yuan Wang, Jun Liu National University of Defense Technology, China

Oral Sessions

Monday PM

Shanghai Hall

Subject: Track 09-2 Energy Storage

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Yong Tae Kang (Korea University),
Yurong He (Harbin Institute of Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 6	**Clean Fuel Production Through Solar Thermochemical Conversion: New Mechanism and Method Exploration** Qibin Liu Institute of Engineering Thermophysics, CAS, China
14:00-14:15	O-0058	**Synthesis and Application Research of Functionalized Phase-Change Microcapsules Based on Nanoparticle Modification** Jifen Wang*, Kuan Zhao, Huaqing Xie, Zhixiong Guo Shanghai Polytechnic University, China
14:15-14:30	O-0229	**Composite Al–Cu–Si Alloy-Based Microencapsulated Phase Change Material for Middle–High-Temperature Applications** Yuto Shimizu*, Melbert Jeem, Takahiro Nomura Hokkaido University, Japan
14:30-14:45	O-0489	**Energy and Exergy Evaluations of Two Novel Liquid Air Energy Storage System Integrating Organic Rankine Cycle and Absorption Refrigeration** Yongan Chen, Jingwei Li, Rongrong Zhai*, Mengliang Liu, Yu Xu, Chongbao Sun North China Electric Power University; China Energy Digital Technology Group Co., Ltd., China
14:45-15:00	O-0814	**Stabilizing the Size of Calcium Hydroxide Pellet by Encapsulation for Thermochemical Heat Storage** Jun Yan*, Lei Jiang Shanghai Jiao Tong University, China

Oral Sessions

Monday PM

Session Room 5

Subject: Track 10-2 Heat Exchangers and Industrial Applications

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Hiroshi Suzuki (Kobe University),
Liang Chen (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 7	**Multi-Scale Modeling and Investigation on Performance Characteristics and Degradation Mechanism of Proton Exchange Membrane Fuel Cells** Zhiguo Qu Xi'an Jiaotong University, China
14:00-14:15	O-0108	**Enhanced Droplet Jumping During Condensation by Multi-Directional Laplace Pressure on Opposed Wedge-Shaped Micropatterned Surface** Chen Bin Yang, Zhi Yuan Jiang, Guo Bin Zhang, Zhi Guo Qu, Jian Fei Zhang* Xi'an Jiaotong University
14:15-14:30	O-0160	**Rapid Prediction Method of Li-Ion Battery Module Thermal State Based on Thermal Resistance Network** Bowen Qi, Zhiguo Qu* Xi'an Jiaotong University, China
14:30-14:45	O-0209	**Film Condensation Experiments of R1233zd(E) Over Horizontal Tubes and High-Temperature Condensation Predictions for High-Temperature Heat Pump** Jiatong Jiang, Bin Hu, Ruzhu Wang*, Hua Liu, Zhiping Zhang, Yongqiang Wu, Qingxue Yue Shanghai Jiao Tong University, China
14:45-15:00	O-0083	**Flow and Heat Transfer Characteristics of Airfoil Fin Printed Circuit Heat Exchanger in Supercritical CO_2 Power Cycle** Wanlong Jin, Lei Deng, Limin Wang, Chao Ye, Defu Che* Xi'an Jiaotong University, China

Oral Sessions

Monday PM

Session Room 6

Subject: Track 19-1 Thermal Radiation

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Gang Pei (University of Science and Technology of China), Cunhai Wang (University of Science and Technology Beijing)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lectures 8	**Pore Level Behavior of Thermal Radiation and Coupled Effects with Convection in Porous Foams at High Temperature.** Xinlin Xia Harbin Institute of Technology, China
14:00-14:15	O-0829	**Simultaneous Control of Spectral and Directional Emissivity with Multilayer Structures** Wenzi Yu, Boxiang Wang*, Changying Zhao* Shanghai Jiao Tong University, China
14:15-14:30	O-0622	**Study on a Universal Calculation Method for External Heat Flux on Convex Surface of Keplerian Orbit** Hua Yi*, Xing Huang, Yupeng Zhou Beijing Institute of Spacecraft System Engineering, Beijing Key Laboratory of Space Thermal Control Technology, China Academy of Space Technology (CAST), China
14:30-14:45	O-0540	**Atmospheric CO_2 Retrieval from Portable Ground-Based Spectral Measurements by Machine Learning Approach** Chenyang Zhang, Tao Ren* Shanghai Jiao Tong University, China
14:45-15:00	O-0028	**Simultaneous Measurement of Temperature and Emissivity Distributions of Nickel Foam Based on Infrared Thermal Imager** Jiaqi Li, Zehao Song, Chuang Sun, Xinlin Xia* Harbin Institute of Technology, China

Oral Sessions

Monday PM

Session Room 7

Subject: Track 17-1 Refrigeration and Cryogenics

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Naoki Shikazono (The University of Tokyo), Yonghua Huang (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 9	**Exploring Heat Transfer and Pressure Drop Characteristics in Fluid Flow Through Open-Cell Porous Metals with Tens-of-PPI Porosity** Ji Hwan Jeong Pusan National University, Korea
14:00-14:15	O-0133	**Frost Growth on Silver Iodide (AGI) Striped Patterns under Condensation Frosting** Jinchen Tang*, Takao Okabe, Katsuhiko Nishimura, Hang Zhang, Naoki Shikazono The University of Tokyo, Japan
14:15-14:30	O-0690	**Energy Performance of Domestic Refrigerator Using R-600A at Different Levels of Sub-Cooling** Syed Ashfaq Husnain Ji Hwan Jeong* Pusan National University, Korea
14:30-14:45	O-0633	**Scalable Barocaloric Cooling by Bulk Plastic Crystals** Kun Qian, Shangchao Lin*, Changying Zhao Shanghai Jiao Tong University, China
14:45-15:00	O-0046	**Experimental Study on Performance of Trans-critical CO_2 Heat Pump System** Haixu Teng, Ming Li* Jilin University College of Automotive Engineering, China

Oral Sessions

Monday PM

Session Room 8

Subject: Track 06-1 Conduction

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Yanhui Feng (University of Science and Technology Beijing), Takushi Saito (Tokyo Institute of Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 10	**TDA (Thermal Design Automation): Realizing Multiscale Thermal Managements for Electronic System** Bingyang Cao Tsinghua University, China
14:00-14:15	O-0111	**Effect of Contact Condition on Effective Thermal Resistance of Thermal Interface Material** Takushi Saito*, Mingjie Wang, Tatsuya Kawaguchi, Shimon Morikawa, Kouji Maeda Tokyo Institute of Technology, Japan
14:15-14:30	O-0431	**Enhancement of Interfacial Thermal Transport Between Epoxy Resin and Silicon Filler by Self Assembled Monolay Er** Ming Yang*, Qingjun Wu Institute of Engineering Thermophysics, CAS, China
14:30-14:45	O-0687	**Study of Temperature Distribution and Effective Thermal Conductivity in Tpms Structure** Dmitry Bragin*, Anton Eremin, Sofia Zinina, Andrey Popov Samara State Technical University, Russia
14:45-15:00	O-0644	**Analysis of Multi-Level Thermal Coupling Characteristics of High Power Density Igbt Modules Based on Fourier Series** Zhuangzhuang Li, Zhaolei Zheng* Chongqing University, China

Oral Sessions

Monday PM

Session Room 9

Subject: Track 21-2 Thermophysical Properties and Measurements

Time: Monday, June 24, 2024 13:30-15:00

Chair(s): Masamichi Kohon (Kyushu University), Weigang Ma (Tsinghua University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 11	**Surface-Plasmon-Enhanced Heat Transfer on a Thin Metallic Film** Bong Jae Lee Korea Advanced Insitute of Science and Technology, Korea
14:00-14:15	O-0330	**Quantum Genetic Algorithm for Thermophysical Characterization of Micro- and Nano-Films Using Pump-Probe Thermoreflectance** Huarui Sun*, Yongze Xu, Yang He, Jinfeng Yang, Yan Zhou, Cui Wei, Yuwei Zhai, Yan Liu, Dihai Wu, Huaixin Guo Harbin Institute of Technology, Shenzhen, China
14:15-14:30	O-0732	**Comparison of In-Plane Thermal Diffusivity of Two Carbon-Based Films** Jianli Wang*, Yanhui Zhang Southeast University, China
14:30-14:45	O-0634	**Direct Observation of Thermal Boundary Resistance in Silicon System** Ryohei Nagahiro*, Kosuke Maeda, Eleonora Isotta, Shizhou Jiang, G. Jeffrey Snyder, Oluwaseyi Balogun, Junichiro Shiomi The University of Tokyo, Japan
14:45-15:00	O-0816	**Ultralow Thermal Conductivity in Au Ion Irradiated GaN** Wujuan Yan, Bai Song* Peking University, China

Oral Sessions

Tuesday, AM

Mingzhu Hall

Subject: Track 02-3 Boiling, Evaporation and Condensation
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Lu Qiu (Beihang University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0393	**Heat Transfer Enhancement of Subcooled Flow Boiling in a Rectangular Narrow Channel by Using Surface Modification** Shikun Liu*, Hitoshi Asano Kobe University, Japan
11:15-11:30	O-0258	**Heat Transfer Randomness of Droplet Transition Boiling** Mengsen Zhang, Jianqin Zhu, Zhi Tao, lu Qiu* Beihang University, China
11:30-11:45	O-0212	**Theoretical Analysis on The Steam Plugs Formation in Supercritical Diameter Oscillating Heat Pipes Based on The Heating Section Length** Yingkai Shen, Yulong Ji*, Zhang Liu, Xin Yang, Yukun Yang, Yadong Li Dalian Maritime University, China
11:45-12:00	O-0414	**Case Study of Sodium-Potassium Alloy Heat Pipe Based on Thermal Resistance Network and CFD** Li Lei*, Liu Hanxuan Harbin Engineering University, China

Oral Sessions

Tuesday, AM

Session Room 1

Subject: Track 05-2 Computational Methods and Simulations
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Seong Hyuk Lee (Chung-Ang University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0323	**Sparse Measurement-Based Reconstruction of Transient Temperature Fields Using Spectral Proper Orthogonal Decomposition** Jin Mi, Lu Qiu*, Jianqin Zhu, Zhi Tao Beihang University, China
11:15-11:30	O-0044	**A Novel Virtual Overlapping Mesh Method For Geothermal Wellbore Modelling** Peng Hong, ChuanShan Dai*, HaiYan Lei, FuYan Zhao Tianjin University, China
11:30-11:45	O-0340	**Design Method for Internal Heat Sink Cooling of Thermal-Side Components** Yunze Yang, Jingchuan Sun* Beihang Univeisity, China
11:45-12:00	O-0161	**A Material with High Efficiency for Photothermal Conversion: First-Principles Investigation on Photothermal Conversion Mechanism of MXene Ti_3C_2** Hanwen Hu, Jifen Wang* Shanghai Polytechic University, China

Oral Sessions

Tuesday, AM

Session Room 2

Subject: Track 18-3 Solar/Renewable Energy
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Ligang Wang (North China Electric Power University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0818	**Roles of Wettability and Wickability on Enhanced Hydrogen Evolution Reactions** Panpan Zhao, Shuai Gong*, Ping Cheng Shanghai Jiao Tong University, China
11:15-11:30	O-0096	**Passive Isothermal Film for Hvac Application** Seonggon Kim, Sunghun Lee, Yong Tae Kang* Korea University, Korea
11:30-11:45	O-0638	**Analysis of a Multi-Energy Collaborative Station Primarily Utilizing Shallow Geothermal Energy** Xin Xu, Xiting Long* Sichuan University, China
11:45-12:00	O-0841	**Simulation of Isothermal Compressor Based on Spray Water Heat Transfer** Xinjing Zhang*, Bingqian Zhou, Ziyu Gao, Runze Wang, Yujie Xu, Haisheng Chen Institute of Engineering Thermophysics, Chinese Academy of Sciences, China

Oral Sessions

Tuesday, AM

Session Room 3

Subject: Track 07-3 Convective Heat Transfer
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Zhexi Wen (Central South University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0394	**Experimental and Numerical Study on Jet Impingement Heat Transfer with Different Pin Fin Configurations** Qiuru Zuo, Yu Rao* Shanghai Jiao Tong University, China
11:30-11:45	O-0581	**Experimental Study of Textile Moisture Evaporation Rate in Accordance with Drum Size Variation and Textile Motion Transition** Ingi Sung, Dahoon Jeong, Zhanzhe Wang, Ji Hwan Jeong* Pusan National University, Korea
11:30-11:45	O-0452	**An Experimental Study on The Cooling Effect of Magnetic Nanofluid** Subin Kim, Seong-Han Bae, Youn-Jea Kim* Sungkyunkwan University, Korea
11:45-12:00	O-0333	**The Potential Thermal Swtich Based on Bistable Slit Flow Driven by Temperature** Tingting Du*, Huacheng Nie, Yuexia Lv Shandong University, China

Oral Sessions

Tuesday, AM

Shanghai Hall

Subject: Track 08-3 Electronic Cooling and Thermal Management
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Guoqing Xin (Huazhong University of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0243	**Research on Single-Phase Heat Transfer Performance of Manifold Microchannel with Topology Design** Li Xin, Feng Shuai* Chongqing University of Technology, China
11:15-11:30	O-0578	**Investigation of Scale Characteristics and Temperature Control Strategies for Thermoelectric Pulsed Supercooling** Zeyu Liu, Jiaxin Tang, Zun Liu, Liemi Shen* Huazhong University of Science and Technology, China
11:30-11:45	O-0497	**Study on Flow Structure and Heat Transfer Characteristics of Gas-Liquid Two-Phase Flow in A Rotating Double Cylinder** Yang Lei, Kaneko Akiko* University of Tsukuba, Japan
11:45-12:00	O-0085	**Highly Efficient Thermal Management Materials and Devices Based on Electrocaloric Effect** Rujun Ma* Nankai University, China

Oral Sessions

Tuesday, AM

Session Room 5

Subject: Track 10-3 Heat Exchangers and Industrial Applications
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Gaosheng Wei (North China Electric Power University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0057	**Experimental Study on the Performance of a Novel Polymer and Activated Carbon Composite Coated Microchannel Heat Exchangers** Jinliang Cai*, Xu Zheng, Yu Zhang, Zhixiang Yi Zhejiang Sci-Tech University, China
11:15-11:30	O-0045	**Effect of Cross Phase Angle on the Performance of CW Primary Surface Heat Exchange Channel** Ruihao Wang*, Zhongyi Wang, Yanhua Wang, Zheng Li Harbin Engineering University, China
11:30-11:45	O-0130	**Experimental and Numerical Analysis for Offset Strip Fin Plate Heat Exchanger for EV Application** Gitaek Jung, Junhyuk Kim, Hoseong Lee* Korea University, Korea
11:45-12:00	O-0565	**A Study on the Detection and Diagnosis of Steam Input Abnormal Section in the Paper Drying Processes Using Ridge Regression Model** Jiwon Song, Soyeon Kim, Minkyu Jung, Donik Ku, Kijeong Seo, Minsung Kim* Chung-Ang University, Korea

Oral Sessions

Tuesday, AM

Session Room 6

Subject: Track 13-3 Micro/Nano Heat Transfer
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Kazuma Isobe (Okayama University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0224	**Electrostatic Interactions Dominate Thermal Conductivity and Anisotropy in Three-dimensional Hydrogen-Bonded Organic Frameworks** Renjiu Hu, Hongzhao Fan, Yanguang Zhou, Kan Tao, Zhiting Tian, Hao Ma* Cornell University, USA
11:15-11:30	O-0215	**Anisotropic Klemens Model for the Thermal Conductivity Tensor and Its Size Effect** Bo Jiang, Tao Li, Zhen Chen* Southeast University, China
11:30-11:45	O-0153	**Thermal Conductance Enhancement Mechanism at Copper/Graphene Interfaces with Symmetric Tilt Grain Boundary** Haimo Li, Lin Qiu*, Xiaohua Zhang, Xiaoliang Zhang, Yanhui Feng University of Science and Technology Beijing, China
11:45-12:00	O-0227	**A Microscale Thermal Diode Based on Phonon Hydrodynamics in Graphene** Ziwen Zou, Menglong Hao* Southeast University, China

Oral Sessions

Tuesday, AM

Session Room 7

Subject: Track 04-2 Combustion
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Weiwei Cai (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0616	**Real Gas Effects on the Detonation Properties and Structure under Super-Knock Relevant Conditions** Isaac Farias, Zifeng Weng, Rémy Mével* Tsinghua University, China
11:15-11:30	O-0302	**Rapid Flame Acceleration and DDT in Supersonic Mixture** Wandong Zhao, Xiaokang Li, Xinxin Wang, Xiong Yang* National University of Defense Technology, China
11:30-11:45	O-0280	**Radiative Characteristics of Non-Premixed Ammonia–Oxygen–Nitrogen Turbulent Jet Flames under Oxygen-Enriched Conditions** Yu Xia*, Daichi Matsumoto Tohoku University, Japan
11:45-12:00	O-0203	**Intermittent Phase Locking Control of Thermoacoustic Instability in a Swirl Premixed Flame** Chenzhen Ji*, Shikang Lu Tongji University, China

Oral Sessions

Tuesday, AM

Session Room 8

Subject: Track 09-3 Energy Storage
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Qinghua Yu (Wuhan University of Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0047	**Interactions Between Transport Phenomena and Transient Characteristics of Solid Oxide Cell** Zhaojian Liang, Mengying Li* The Hong Kong Polytechnic University, China
11:15-11:30	O-0073	**Optimization of High Conductivity Material Distribution to Enhance Heat Transfer in Metal Hydride Reactor** Hao Ye, Yubing Tao*, Xiaokun Yu, Zhenjiao Dong, Xu Xin Xi'an Jiaotong University, China
11:30-11:45	O-0126	**Development of Pcm-Based Thermal Energy Storages for EV Thermal Management** Hyuntae Kim, Hongseok Choi, Hoseong Lee* Korea University, Korea
11:45-12:00	O-0157	**Thermophysical Properties Investigation of D-Mannitol-Based Form-Stable Phase Change Composites** Zhizhao Mai, Ying Chen* Guangdong University of Technology, China

Oral Sessions

Tuesday, AM

Session Room 9

Subject: Track 21-3 Thermophysical Properties and Measurements
Time: Tuesday, June 25, 2024 11:00-12:00
Chair(s): Zhen Liu (University of Science and Technology of China)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0238	**Nanoscale Temperature Measurements with Sem-Reels** Menglong Hao* Southeast University, China
11:15-11:30	O-0624	**Metal Transducer-Assisted Acoustic Deformation Potential Characterization via Coherent Acoustic Phonon Dynamics** Yuhang Cai, Liang Guo* Southern University of Science and Technology, China
11:30-11:45	O-0723	**Measurement of Thermal Diffusivity Distribution for Single Lunar Regolith Grain by Microscopic Lock-in Thermography** Feilin Cheng, Hosei Nagano*, Abdulkareem Alasli, Ryohei Fujita, Ai Ueno, Naoya Sakatani, Satoshi Tanaka, Rie Endo, Sota Arakawa, Makito Kobayashi, Tsuyoshi Nishi, Akihiko Kondo, Saotshi Matsumura, Akira Tsuchiyama Nagoya University, Japan
11:45-12:00	O-0131	**Flow Method Measurement of Fluid Thermal Conductivity Based on Hot Wire** Yanchen Fu*, Ruoyu Wang, Yinlong Liu, Weitong Liu Beihang University, China

Oral Sessions

Tuesday, PM

Fuyue Hall 1

Subject: Track 02-4 Boiling, Evaporation and Condensation

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Chun Yang (Nanyang Technological University),
Liang Gong (China University of Petroleum (East China))

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 12	**Supercritical Pseudo-Boiling: Theory, Experiment and Applications** Jinliang Xu North China Electric Power University, China
14:00-14:15	O-0317	**Mechanism Study on the Regulation of Deposition Outcomes by Boiling Behavior of ITO Ink-Droplets on Substrates with Different Thermal Conductivities** Longbin Liu, Jianqin Zhu, Zhi Tao, Lu Qiu* Beihang University, China
14:15-14:30	O-0326	**Experimental Study of a Two-Phase Loop Thermosyphon for Horizontal Thermal Rectification** Zhanxiao Kang*, Jintu Fan The Hong Kong Polytechnic University
14:30-14:45	O-0154	**Plasmonic Nanoparticles & Nanobubbles** Dezhao Huang*, Jiajie Lei, Wensheng Zhao, Sheng Liu, Yanan Yue Wuhan University, China
14:45-15:00	O-0366	**A Novel Bubble Removal Method Applied in Pool Boiling by a Pair of Elastic Fins** Xiaojing Ma*, Songhe Wang, Ming He, Jinliang Xu North China Electric Power University, China
15:00-15:15	O-0315	**Flow Boiling Enhancement by Combining Surface Design and Flow Intermittency** Demin Kong, Qiang Zhang, Zhaoguang Wang* University of Michigan- Shanghai Jiao Tong University Joint Institute, China
15:15-15:30	O-0307	**Effect of The Transverse Microgrooves on The Thermal Performance of The Pulsating Heat Pipe** Young Jong Lee, Sung Jin Kim* Korea Advanced Institute of Science and Technology, Korea

Oral Sessions

Tuesday, PM

Fuyue Hall 2

Subject: Track 08-4 Electronic Cooling and Thermal Management

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Ronggui Yang (Peking University),
Chaoyang Zhang (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 13	**Engineering Complex Thermophysical Properties by Materials Informatics** Junichiro Shiomi University of Tokyo, Japan
14:00-14:15	O-0040	**Flow Boiling Heat Transfer in Silicon-Based Micro Jet Microchannel Heat Sink** Jinya Liu, Huiying Wu* Shanghai Jiao Tong University, China
14:15-14:30	O-0137	**High-Performance Thermal Management System and Model Predictive Inverse Method of High-Power Leds Based on Spray Cooling** Linyi Xiang, Xuan Yang, Yuntao Zha, Bisheng Zhang, Run Hu, Xiaobing Luo* Huazhong University of Science and Technology, China
14:30-14:45	O-0559	**A Study on the Improvement of Heat Transfer Performance in Pulsating Heat Pipes Applying a Unidirectional Circulation Mechanism with Asymmetric and Interconnecting Channels** Juneseok Kim, Yongseok Jeon* National Korea Maritime and Ocean University, Korea
14:45-15:00	O-0141	**Investigation on Heat Transfer Performance of Flat Plate Heat Pipes With Various Wick Structures** Jiamin Zhu, Sicong Tan*, Yuyan Jiang Beijing Institute of Technology, China
15:00-15:15	O-0284	**Numerical Studies on Transient Heat Transfer Properties of Adaptive Microchannel Heat Sink** Ning Mao*, Wenfei Li, BoYu Qin, Fan Yu, Yutao Wang China University of Petroleum (East China), China
15:15-15:30	O-0178	**A Diamond-made Manifold Pin-Fin Heat Sink for High-Heat-Flux Electronic Chip Cooling** Yuandong Guo*, Kai Tang Beihang University, China

Oral Sessions

Tuesday, PM

Fuyue Hall 3

Subject: Track 18-4 Solar/Renewable Energy

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Janusz Szmyd (AGH University of Science and Technology in Kraków), Zhenyuan Xu (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 14	**Centrifugal Granulation Assisted Thermal Energy Recovery to Harvest Ultrahigh Temperature Waste Heat from Molten Slag** Xun Zhu Chongqing University, China
14:00-14:15	O-0239	**Molecular Dynamics and Dft Simulation for Magnesium Diffusion in Metal Oxide** Shuhei Inoue*, Hiroki Kuroda, Ko Suzuki, Teru Mabuchi, Yukihiko Matsumura Kindai University, Japan
14:15-14:30	O-0056	**Enhancing Water Production of Solar Distillers by Regulating Wettability of Condensing Surface** Fengmin Su*, Zhenjiang Dai, Yiming Fan, Na Liu, Chao Chang, Yulong Ji Dalian Maritime University, China
14:30-14:45	O-0079	**Siphon-Driven Unidirectional Forced Convection Enables Salt-Rejecting Interfacial Solar Evaporation** Yaoxin Zhang* Shanghai Jiao Tong University, China
14:45-15:00	O-0518	**Photothermal Doubel-Response Colored Polymer Films** Yuanwei Lu, Huaiyuan Wang, Xuefeng Tian, Meiqi Wang, Jihui Gao* Harbin Institute of Technology, China
15:00-15:15	O-0088	**Improving Stirling Engine Performance by Constructing a Novel Inclined-Flow Miniature-Channel Regenerator** Minjie Yu, Zhichun Liu, Wei Liu* Huazhong University of Science and Technology, China
15:15-15:30	O-0427	**Optimal Cooling Operation of Water-Source Heat Pump System with Thermal Energy Storage** Hyun Ho Shin, Yongchan Kim* Korea University, Korea

Oral Sessions

Tuesday, PM

Mingzhu Hall

Subject: Track 13-4 Micro/Nano Heat Transfer

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Hua Bao (Shanghai Jiao Tong University), Jiayue Yang (Shandong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 15	**Thermal Transport through Nanowires-Beyond the Classical Size Effect** Deyu Li Vanderbilt University, United States
14:00-14:15	O-0463	**Near Interface Effects on Interfacial Thermal Transport** Yanguang Zhou* The Hong Kong University of Science and Technology, China
14:15-14:30	O-0199	**Molecular Dynamics Study on Local Thermal Resistance at a Nanostructured Solid-Liquid Interface** Masahiko Shibahara*, Yuri Oki, Kunio Fujiwara Osaka University, Japan
14:30-14:45	O-0132	**Insight into the Effect of Heat Carrier Interactions on Thermal Transport in Two-Dimensional Semiconductors** Xinyu Wang*, Guangwu Zhang, Xue Cheng Shandong University, China
14:45-15:00	O-0180	**Active Design of Ternary B-C-N Crystals with Ultra-High Thermal Conductivity via Particle Swarm Optimization** Shenghong Ju*, Yongchao Rao Shanghai Jiao Tong University, China
15:00-15:15	O-0454	**Thermal Transport and Phonon Physics in Two-Dimensional Materials** Jie Chen* Tongji University, China
15:15-15:30	O-0575	**Investigating the Thermal Transport Regime in Crystal $KTaO_3$ and $LiTaO_3$ under High Temperature** Xuanhui Fan, Feng Tao, Jing Zhou, Donghao Li, Zhongyin Zhang, Jie Zhu*, Dawei Tang Dalian University of Technology, China

Oral Sessions

Tuesday, PM

Session Room 1

Subject: Track 16-1 Porous Media

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Moran Wang (Tsinghua University),
Fei He (University of Science and Technology of China)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 16	**Thermophysical Properties under Extreme Conditions by Ultrafast-Laser Time Domain Thermoreflectance Method** Dawei Tang Dalian University of Technology, China
14:00-14:15	O-0201	**Numerical Simulation of Pool Boiling Heat Transfer Mechanisms in Hierarchical Gradient Mesh Surface** Jingyi Lu, Chengzhi Hu, Chengjun Yu, Huihui Wang, Dawei Tang* Dalian University of Technology, China
14:15-14:30	O-0247	**Prediction of Effective Thermal Conductivity and Multiscale Analysis of Heat Storage Characteristics in Composite Phase Change Materials** Hong-Tai Zhang, Ming-jia Li*, Xiang Liu Xi 'an Jiaotong University, China
14:30-14:45	O-0086	**Drying Characteristics and Thin Layer Drying Model of Semi-Mature Rice Paper** Weichao Wang, Yan Yan*, JiaXi Li, Zhen Yang, Zhao Pan Xi'an Polytechnic University, China
14:45-15:00	O-0526	**Effect of Surface Roughness of Water-Containing Porous Material on the Rapid Generation of Superheated Steam** Shoji Mori*, Bicheng Wang Kyushu University, Japan
15:00-15:15	O-0640	**Thermal -Hydrologic -Chemical and Fracture Dynamics Processes in the Evolution of Geothermal Reservoir** Weitao Zhang, Dongxu Han, Yujie Chen, Tingyu Li, Liang Gong*, Bo Yu China University of Petroleum (East China), China
15:15-15:30	O-0658	**Enhanced Wickability of Long-Range Ordered Structures Fabricated by Bidirectional Freeze-Casting Technique** Dan Wang, Siyu Li, Xiaojun Quan* Shanghai Jiao Tong University, China

Oral Sessions

Tuesday, PM

Session Room 2

Subject: Track 19-2 Thermal Radiation

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Qiang Cheng (Huazhong University of Science and Technology), Boxiang Wang (Chinese Academy of Sciences)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 17	**Photon Tunneling Mediated Heat Transfer in Particle Networks: From Particle Scale to Continuum Scale** Junming Zhao Harbin Institute of Technology, China
14:00-14:15	O-0208	**Designing a Photon Recycling Optical Cavity with Ray-Trace Simulations and Thermal Load Considerations for TPV Cells** Haolin Wang*, Makoto Shimizu, Hiroo Yugami Tohoku University, Japan
14:15-14:30	O-0544	**Improving Energy Conversion of Near-Field Thermophotovoltaic System with Multilayer Emitter** Wenbin Zhang, Changying Zhao* Shanghai Jiao Tong University, China
14:30-14:45	O-0501	**Enhanced Near-Field Radiative Heat Transfer Between Nanoparticles by graphene-hBN Multilayer** Kun Zhang, Jinlin Song, Qiang Cheng* Huazhong University of Science and Technology, China
14:45-15:00	O-0655	**Thermal Radiation Based on Quantum Phases** Zhou Chenglong, Yi Hongliang* Harbin Institute of Technology, China
15:00-15:15	O-0110	**Unraveling the Unique Thermal Radiation Properties of $Ti_3C_2T_x$ MXene** Yang Li*, Keqiao Li, Baoling Huang Zhejiang University, China
15:15-15:30	O-0168	**Measurement and Reconstruction of Radiation Characteristics of Thermal Insulation Ceramics** Yu Shi, Xue Chen, Chuang Sun, Xin-Lin Xia* Harbin Institute of Technology, China

Oral Sessions

Tuesday, PM

Session Room 3

Subject: Track 14-1 Multiphase Flow

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Ikuya Kinefuchi (The University of Tokyo), Dengwei Jing (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 18	**Two-Phase Spray Flamelet/Progress Variable Model for Spray Combustion** Kun Luo Zhejiang University, China
14:00-14:15	O-0072	**Bubble Growth and Nucleation Site Density on Microstructured Surfaces During Flow Boiling Heat Transfer** Zhanru Zhou*, Shenghong Huang, Haonan Wang University of Science and Technology of China, China
14:15-14:30	O-0297	**Pore-Scale Investigation on CH_4 Hydrate Phase Change and Seepage Behavior Using a Microfluidic Chip** Zhenyuan Yin*, Jidong Zhang, Xiaohui Liu Tsinghua University, China
14:30-14:45	O-0232	**Visualization of Internal Flow of Single Evaporating Micro Sessile Droplet Utilizing Micro-PIV** Hao Cong*, Kazuyoshi Fushinobu, Tatsuya Kawaguchi Tokyo Institute of Technology, Japan
14:45-15:00	O-0636	**A Discussion on the Drag Coefficient Correlations for Single Large Rising Bubble in Quiescent Liquids** Yi Feng, Zhengyu Mo*, Licheng Sun, Min Du, Chunxiao Zhu, Wei Yang, Xin Xu, Qinyi Zhang, Jiaxin Zheng Sichuan University, China
15:00-15:15	O-0334	**Droplet Splitting Induced Droplet Directional Transport on Ridged Superhydrophobic Surfaces** Zhifeng Hu, Ruzhu Wang* Shanghai Jiao Tong University, China
15:15-15:30	O-0423	**Comparison for the Unified Gas-Liquid Mass Transfer Models Based on the Phase-Field Lattice Boltzmann Method** Zhikai Tan, Hongjie Yan, Rongzong Huang, Qing Li, Liu Liu* Central South University, China

Oral Sessions

Tuesday, PM

Shanghai Hall

Subject: Track 13-5 Micro/Nano Heat Transfer

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Jie Chen (Tongji University),
Bai Song (Peking University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	AUTSE YSA Lecture 1	**Spectral Control of Far- and Near-Field Radiation Transfer** Kazuma Isobe Okayama University, Japan
14:00-14:15	O-0250	**Ballistic Phonon Transport under Periodic Heating** Zhen Chen*, Tao Li, Bo Jiang Southeast University, China
14:15-14:30	O-0025	**Atomic Insight into the Effect of Surface Ionization on the Heat Transfer at Silica—Water Interface** Haiyi Sun*, Donatas Surblys, Shukai Cheng, Taku Ohara Tohoku University, Japan
14:30-14:45	O-0054	**The Role of Anharmonicity in Calculating the Thermal Conductivity of Amorphous Silica** Xueyan Zhu* Institute of Applied Physics and Computational Mathematics, China
14:45-15:00	O-0546	**Boiling Heat Transfer in Nanoscale Pores: A Molecular Dynamics Simulation** Shuya Guan, Changying Zhao* Shanghai Jiao Tong University, China
15:00-15:15	O-0030	**Research on Interface Phonon Transport of GaN Nanowires Encapsulated by SiO_2** Jiao Chen, Zhaoliang Wang* China University of Petroleum (East China), China
15:15-15:30	O-0777	**Four-Phonon Scattering and Thermal Transport in 2H-$MoTe_2$** Haichang Guo, Bai Song* Peking University, China

Oral Sessions

Tuesday, PM

Session Room 5

Subject: Track 10-4 Heat Exchangers and Industrial Applications

Time: Tuesday, June 25, 2024 13:30-15:15

Chair(s): Gota Kikugawa (Tohoku University),
Dong-Chuan Mo (Sun Yat-sen University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 19	**Latent Heat Transportation with Hard-Shell Micro-Encapsulated Phase Change Materials** Hiroshi Suzuki Kobe University, Japan
14:00-14:15	O-0511	**Cooling Performance Analysis of Oil-Cooled High-Temperature PEFC by HDV's Driving Simulation** Ryosuke Ichikawa* Hokkaido University, Japan
14:15-14:30	O-0300	**Analyzing the Application of Cassie-Baxter on the Flocking Surface Coated by Hydrophobic Agent** Yoshinori Hamamoto*, Xiawei Qin Kyushu University, Japan
14:30-14:45	O-0469	**A General Physics-Informed Neural Network Approach for Transient Modeling of Fluid Transportation** Xiaojie Lin*, Jiale Wang, Yihui Mao, Wei Zhong Zhejiang University, China
14:45-15:00	O-0573	**Theoretical Analysis for Refrigerant Charge Optimization of Heat Pump for Electric Vehicles.** Donik Ku, Soyeon Kim, Minkyu Jung, Kijeong Seo, Minsung Kim* Chung-Ang university, Korea
15:00-15:15	O-0305	**Experimental Study on Aviation Kerosene Cooling Turbine Stator Blade** Jingshuai Yao, Jingchuan Sun * Beihang University, China

Oral Sessions

Tuesday, PM

Session Room 6

Subject: Track 12-1 Metamaterial and Thermoelectric Devices

Time: Tuesday, June 25, 2024 13:30-15:15

Chair(s): Rujun Ma (Nankai University),
Masahiro Nomura (The University of Tokyo)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 20	**Heat Transfer in Nanostructured Semiconductors: A Photonic Perspective** Masahiroi Nomura The University of Tokyo, Japan
14:00-14:15	O-0185	**Numerical Analysis of Interfacial Thermal Resisntace Between Bismuth Telluride and Halide Perovskite** Koji Miyazaki*, Kazaenosuke Kobayashi, Qing Wang, Kosuke Watanabe, Asuka Miura, Tomohide Yabuki, Satoshi Iikubo, Qing Shen, Shuzi Hayase Kyushu University, Japan
14:15-14:30	O-0574	**Planar-Type SiGe Thermoelectric Generator with a Double Cavity Structure** Sota Koike, Ryoto Yanagisawa, Laurent Jalabert, Roman Anufriev, Masashi Kurosawa, Takao Mori, Masahiro Nomura* The University of Tokyo, Japan
14:30-14:45	O-0118	**Enhancement of Thermoelectric Performance in Epitaxial GeTe Film by Domain Engineering and Defect Control** Takafumi Ishibe, Nobuyasu Naruse, Yutaka Mera, Yuichiro Yamashita, Yoshiaki Nakamura* Osaka University, Japan
14:45-15:00	O-0692	**Competitive Solvent Boosts the Thermopower of Liquid Thermocell by Gradient Ion Concentration** Shouze Li, Zhou Li, Run Hu* Huazhong University of Science and Technology, China
15:00-15:15	O-0034	**Strain Engineering in 3D Architected Silicon for High-Performance Thermoelectric Energy Harvesting** Bin Xu, Ryohei Nagahiro, Shingo Terashima, Cheng Shao, Yifei Li, Zhenglong Fang, Yuanzhe Li, Yuxuan Liao, Ohnishi Masato, Shinya Kato, Eiji Iwasa, Junichiro Shiomi* University of Tokyo, Japan

Oral Sessions

Tuesday, PM

Session Room 7

Subject: Track 04-3 Combustion

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Jun Hayashi (Kyoto University),
Yuyang Li (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 21	**Measuring and Understanding Thermochemical Process in Combustion: From Regular to Extreme Conditions and Homogenous to Multiphase Circumstances** Yuyang Li Shanghai Jiao Tong University, China
14:00-14:15	O-0531	**Detonation Properties in Ammonia-Hydrogen-Air Mixtures** Xiangrong Huang, Remy Mevel*, Fernando Veiga-Lopez Tsinghua University, China
14:15-14:30	O-0425	**Extinction Dynamics with the Underlying Physics of Ammonia and Ammonia/Hydrogen Spherical Diffusion Flame** Jiuyi Zhang, Yinhu Kang*, Xiaomei Huang, Xiaofeng Lu Chongqing University, China
14:30-14:45	O-0278	**Signal Characteristics of Laser-Induced Breakdown Spectroscopy in Nitrogen-Diluted Methane and Air** Ching-Kang Huang* Kyoto University, Japan
14:45-15:00	O-0508	**Eeffects of CO_2 and H_2O Addition on NO Formation in AmmoniaMethanol Combustion by a Comprehensive Chemical Kinetic Modeling** Gao Yuzheng, Li Youping* Qingdao University, China
15:00-15:15	O-0475	**Characteristics of Hydrogen Hydrothermal Combustion in a Wall-Cooled Reactor** Mingjing Fan, Haoze Wang, Youjun Lu* Xi'an Jiaotong University, China
15:15-15:30	O-0158	**Experimental Investigation on Rotating Detonation Fueled by Ammonia** Shijie Liu*, Siyuan Huang, Hailong Zhang, Haoyang Peng, Chenglong Yan National University of Defense Technology, China

Oral Sessions

Tuesday, PM

Session Room 8

Subject: Track 09-4 Energy Storage

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Qibin Liu (Institute of Engineering Thermophysics, Chinese Academy of Sciences), Qiye Zheng (The Hong Kong University of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 22	**Electrostatic Adsorption and IonTransport in Microporous Structure for High Power Supercapacitor Energy Storage** Zheng Bo Zhejiang University, China
14:00-14:15	O-0100	**X-Ray CT and Simulation of Influence of Active Material Particle Size on All-Solid-State Batteries Performance** Lee Kiyoung*, Kodama Manabu, Yanagi Kazuaki, Haniu Yamato, Masuda Naoya, Higuchi Hiroyuki, Arashi Toshimi, Hirai Shuichiro Tokyo Institute of Technology, Japan
14:15-14:30	O-0542	**Zeolitic-Imidazolate Framework-Derived Porous Electrode for High-Performance Redox Flow Batteries** Jia-Chen Li, Ren-Zhong Zhang, Wei-Wei Yang* Xi'an Jiaotong University, China
14:30-14:45	O-0470	**Experimental Study of The Thermochemical Energy Storage Performance of Copper-Cobalt Oxides** Tiantian Yan, Bachirou Guene Lougou, Boshu Jiang, Boxi Geng, Danni Ma, Shuo Zhang, Yong Shuai* Harbin Institute of Technology, China
14:45-15:00	O-0610	**Experimental Analysis of the Effect of Pulsating Flow on the Overpotential of Vanadium Redox Flow Battery** Pengfei Sun*, Mehrzad Alizadeh, Patcharawat Charoen-amornkitt, Takahiro Suzuki, Shohji Tsushima Osaka University, Japan
15:00-15:15	O-0343	**Transport Performance Analysis of Modified Cation Exchange Membrane Nafion-X (X=Li, Na, K) for Alkaline All-Iron Flow Batteries** Xusheng Cheng, Tao Xuan, Liwei Wang* Shanghai Jiao Tong University, China
15:15-15:30	O-0220	**Real-Time High-Fidelity Model of Temperature Reconstruction for Lithium-Ion Battery** Zebin Sun, Zhaoguang Wang* Shanghai Jiao Tong University, China

Oral Sessions

Tuesday, PM

Session Room 9

Subject: Track 21-4 Thermophysical Properties and Measurements

Time: Tuesday, June 25, 2024 13:30-15:30

Chair(s): Xinlin Xia (Harbin Institute of Technology), Dong-Wook Oh (Chosun University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 23	**Investigation of Wall Chemical Effects in Hydrogen/Ammonia Flames toward Green Combustion Systems** Yuji Suzuki The University of Tokyo, Japan
14:00-14:15	O-0718	**Specific Heat Capacity Mapping of Carbon Fiber Reinforced Plastics Using Lock-in Thermography to Evaluate Fatigue Life** Boxi Song*, Ryohei Fujita, Natsuko Kudo, Shun Abe, M. J. Mohammad Fikry, Jun Koyanagi, Shinji Ogihara, Hosei Nagano Nagoya University, Japan
14:15-14:30	O-0429	**Experimental Investigation of Critical Parameters for R290 + R1234YF Binary Mixture** Bo Tang, Xueqiang Dong*, Xiaoyu Yao, Yanxing Zhao, Maoqiong Gong Technical Institute of Physics and Chemistry, CAS, China
14:30-14:45	O-0367	**Advancing Thermal Characterization: Simultaneous Micrometer-Scale Measurement of Thermal Conductivity and Heat Capacity in Low-Conductivity Materials Using the Square-Pulsed Source (SPS) Technique** Tao Chen, Shangzhi Song, Yang Shen, Kexin Zhang, Ronggui Yang, Puqing Jiang* Huazhong University of Science and Technology, China
14:45-15:00	O-0143	**Combining Broadband Dual-Comb Absorption Spectroscopy and Neural Network for Detection of CH4 and CH_3COCH_3 Mixtures** Qingran Wang, Zhitian Niu, Yatao Ren*, Linbo Tian, Hong Qi Harbin Institute of Technology, China
15:00-15:15	O-0049	**Study on the Effects of Typical Volatile Organic Compounds on Soil Thermal Conductivity** Liwu Fan*, Yuhao Wu, Zitao Yue Zhejiang University, China
15:15-15:30	O-0038	**Synchronous Measurement of Multiple Thermophysical Properties in Heterostructures via Structure Function Analysis with Sub-microsecond Thermoreflectance Thermal Imaging** Zhaoyang Liu, Zhike Liu, Guang Yang, Bingyang Cao* Tsinghua University, China

Oral Sessions

Wednesday, AM

Mingzhu Hall

Subject: Track 02-5 Boiling, Evaporation and Condensation
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Zhichun Liu (Huazhong University of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0349	**Experimental Study on Microbubble Emission Boiling with Time-Frequency Analysis** Akira Otake, Ichiro Ueno* Tokyo University of Science, Japan
11:15-11:30	O-0395	**Experimental Study on the Condensation Heat Transfer Characteristics of Room Temperature Phase Transition Fluid in Horizontal Microchannels** Zhi Li, Zhangbin Yang, Lin Ruan* Institute of Electrical Engineering, CAS, China
11:30-11:45	O-0510	**Nanofluids Improve the Performance of Membrane Distillation** Jiacheng He*, Ping Wang, Ying Chen Guangdong University of Technology, China
11:45-12:00	O-0719	**Optimizing Evaporation Heat Transfer of Dielecreic Fluids in Nanoporous Membranes** Shasha Ma, Shuai Gong*, Ping Cheng Shanghai Jiao Tong University, China

Oral Sessions

Wednesday, AM

Session Room 1

Subject: Track 03-2 Carbon Capture, Utilization and Storage
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Lanlan Jiang (Dalian University of Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0558	**Surface Leakage Monitoring Study of CO_2 Injection in Low-Permeability Reservoirs for Oil Recovery** Meiheriayi Mutailipu*, Gang Wang, Yanjing Li Xinjiang University, China
11:15-11:30	O-0589	**Experimental Study on the Absorption and Desorption Enhancement of CO_2 by Amine-based Graphene Oxide Nanofluids** Shaojun liu*, Zhuoyi Li, Jun Meng, Jiangmin Guo, Gang Ma, Chenghang Zheng, Xiang Gao Zhejiang University, China
11:30-11:45	O-0389	**Numerical Investigation of Mechanical Energy Transfer in Porous Media with Different Capillary Numbers and Viscous Ratios** Wang Kailin*, Shintaro Matsushita, Yamashita Shu, Nasir Muhammad, Suekane Tetsuya Tokyo Institute of Technology, Japan
11:45-12:00	O-0826	**Carbon Flow Tracing and the CO_2 Reduction Potential of Steel Industry in China** Jiang Binfan, Tian Zhuohang, Cheng Chunyun, Xia Dehong*, Wang Yanmin, Xu Runsheng University of Science and Technology Beijing, China

Oral Sessions

Wednesday, AM

Session Room 2

Subject: Track 20-1 Thermocatalysis, Thermochemistry, and Energy Conversion
Time: Wednesday, June 26, 2024 11:00-11:45
Chair(s): Yang Yang (Chongqing University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0061	**Heat and Mass Transfer in Microscale Reformer for Ammonia Decomposition** Viacheslav Papkov*, Igor Karpilov, Dmitry Pashchenko Guangdong Technion - Israel Institute of Technology (GTIIT), China
11:15-11:30	O-0245	**Numerical Analysis of Performance and Thermo-Electric Conversion Efficiency in Thermally Regenerative Ammonia-Based Flow Batteries with Copper Foam Electrode** Qinghua Yu*, Qinghua Yu Wuhan University of Technology, China
11:30-11:45	O-0524	**Relationship Between Mesh Electrode Structure and Hydrogen Bubble Detachment Behavior in Alkaline Water Electrolysis** Xuesong Wei, Shoji Mori* Kyushu University, Japan

Oral Sessions

Wednesday, AM

Session Room 3

Subject: Track 07-4 Convective Heat Transfer
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Jianfei Zhang (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0318	**Interactive Reinforcement Learning Platform for Film Cooling to Assist Designer** Li Yang*, Xiaopeng Li, Xingcheng Liu, Qi Wang Shanghai Jiao Tong University, China
11:15-11:30	O-0596	**Clogging and Pressure Loss Characteristics of Particle Mixed Flow in a Lattice-Shaped Microchanne** Kazuya Tatsumi*, Yuki Hatta, Reiko Kuriyama Kyoto University, Japan
11:30-11:45	O-0347	**Modeling of Coupled Fouling and Heat Transfer of a Wavy Plate** Hongying Li, MD Didarul Islam, Afshin Goharzadeh, Yit Fatt Yap* Khalifa University (United Arab Emirates)
11:45-12:00	O-0051	**Effect of Mechanical Stirring on the Heat Transfer Characteristics and Energy Efficiency of Waxy Crude Oil Storage Tank during Heating Process** Jian Zhao*, Mingyu Lei Northeast Petroleum University, China

Oral Sessions

Wednesday, AM

Shanghai Hall

Subject: Track 08-5 Electronic Cooling and Thermal Management
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Yong Ren (University of Nottingham Ningbo China)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0213	**Surface Structure Design of Pump-Cooler for Heat Transfer Enhancement** Weihan Fan, Qiang Zhang, Zhaoguang Wang* University of Michigan - Shanghai Jiao Tong University Joint Institute, China
11:15-11:30	O-0237	**Topology Optimization of a High-Performance Cold Plate Operating in the Turbulent Regime for Battery Thermal Management Applications** Zexu Wang, Menglong Hao* Southeast University, China
11:30-11:45	O-0055	**Investigation of Thermal Management of Mosfet Semiconductor Using Phase Change Materials** Yong Ren*, Haocheng Wang, Yanhong Guo University of Nottingham Ningbo China, China
11:45-12:00	O-0020	**Experimental Investigation on Transpiration Cooling of Ammonium Carbonate in Porous Composite Structure at High Temperature** Fei Wang, Nianduo Song, Xinlin Xia*, Xue Chen Harbin Institute of Technology, China

Oral Sessions

Wednesday, AM

Session Room 5

Subject: Track 10-5 Heat Exchangers and Industrial Applications
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Qian Fu (Chongqing University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0122	**Investigation on the Cooling Characteristics of an Innovation Double Layer Combined Cooling Design** Ding Rui* Northwest Institute of Nuclear Technology, China
11:15-11:30	O-0256	**Flow and Heat Transfer Behavior of Supercritical CO_2 in Different PCHE Channels under Heaving Motions** Jiaqi Cheng, Zhexi Wen*, Shuaishuai Wang, Yaru Zhang, Qing Li Central South University, China
11:30-11:45	O-0563	**Heat Transfer Coefficient of HFO-1336mzz(Z) as an Alternative to HFC-245fa in a Brazed Plate Heat Exchanger with Distributor** Beomjun Kim, Dongchan Lee* University of Seoul, Korea
11:45-12:00	O-0236	**System Analysis and Optimization of Thermal Booster Based on Calcium Chloride in Micro-Capsules with Nano-Holes** Linbin Zeng, Hiroshi Suzuki*, Ruri Hidema, Keiko Fujioka Kobe University, Japan

Oral Sessions

Wednesday, AM

Session Room 6

Subject: Track 13-6 Micro/Nano Heat Transfer
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Cunlu Zhao (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0184	**Numerical Analysis and Experimental Validation of Microchannel Heat Exchanger** Vishwas Kumar Pandey*, Chennu Ranganayakulu, Xing Luo Birla Institute of Technology and Science, India
11:15-11:30	O-0276	**Resistance-Based MEMS Sensor for Liquid Film Thickness Measurement in Microchannel** Zhaorui Guo, Victor Baptistella, Minhyeok Lee, Yuji Suzuki*, Gherhardt Ribatski The University of Tokyo, Japan
11:30-11:45	O-0530	**Optimization and Thermodynamic Analysis of Multi-Objective Optimization Algorithm in Venturi Microchannel Nanoflure** Yusheng Qiu, Ping Liu*, Shiming Sang, Ruiqi Sun Anhui University of Science and Technology, China
11:45-12:00	O-0067	**Entropy Generation Analysis of Galinstan in Inhomogeneous, Ultra-Thin, Wide-Straight Micro-Channel** Yunhao Bao, Shuangquan Shao* Huazhong University of Science and Technology, China

Oral Sessions

Wednesday, AM

Session Room 7

Subject: Track 04-4 Combustion
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Qian Wang (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0552	**Detonation Limits in Long Spiral Tubes** Zhaoyuan Huang, Zihang Ni, Qiang Xiao, Fernando Veiga-López, Damir Valiev, Rémy Mével*, Bing Wang Tsinghua University, China
11:15-11:30	O-0649	**Computational Study on Compressor-Combustor Interactions for the Improved Multi-Component Matching of a Micro Gas Turbine** Jingke Su, Anxiong Liu*, Kun Luo, Jianren Fan Zhejiang University, China
11:30-11:45	O-0653	**An Les-Pdf-Dpbe Method for Soot Formation in a Turbulent Lifted Flame** Anxiong Liu, Kun Luo* Zhejiang University, China
11:45-12:00	O-0312	**Combustion Process of Boron Aggregates At 1-10 Atm Pressure** Binbin Chen*, Lian Duan, Zhixun Xia, Yunchao Feng, Likun Ma National University of Defense Technology, China

Oral Sessions

Wednesday, AM

Session Room 8

Subject: Track 09-5 Energy Storage
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Jun Yan (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0298	**Insulation Performance of Underground Heat Storage Tank for Severe Cold Area Single-Family Dwelling in Deep Winder: An Experimental Test** Saranmanduh Borjigin*, Wang Fu, Suritu bai, Changchun Bao, Keqilao Meng, Hexi Baoyin, Jinglei Wang Inner Mongolia University of Technology; Tsinghua University, China
11:15-11:30	O-0435	**Esterification Enabled Wide Temperature Range Phase Change Cold Storage** Long Geng, Ben Zhou, Haitao Xue, Changle Zhang, Yabo Yan, Jiateng Zhao, Changhui Liu* China University of Mining and Technology, China
11:30-11:45	O-0549	**Further Heat Transfer Enhancement in a Channel with Nano-Encapsulated PCM by Using Ribs** Kei Tamura, Keisuke Shibata, Moghtada Mobedi* Shizuoka University, Japan
11:45-12:00	O-0195	**Molecular Simulations of NaCl-$CaCl_2$ Binary Molten Salt Systems under Spatially Gradient Electric Fields** Gegentana, Leping Zhou* North China Electric Power University, China

Oral Sessions

Wednesday, AM

Session Room 9

Subject: Track 01-1 Bio and Medical Applications
Time: Wednesday, June 26, 2024 11:00-12:00
Chair(s): Dan Huang (Central South University of Forestry and Technology)

Time	ID	Title, Author(s), Affiliation(s)
11:00-11:15	O-0434	**Probing the Mechanism of Inhibiting Ice Nucleation by Cryoprotective Solution** Min Lin, Haishan Cao* Tsinghua University, China
11:15-11:30	O-0468	**Influence of Different Laser Irradiation Conditions on the Efficacy of Gold Nanoparticle-Enhanced Laser Thermal Therapy** Yu Xiao, Zelong Zhang, Menghua Jian, Wei Dong* Shanghai Jiao Tong University, China
11:30-11:45	O-0593	**Preliminary Study Using Fibre-Optic Laser for the Treatment of Breast Cancer** Akiyoshi Obonai*, Takuma Kogawa, Yuki Kanda, Tetsuya Kodama, Atsuki Komiya Tohoku University, Japan
11:45-12:00	O-0441	**A Study of Breath-Holding on the Deposition of Drug Droplets in Human Airways** Hangyu Dang, Yi Xu* University of Shanghai for Science and Technology, China

Oral Sessions

Wednesday, PM

Fuyue Hall 1

Subject: Track 20-2 Thermocatalysis, Thermochemistry and Energy Conversion

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Chengwang Lei (The University of Sydney), Yaoxin Zhang (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 24	**Solar-Driven Valorization for CO_2, Biomass, and Waste Plastics: A Study on Carbon Emission Reduction from Concentrated Solar Power (CSP)** Yong Shuai Harbin Institute of Technology, China
14:00-14:15	O-0059	**Endothermic Effect of Steam Methane Reforming Reactions: Heat and Mass Transfer Analysis** Igor Karpilov*, Viacheslav Papkov, Dmitry Pashchenko Guangdong Technion - Israel Institute of Technology, China
14:15-14:30	O-0169	**Numerical Investigation of the Optimum Hydrogen Humidification Rate to Improve Protonic Ceramic Fuel Cell Performance** Kunpeng Li*, Yohei Nagata, Takeru Murakami, Takuto Araki, Konosuke Watanabe, Yasunobu Mizutani, Hiroyuki Shimada, Hirofumi Sumi, Yuji Okuyama, Masashi Mori Yokohama National University, Japan
14:30-14:45	O-0103	**Novel C2 Hydrocarbon Synthesis via Chemical Looping Oxidative Coupling of Methane and Carbon Dioxide** Tingting Gu*, Nobusuke Kobayashi, Akira Suami Gifu University, Japan
14:45-15:00	O-0356	**Transition Metals (M–Fe) Surface Enrichment h-BN 2D Nanosheets for Thermochemical Redox Cycling Conversion of CO_2 and H_2O** Bachirou Guene Lougou, Rafique Muhammad, Boshu Jiang, Yong Shuai*, Boxi Geng Harbin Institute of Technology, China

Oral Sessions

Wednesday, PM

Fuyue Hall 2

Subject: Track 11-1 Melting and Solidification

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Zhen Li (Tsinghua University),
Tatsunori Asaoka (Shinshu University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 25	**Freezing Dynamics and Morphology of Deposited and Impact Droplets on a Cold Surface** Chun Yang Nanyang Technological University, Singapore
14:00-14:15	O-0017	**Solidification of Drops Spreading on Cold Substrates: A Cluster of Modelling Challenges** Yulii Shikhmurzaev, Yulii Shikhmurzaev* University of Birmingham, United Kingdom
14:15-14:30	O-0617	**Numerical Investigation of the Melting Process of Ice Crystals** Fuhao Zhong, Xiufang Liu*, Jiajun Chen, Zhen Wei, Bo Han, Yu Hou Xi'an Jiaotong University, China
14:30-14:45	O-0348	**Droplet Deposition on Curved Surfaces** Haokun Zhang, MD Didarul Islam, Nader Vahdati, Firas Jarrar, Yit Fatt Yap* Khalifa University, United Arab Emirates
14:45-15:00	O-0291	**Microscopic Mechanism of Heterogeneous Ice Nucleation: The Roles of Cooling Rate, Interaction Strength and Wetting State** Ping Li, Chuanshuai Dong* South China University of Technology, China

Oral Sessions

Wednesday, PM

Fuyue Hall 3

Subject: Track 05-3 Computational Methods and Simulations

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Tomoya Houra (Nagoya Institute of Technology), Nuo Yang (National University of Defense Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 26	**Direct Evaluation and Optimization of Heat Exchangers on Cycle Efficiency in Brayton Cycles for Power and Energy** Guihua Tang Xi'an Jiaotong University, China
14:00-14:15	O-0598	**Accelerated Discovery of High & Low Thermal Conductivity Metal-Organic Frameworks via Active Learning** Ziwen Zhang, Jianchun Chu, Sa Xue, Xiangyang Liu*, Maogang He Xi'an Jiaotong University, China
14:15-14:30	O-0392	**Localized Vibrational Modes as Efficient Heat Carriers for Thermal Insulator-to-Conductor Transition in Polymers** Zhuangli Cai, Shangchao Lin*, Changying Zhao Shanghai Jiao Tong University, China
14:30-14:45	O-0407	**Statistical Analysis on the Molecular Aggregation Phenomena of Supercritical CO_2 Using Opls-AA Force Field Simulation** Lichao He, Ziyu Liu, Lin Chen* Institute of Engineering Thermophysics Chinese Academy of Sciences, China
14:45-15:00	O-0603	**Simulation and Evaluation of the Basic Equations Using the CubicDEL Method** Seitaro Ueno, Yutaka Namiki, Masataka Teshigawara, Naruki Shoji, Hiroshige Kikura*, Takahiko Tanahashi Tokyo Institute of Technology, Japan

Oral Sessions

Wednesday, PM

Session Room 1

Subject: Track 13-7 Micro/Nano Heat Transfer

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Wei Yu (Shanghai Polytechnic University), Ruoyu Dong (Beihang University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 27	**Energy Conversion and Heat Transfer Based on Phase Change at Nanoporous Membranes** Zhichun Liu Huazhong University of Science and Technology, China Thermal Coupled and Photovoltaic Electrolysis Integrated Solar Hydrogen Production, China
14:00-14:15	O-0432	**Molecular Dynamics Study on Phase Change Properties and Molecular-Scale Mechanism of Sugar Alcohols: Melting and Latent Heat** Shukai Cheng*, Donatas Surblys, Taku Ohara Tohoku University, Japan
14:15-14:30	O-0628	**Nonequilibrium Velocity Distribution of Evaporated Water Molecules from a Liquid-Vapor Interface: A Molecular Beam Experiment** Ikuya Kinefuchi*, Atsushi Matsushima, Kohei Sato The University of Tokyo, Japan
14:30-14:45	O-0075	**Thermal Field Simulation of a Novel Top-Seeded Crystal Growth Method** Shengying Yue*, Shenghui Xie Xi'an Jiaotong University, China
14:45-15:00	O-0123	**Quantitative Calculation of Thermo-Osmosis Velocity and Investigation into Influencing Facters** Wenhao Fan, Zhichun Liu* Huazhong University of Science and Technology, China

Oral Sessions

Wednesday, PM

Session Room 2

Subject: Track 14-2 Multiphase Flow

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Kun Luo (Zhejiang University), Xiangyang Liu (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 28	**Thermal Coupled and Photovoltaic Electrolysis Integrated Solar Hydrogen Production** Dengwei Jing Xi'an Jiaotong University, China
14:00-14:15	O-0362	**Experimental Study on Vibration Characteristic Induced by Direct Contact Condensation of a Steam Jet in Flowing Water** Aoyue Hong* Xi'an Jiaotong University, China
14:15-14:30	O-0486	**Measurement of Water Content in Gas-Liquid Two-Phase Flow Based on Pressure Drop** Xiaojun Ma*, Qiang Xu, Suifeng Zou, Liejin Guo Xi'an Jiaotong University, China
14:30-14:45	O-0594	**Simulation Study of Flow Fields Characterization and Structure Optimization on U-type Flow Channel.** Zhi Zhang, Shen Xu*, Bo Huang, Tianjun Zhou, Mingfeng Yang, Linghan Zhang, Zhongliang Feng Shanghai University of Engineering Science, China
14:45-15:00	O-0572	**Numerical Study on Two-Phase Heat and Mass Transfer of Cryogenic Distillation under Offshore Conditions** Hongyu Lv, Liang Chen*, Ze Zhang, Shuangtao Chen, Yu Hou Xi'an Jiaotong University, China

Oral Sessions

Wednesday, PM

Session Room 3

Subject: Track 16-2 Porous Media

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Hiroshi Iwai (Kyoto University),
Chiyu Xie (Beihang University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 29	**Collaborative Research of Thermo-Fluids and Materials Developments in Fuel Cells and Flow Batteries** Shohji Tsushima Osaka University, Japan
14:00-14:15	O-0641	**Numerical Simulation of Li Transport in Polycrystalline Active Materials of Li-Ion Batteries** Ren Matsukawa*, Yuting Guo, Masashi Kishimoto, Hiroshi Iwai Kyoto University, Japan
14:15-14:30	O-0162	**Multiscale Simulation and Research on the Transport Mechanism of the Porous Microstructure of Thermal Protection Materials for Hypersonic Vehicles** Jinghui Guo*, Yuhao Tian, Qiming Zhang, Sijia Li, Guiping Lin Beihang University, China
14:30-14:45	O-0496	**Nanoscale Multiphase Structures Confined in Nanotubes Revealed by 3D Electron Microscopy** Ryota Saito, Qin-Yi Li*, Tatsuya Ikuta, Koji Takahashi Kyushu University, Japan
14:45-15:00	O-0623	**Lattice Boltzmanm Study of Catalyst Layer with High-Utilization Gradient Pt Design for Proton Exchange Membrane Fuel Cells** Yulin Wang*, Lixia Qi Tianjin University of Commerce, China

Oral Sessions

Wednesday, PM

Shanghai Hall

Subject: Track 03-3 Carbon Capture, Utilization and Storage

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Rong Chen (Chongqing University), Yutaka Tabe (Hokkaido University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	AUTSE YSA Lecture 2	**Elevated Temperature Adsorptive Separation for Hydrogen Purification** Xuancan Zhu Shanghai Jiao Tong University, China
14:00-14:15	O-0520	**Pore-Scale Simulation of Interfacial Mass Transfer during CO_2 Dissolution Trapping** Yingxue Hu*, Yusong Xu, Haozhou Wang, Yuki Kanda, Junwei Su Xi'an Jiaotong University, China
14:15-14:30	O-0551	**X-Ray Microtomography Analysis of Particles Migration in Immiiscible Two-Phase Flow Systems** Sotheavuth Sin*, Muhammad Nasir, Shintaro Matsushita, Tetsuya Suekane Tokyo Institute of Technology, Japan
14:30-14:45	O-0228	**Advanced Contactor with 3D Printed Triply Periodic Minimal Surfaces TPMS for Adsorption Based Direct Air Capture** Qingyang Shao, Zhuozhen Gan, Xuancan Zhu* Shanghai Jiao Tong University, China
14:45-15:00	O-0532	**Construction of Mn-Polymeric Carbon Nitride for Enhancing Photocatalytic Reduction of CO_2 to CO** Hang Zhao, Rong Chen*, Xun Zhu, DingDing Ye, Yang Yang, Qiang Liao Chongqing University, China

Oral Sessions

Wednesday, PM

Session Room 5

Subject: Track 02-6 Boiling, Evaporation and Condensation

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Shoji Mori (Kyushu University),
Haiwang Li (Beihang University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 30	**From Contact Line Corrugations to Rewritable Nanofilm Printing** Hao Wang Peking University, China
14:00-14:15	O-0293	**Influences of Surface Microstructure and Wettability on Boiling Heat Transfer** Shengwei Zhao*, Akiko Kaneko, Biao Shen, Yasuyuki Takata University of Tsukuba, Japan
14:15-14:30	O-0014	**Effect of Low-Carbon Alcohol Additive on Leidenfrost Dynamics of an Impacting Water Droplet** Chang Cai*, Han Chen, Chao Si, Hong Liu Dalian University of Technology, China
14:30-14:45	O-0426	**Improving Prediction Capability of Mars Code for Subcooled Boiling Flow** Manh Long Doan, Dongwon Jeong, Jae Jun Jeong, Byongjo Yun* Pusan National University, Korea
14:45-15:00	O-0471	**Molecular Dynamics Study of the Impact of CNT Membrane on Evaporation** Minghao Wang, Borui Zhang, Yurong He* Harbin Institute of Technology, China

Oral Sessions

Wednesday, PM

Session Room 6

Subject: Track 19-3 Thermal Radiation

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Junming Zhao (Harbin Institute of Technology),
Run Hu (Huazhong University of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 31	**Tailoring Thermal Radiation Based on Topological Photonic Structures** Boxiang Wang Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences / Shanghai Jiao Tong University, China
14:00-14:15	O-0477	**Optical Properties of a Metal-Insulator-Metal Nanocube for Solar Thermal Applications** Zhanchao Chen, Caiyan Qin* Harbin Institute of Technology (Shenzhen), China
14:15-14:30	O-0669	**Modulation of Radiative Heat Transfer in 1D Flat-Band Lieb Lattice Composed of SiC Nanoparticles** Zhen Gong, Boxiang Wang, Changying Zhao Shanghai Jiao Tong University, China
14:30-14:45	O-0272	**Flexible Wavy Radiative Heat Sink for Daytime and Nighttime Passive Cooling** Hexing Zheng, Woochul Kim* Yonsei University, Korea
14:45-15:00	O-0446	**Thermochromic Organic Metal Coordination Polymer** Huaiyuan Wang, Jie Wang, Yuanwei Lu, Xuefeng Tian, Meiqi Wang, Jihui Gao* Harbin Institute of Technology, China

Oral Sessions

Wednesday, PM

Session Room 7

Subject: Track 17-2 Refrigeration and Cryogenics

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Wei Rao (Technical Insitute of Physics and Chemistry, CAS), Limei Shen (Huazhong University of Science and Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 32	**Molecular Understanding and Realization of Scalable Barocaloric Cooling Using Bulk Plastic Crystals** Shangchao Lin Shanghai Jiao Tong University, China
14:00-14:15	O-0186	**Optimizing Performance of a Heat Pump Through Reverse Brayton and Vapor Compression Cascade Integration** Mohammad Ali Yaqteen, Yoong Chung, Jin Sub Kim*, Chan Ho Song Korea Institute of Machinery and Materials, Korea
14:15-14:30	O-0386	**Technical Assessment of Auto--Cascade Refrigeration Cycles Integrating the Vortex Tube** Yinlong Li, Gang Yan* Xi'an Jiaotong University, China
14:30-14:45	O-0371	**Evaluation of Pressure Control Performance in a Small Liquid Nitrogen Tank by a Passive Thermodynamics Venting System or a Cryocooler** Jiaxu Zhang, Yonghua Huang* Shanghai Jiao Tong University, China
14:45-15:00	O-0648	**Experimental Study of a Novel Pumpless Absorption Heat Pump Using R134a/DMF as Working Pair** Zizeng Gao, Hanyu Zhu, Xuefeng Zhang, Liwei Wang*, Chen Zhang Shanghai Jiao Tong University, China

Oral Sessions

Wednesday, PM

Session Room 8

Subject: Track 09-6 Energy Storage

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Zheng Bo (Zhejiang University),
Leping Zhou (North China Electric Power University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 33	**Sorption Thermal Battery for Plus Energy Building Application** Yong Tae Kang Korea University, Korea
14:00-14:15	O-0070	**Evaluation of Supercritical Carbon Dioxide Utilization in Geothermal Heating, Power and Energy Storage Plant** Dongxu Ji*, Fan Zhang Chinese University of Hong Kong, Shenzhen, China
14:15-14:30	O-0629	**Thermal Sensing for Monitoring Battery Degradation** Yuqiang Zeng* Southern University of Science and Technology, China
14:30-14:45	O-0711	**Integrating Adaptive Phase Change Modulation with Dynamic Insulation for Distributed Thermal Storage and Management in Green Buildings** Saad Bin SAFIULLAH, Ruitong Yang, Dong Li, Qiye Zheng* The Hong Kong University of Science and Technology, China
14:45-15:00	O-0265	**Development of a Polymer Intercell Heat Exchanger Based Battery Thermal Management System with Phase Change Material** Hongseok Choi, Hoseong Lee* Korea university, Korea

Oral Sessions

Wednesday, PM

Session Room 9

Subject: Track 01-2 Bio and Medical Applications

Time: Wednesday, June 26, 2024 13:30-15:00

Chair(s): Atsuki Komiya (Tohoku University),
Haishan Cao (Tsinghua University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 34	**Personalized Laser Treatment of Ota's Nevus with External Skin Cooling** Bin Chen Xi'an Jiaotong University, China
14:00-14:15	O-0376	**Real-Time Denoising of Laser Speckle Contrast Imaging of Blood Flow Based on Deep Learning** Xu Sang, Ruixi Cao, Bin Chen*, Dong Li Xi'an Jiaotong University, China
14:15-14:30	O-0509	**A Dual-Wavelength High-Precision Noninvasive Photoacoustic Temperature Measurement Technology** Hao Zhang, Dong Li, Bin Chen* Xi'an Jiaotong University, China
14:30-14:45	O-0377	**Drying Kenecits and Energy Consumption of Astragalus Membranaceus under Infrared Drying** Dan Huang*, Ruowen Deng, Hong Ren, Musaddiq Auwal, Liqiang Zhang, Wei Li Central South University of Forestry and Technology, China
14:45-15:00	O-0664	**Leveraging Thermal Properties Data Towards Efficient Photothermal Therapy of Mammary Glands** Dezhao Huang, Xiaona Huang, Yuxin Fang, Yanan Yue* Wuhan University, China

Oral Sessions

Thursday, AM

Mingzhu Hall

Subject: Track 02-7 Boiling, Evaporation and Condensation
Time: Thursday, June 27, 2024 10:20-12:05
Chair(s): Wenxiao Chu (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0296	**Progress on Cryogenic Chill-Down in the Exit-Contracted Pipes** Wenjing Qin, Jiaqi Zhang* National University of Defense Technology, China
10:35-10:50	O-0283	**Multicomponent Nanoparticle Droplet Boiling Deposition Patterns** Jiarun Chen, Lu Qiu* Beihang University, China
10:50-11:05	O-0397	**The Criteria of the Onset of Nucleate Boiling: A Mass Transfer Perspective** Junda Liu, Bin Liu, Ping Zhou* Central South University, China
11:05-11:20	O-0275	**Experiment Investigations on Expanding Channel Surface Coupled with Porous Media** Chengzhi Li, Chaobin Dang* University of Fukui, Japan
11:20-11:35	O-0338	**High-Speed Observation on the Microscopic Behaviors of Liquid/Vapor During Nucleate Boiling for Water** Zhongxiang Shen, Yunfei Yin, Zhihao Chen*, Yoshio Utaka Tianjin University, China
11:35-11:50	O-0068	**Numerical Simulation of Bischofite Precursor Droplet Evaporation Considering Decomposition Reaction** Hanlu Xu, Hui Dong*, Daokuan Cheng, Liang Zhao Northeastern University, China
11:50-12:05	O-0313	**Promoting Droplet Condensation Through Thermocapillary Migration** Yinjiang Chen, Jinhua Hu* Ningbo University, China

Oral Sessions

Thursday, AM

Session Room 2

Subject: Track 14-3 Multiphase Flow
Time: Thursday, June 27, 2024 10:20-11:50
Chair(s): Fang Liu (Shanghai University of Electric Power)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0601	**Mescoscale Large Eddy Simulation of Bubble Column Bubbly Flows Accounting for SGS Turbulent Dispersion and Added Mass Stress Effects** Xiaogang Yang*, Shanshan Long, Jie Yang, Martin Sommerfeld University of Nottingham Ningbo China, China
10:35-10:50	O-0176	**Numerical Study on the Characteristics of Transpiration Cooling Liquid Film in Liquid Rocket Engine** Yang He, Fei He* University of Science and Technology of China, China
10:50-11:05	O-0240	**The Roles of Surface Temperature and Roughness in Droplet Splashing** Shiji Lin, Le Zhou, Biyuan Liu, Qin Xu, Longquan Chen, Zhigang Li* The Hong Kong University of Science and Technology, China
11:05-11:20	O-0335	**Three-Dimensional Flow Characteristics of Falling Film Around a Horizontal Elliptical Tube** Donghui Li, Xueshuo Chen, Tao Lu, Shengqiang Shen, Xue Chen* Beijing University of Chemical Technology, China
11:20-11:35	O-0406	**Characterization of a Fluid Goes Across the Critical Region: Experiments Discussions on a Vertical CO_2 Loop** Dong Yang, Rufan Song, Yongchang Feng, Lin Chen* Institute of Engineering Thermophysics, CAS, China
11:35-11:50	O-0145	**Study on Droplet Size Characteristics in a CO_2 Ejector with Lubricating Oil Based on CFD-PBM Simulation** Fang Liu* Shanghai University of Electric Power, China

Oral Sessions

Thursday, AM

Session Room 3

Subject: Track 15-1 Nuclear Energy
Time: Thursday, June 27, 2024 10:20-12:05
Chair(s): Tenglong Cong (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0467	**Core Study of 5Mw (Thermal) Water Cooled Super Small Modular Reactor (Wsmr) Based on the Sensitivity Analysis of the Key Design Parameters for the Steady State Neutronics and Burnup Performance** Zhongliang Lv*, Zijia Zhao, Lichao Tian, Zhong Chen National University of Defense Technology, China
10:35-10:50	O-0405	**Numerical Simulation on Boiling Crisis Characteristic of Helical Cruciform Fuel with Non-Uniform Heat Flux** Zijian Huang, Hongkang Tian, Mengke Cai, Tenglong Cong*, Hanyang Gu Shanghai Jiao Tong University, China
10:50-11:05	O-0439	**Analysis of Natural Circulation Flow in Parallel Channels with Non-Uniform Heat Power for an Integrated Samll Reactor** Mingqian Zhang* State Key Laboratory of Nuclear Power Safety Technology and Equipment, China Nuclear Power Engineering Co., Ltd., China
11:05-11:20	O-0089	**Investigation on Flow Boiling Surface Heat Flux during Bubble Growth Based on Inverse Heat Conduction** Wei Zhang, Ji Wang, Jinbiao Xiong* Shanghai Jiao Tong University, China
11:20-11:35	O-0462	**Deposition of Particles in LBE** Zheng Jia, Li Liu* Shanghai Jiao Tong University, China
11:35-11:50	O-0504	**Experimental Study on Bubble Flow Characteristics in Liquid Metal Pool** Zhuoya Mou, Longxiang Zhu*, Yong Ouyang, Zhikang Lin, Hong Zhang, Hao Liu, Liang-ming Pan Chongqing University, China
11:50-12:05	O-0363	**The Development and Preliminary Verified of the Simulation Platform for the Heat Pipe-Cooled Reactor** Kang Chen, Chuntao Tang*, Qichang Chen, Jinkun Zhao, Chuntian Yuan, Jinming Li, Chang Zhang Shanghai Nuclear Engineering Research and Design Institute Co., LTD., China

Oral Sessions

Thursday, AM

Shanghai Hall

Subject: Track 06-2 Conduction
Time: Thursday, June 27, 2024 10:20-11:50
Chair(s): Xiaokun Gu (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0129	**Interatomic Bonding Effects on Thermal Transport in Amorphous Boron Carbonitride Compounds** Lei Yang, Bingyang Cao* Tsinghua University, China
10:35-10:50	O-0459	**Improvement of Data Processing Method for Estimating Heat Dissipation Using Infrared Thermal Camera** HIorshi Ishikawa* Tokyo Institute of Technology, Japan
10:50-11:05	O-0545	**A Pore-Scale Study on the Effective Tmernal Conductiveiy of the Fluid Saturated Porous Media** Dong Wang, Guoyang Song, Dongxing Du*, Wei Li Qingdao University of Science and Technology, China
11:05-11:20	O-0115	**Physics-Informed Neural Network (PINN) Algorithm and Optimsation of Combustion Process** Amirali Shateri, Jianfei Xie*, Zhiyin Yang University of Derby, United Kingdom
11:20-11:35	O-0472	**Effect of Temperature and Interfacial Bonding on Interfacial Thermal Conductance Between Diamond/Carbon Nanotube Composite** Ziyi Liu, Yanhui Feng* University of Science and Technology Beijing, China
11:35-11:50	O-0672	**Soft Phonon Modes Lead to Suppressed Thermal Conductivity in Ag-Based Chalcopyrites under High Pressure** Kunpeng Yuan*, Zhaoliang Wang, Xiaoliang Zhang, Dawei Tang China University of Petroleum East China - Qingdao Campus, China

Oral Sessions

Thursday, AM

Session Room 5

Subject: Track 11-2 Melting and Solidification
Time: Thursday, June 27, 2024 10:20-12:05
Chair(s): Shuai Gong (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0149	**Simplified Formula for Pressure Drop Estimation of PCM Slurry in a Circular Tube** Hikaru Ebihara*, Shunsuke Abe, Tatsunori Asaoka Shinshu University, Japan
10:35-10:50	O-0269	**Bioinspired Design of Anti-Icing Coatings for Sea-Based Wind Turbines** Jing Wang* Shanghai Jiao Tong University, China
10:50-11:05	O-0503	**Improving Proton Exchange Membrane Fuel Cell Efficiency with Phase Change Thermal Management** Iman Sarani, Zhiming Bao*, Kui Jiao Tianjin University, China
11:05-11:20	O-0231	**The Influence of Two Kinds of Heat Dissipation Modules as Consolidated and Unconsolidated Structure on Performance of Thermoelectric Cooler** Chunyang Wang*, Moghtada Mobedi, Xiao Yang, Yanan Shen, Haibo Zhao, Haisheng Chen, Ting Zhang, Xinghua Zheng Institute of Engineering Thermophysics, CAS, China
11:20-11:35	O-0831	**Numerical Investigation of Enhanced Evaporative Cooling Efficiency in Sessile Droplets Induced by Internal Flow Instability** Yu Jialing, Huang Haoxiang, Pan Zhenhai* Shanghai Jiao Tong University, China
11:35-11:50	O-0222	**Modeling the Thickness-Dependent Wettability of Cellulose Nanofiber Film** Masumi Misaka, Hideaki Teshima*, Sota Hirokawa, Qin-Yi LI, Koji Takahashi Kyushu University, Japan
11:50-12:05	O-0156	**Experimental Study on Heat and Mass Transfer in Aftercooling Humidification Process of HAT Cycle** Sun Haozhe, Wang Yuzhang*, Wang Yueheng, Wei Houqi Shanghai Jiao Tong University, China

Oral Sessions

Thursday, AM

Session Room 6

Subject: Track 13-8 Micro/Nano Heat Transfer
Time: Thursday, June 27, 2024 10:20-12:05
Chair(s): Shengying Yue (Xi'an Jiaotong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0390	**Diffuson-Domination-Induced Ultra Defect-Tolerant Two-Channel Thermal Transport in Hybrid Halide Perovskites** Zhuangli Cai, Shangchao Lin*, Mohammad-Reza Ahmadian-Yazdi, Changying Zhao Shanghai Jiao Tong University, China
10:35-10:50	O-0167	**Mechanism of Nanostructure-Induced Bubble Nucleation—— Molecular Dynamics Investigation** Deyang Gao, Hanliang Bo* Tsinghua University, China
10:50-11:05	O-0737	**The Transient Plane Source Scanning Method Assisted by Numerical Simulation for Heat Capacity Measurement of Materials with Low Thermal Conductivity** Zijin Zeng, Christian Müller, Besira Mihiretie* Chalmers University of Technology/ Hot Disk AB, Sweden
11:05-11:20	O-0458	**The Receding Contact Line Is Cooling During Dynamic Wetting** Hiroki Kusudo*, Takeshi Omori, Laurent Joly, Yasutaka Yamaguchi, Gota Kikugawa Tohoku University, Japan
11:20-11:35	O-0197	**Modulating Leidenfrost-Like Prompt Jumping of Sessile Droplets on Microstructured Surfaces** Lei Zhao* Dalian University of Technology, China
11:35-11:50	O-0152	**Fast Prediction Method of Thermal Protection Design for Hypersonic Vehicle Based on Micro-Channels Phase Change Heat Transfer** Tang Ping* National University of Defense Technology, China
11:50-12:05	O-0384	**A Large Laser Spot Surface-Enhanced Raman Scattering on Hydrophilic Nanostructures for Biofluid Analysis** Xiaoyu Zhang, Aoran Fan, Xing Zhang* Tsinghua University, China

Oral Sessions

Thursday, AM

Session Room 8

Subject: Track 09-7 Energy Storage
Time: Thursday, June 27, 2024 10:20-11:50
Chair(s): Xuancan Zhu (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0350	**Development of Heat Storage Material Using Covalent Organic Framework Impregnated with Sugar Alcohols** Xiaohan Wang, Shoma Mitsui, Shiori Nakagawa, Hiroki Fujisawa, Meguya Ryu, Junko Morikawa, Yoichi Murakami* Tokyo Institute of Technology, Japan
10:35-10:50	O-0200	**Mechanical Microencapsulation of High Working Temperature Al-Si Alloy Phase Change Material** Kaixin Dong, Qingda Li, Takahiro Kawaguchi, Yuto Shimizu, Minako Kondo, Tomokazu Nakamura, Mba Joshua Chidiebere, Melbert Jeem, Takahiro Nomura* Hokkaido University, Japan
10:50-11:05	O-0525	**Pore Network Modeling of Non-Isothermal Two-Phase Transport in Anode of Proton Exchange Membrane Electrolyzers** Yang Xu, Dingding Ye*, Jun Li, Liang Zhang, Jian Huang, Xun Zhu, Qiang Liao Chongqing University, China
11:05-11:20	O-0226	**Experimental Study on Efficiency Improvement of Packed-Bed Thermal Storage Tank with Graphite-Based Phase Change Material** Baoshan XIE, Lisha MA, Chuanchang LI* Changsha University of Science and Technology; Shanghai Jiao Tong University, China
11:20-11:35	O-0097	**Thermally Regenerative Battery with Low Grade Heat Source Based on Complexation Reaction** Sunghun Lee, Yun Mo Ko, Yong Tae Kang* Korea University, Korea
11:35-11:50	O-0128	**Multi-Timescale Optimization of a Distributed Energy System with Thermal Energy Storage Considering Nonlinear Transmission and Conversion Processes** Ronghong Xu, Huan Ma*, Qinghan Sun, Yonglin Xin, Qun Chen Tsinghua University, China

Oral Sessions

Thursday, AM

Session Room 9

Subject: Track 01-3 Bio and Medical Applications
Time: Thursday, June 27, 2024 10:20-12:05
Chair(s): Qian Wang (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
10:20-10:35	O-0460	**Measuring 2D Distribution of Water Rotational Relaxation Time in a Fish Egg by Short-Wave Infrared Micro Spectroscopy** Kosei Kawai*, Ryo Shirakashi The University of Tokyo, Japan
10:35-10:50	O-0383	**A High-Quality Thermally-Assisted Fluorescence Elimination Dual-Wavelength Raman Method for Biological Detection** Aoran Fan, Xiaoyu Zhang, Xing Zhang* Tsinghua University, China
10:50-11:05	O-0585	**Measurement of Slow Dynamics of Intracellular Water by Dielectric Spectroscopy** Hiroaki Matsuura*, Ryo Shirakashi The University of Tokyo, Japan
11:05-11:20	O-0159	**One-Dimensional Cardiovascular System and Lumped Parameter Heat Transfer Model for Analyzing Hemodynamics in Human Fatigue State** Yongtao Liu, Huimin Chen, Ying He* Dalian University of Technology, China
11:20-11:35	O-0498	**A Microfluidic-Raman System for Single Bacterium Identification, Sorting, and Drug Resistance Analysis** Zixin Shu, Fengyi Li, Aoran Fan, Weigang Ma, Xing Zhang* Tsinghua University, China
11:35-11:50	O-0464	**Effect of Concentration of Cryoprotectants in Cryovials on Boiling Heat Transfer Behavior During Cryopreservation by Immersion in Liquid Nitrogen** Ning Guo, Yi Xu* University of Shanghai for Science and Technology, China
11:50-12:05	O-0146	**Investigation of Drivers' HRV Changes with HVAC Based Thermal Comfort During Summer** Myeongjae Shin, Honghyun Cho Chosun University, Korea

Oral Sessions

Thursday, PM

Fuyue Hall 1

Subject: Track 12-2 Metamaterial and Thermoelectric Devices

Time: Thursday, June 27, 2024 13:30-14:45

Chair(s): Yoichi Murakami (Tokyo Institute of Technology), Jie Xu (Harbin Institute of Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 35	**Colossal Electrocaloric Cooling Effect in High-Entropy Ferroelectric Working Bodies** Xiaoshi Qian Shanghai Jiao Tong University, China
14:00-14:15	O-0287	**Liquid-Tehrmoelectrics - Thermo-Electrochemical Power Generation and the Forced-Flow Thermocell** Yoichi Murakami*, Yutaka Ikeda, Yuki Cho Tokyo Institute of Technology, Japan
14:15-14:30	O-0353	**An Effective Method for Lowering the Power Generation Cost of Thermoelectric Generators** Yousung Choi, Sungjin Park, Woochul Kim* Yonsei University, Korea
14:30-14:45	O-0561	**Highly Enhanced Thermoelectric Performance through Combined Strategy of Energy Filtering and Phonon-Defect Scattering in GeTe-based Nanocomposites** Ge Fu, Shangchao Lin* Shanghai Jiao Tong University, China

Oral Sessions

Thursday, PM

Fuyue Hall 2

Subject: Track 16-3 Porous Media

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Youjun Lv (Xi'an Jiaotong University), Qin-Yi Li (Kyushu University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 35	**Gas Diffusion and Effective Diffusivity through Saturated or Unsaturated Microporous Media** Moran Wang Tsinghua University, China
14:00-14:15	O-0166	**Numerical Simulations on Transpiration Cooling Performance of Triply Periodic Minimal Surface** Zhizhao Zhou, Fei He* University of Science and Technology of China, China
14:15-14:30	O-0385	**A Non-dimensional Lattice Boltzmann Simulation for Topology Optimization of Diffusion Through Porous Structures with Mass Sinks** Yan Su* University of Macau, China
14:30-14:45	O-0270	**Tailoring Porous Reactor Topology: A Pore-Level Multi-Objective Optimization Approach** Mehrzad Alizadeh*, Jeff Gostick, Takahiro Suzuki, Shohji Tsushima Osaka University, Japan
14:45-15:00	O-0268	**Similarity Analysis for Flow and Heat Transfer of Triply Periodic Minimal Surface Structures** Dong Liang, Wei Chen, Shuhuai Yao* The Hong Kong University of Science and Technology, China

Oral Sessions

Thursday, PM

Fuyue Hall 3

Subject: Track 20-3 Thermocatalysis, Thermochemistry, and Energy Conversion

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Zhonghao Rao (China University of Mining and Technology), Ruming Pan (Harbin Institute of Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 37	**Solar Thermochemical CO_2 to Fuel Conversion** Xianglei Liu Nanjing University of Aeronautics and Astronautics, China
14:00-14:15	O-0365	**Preliminary Discussion on the Engineering Issues of Open-Air Brayton Cycle** Siguang Li* Nuclear Power Institute of China, China
14:15-14:30	O-0299	**Molecular Dynamics Study of H_2O/CO_2 Co-Electrolysis Using SOEC: Surface Diffusion and Adsorption in Ni-YSZ Composite Cathode** Taiyo Taniuchi*, Yuting Guo, Masashi Kishimoto, Hiroshi Iwai Kyoto University, Japan
14:30-14:45	O-0248	**Through-Plane Mass Transport Characteristic of the Cathode in PEM Fuel Cell under Dynamic Operating Conditions** Dinh Hoang Trinh, Jongbin Woo, Wansung Pae, Sangseok Yu* Chungnam National University, Korea
14:45-15:00	O-0214	**Response Characteristics of Pemfc According to Cooling System Operation Strategy** Jongbin Woo, Wansung Pae, Sangseok Yu* Chungnam national university, Korea

Oral Sessions

Thursday, PM

Mingzhu Hall

Subject: Track 13-9 Micro/Nano Heat Transfer

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Yanan Yue (Wuhan University),
Ruiqiang Guo (Shandong Institute of Advanced Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 38	**Thermal Transport in a 2D Amorphous Material** Bai Song Peking University, China
14:00-14:15	O-0053	**Controlling Near-Field Thermal Radiation via Coupled Surface Plasmon and Phonon Polaritons with Graphene Heterostructures** Kezhang Shi*, Sailing He Zhejiang University, China
14:15-14:30	O-0286	**Unexpected Weak Effects of Phonon-Electron Interactions on the Lattice Thermal Conductivity of High-Concentration n-Type GaN** Jianshi Sun, Shouhang Li* Donghua University, China
14:30-14:45	O-0173	**Resonance Property of Magnetic Polariton in a MIM Structure with Gradient Dielectric Function Distribution** Hangjie Li, Junming Zhao*, Linhua Liu Harbin Institute of Technology, China
14:45-15:00	O-0418	**Smart Glass with the Core-Shell Doped Structure for Spectral Regulation and Power Generation** Shuni Chen, Yanming Guo*, Yiquan Gong, Qinghui Pan, Yong Shuai Harbin Institute of Technology, China

Oral Sessions

Thursday, PM

Session Room 1

Subject: Track 05-4 Computational Methods and Simulations

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Lin Chen (Institute of Engineering Thermophysics, Chinese Academy of Sciences),
Xiaokun Gu (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 39	**Topology Optimization of Heat and Mass Transfer Processes** Li Chen Xi'an Jiaotong University, China
14:00-14:15	O-0188	**Isomorphic Modelling Approach and Unified Solving Strategy for Flow and Heat Transfer Processes in Thermal Systems** Dong-Yi Wu, Ke-Lun He, Hang Li, Nan Meng, Zheng Liang, Qun Chen* Tsinghua University, China
14:15-14:30	O-0604	**Numerical Simulation of Salt-Containing Flue Gas Desulfurization Wastewater Evaporation** Nana Qi*, Keyu Jiang, Kai Zhang North China Electronic Power University, China
14:30-14:45	O-0019	**Particle-Scale Computational Investigations on Thermal Flow Performances of Nanofluids** Mayssaa Jbeili, Junfeng Zhang* Laurentian University, Canada
14:45-15:00	O-0632	**An Effective Method for Volume-to-Point Heat Conduction Problems with Arbitrary Boundary Conditions** Jiajun Zhang, Shuangfeng Wang, Kai Chen* South China University of Technology, China

Oral Sessions

Thursday, PM

Session Room 2

Subject: Track 15-2 Nuclear Energy

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Jun Sun (Tsinghua University),
Hanyang Gu (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 40	**Research on Key Thermal-Hydraulic Characteristics of Advanced Helical Fuel for Small Modular Reactor** Yao Xiao Shanghai Jiao Tong University, China
14:00-14:15	O-0375	**Investigation of the Heat Transfer Performance and Flow Characteristics for Alkali Metal Heat Pipe Based on the CFD Method** Enpei Wang, Lei Li* Harbin Engineering University, China
14:15-14:30	O-0500	**Experimental Study on the Removal Efficiency of Resuspended Aerosols under Recirculation Spray Conditions** Yang Yang, Luteng Zhang*, Jiaxuan Tang, Jialong Li, Liangming Pan, Zhuo Liu, Li Gao, Yidan Yuan Chongqing University, China
14:30-14:45	O-0428	**Openfoam Modelling of Air Ingress Into the High Vacuum for Fusion Reactor Safety** Kaiqi Liang, Zhibin Chen* Institute of Nuclear Energy Safety Technology, Hefei Institutes of Physical Science, Chinese Academy of Sciences, China
14:45-15:00	O-0550	**Investigation of the Nucleation and Growth of Cerium Influenced by F- in LiCl-KCl Molten Salt** Xiaorui Xu, Wentao Zhou*, Yuncong Ding, Xinyu Zhang, Jia Song, Yafei Wang Shanghai Jiao Tong University, China

Oral Sessions

Thursday, PM

Session Room 3

Subject: Track 02-8 Boiling, Evaporation and Condensation

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Qing Li (Central South University), Zhaoguang Wang (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 41	**Modeling of Liquid-vapor Phase Change Heat Transfer: from Nanoscale to Macroscale** Shuai Gong Shanghai Jiao Tong University, China
14:00-14:15	O-0090	**Flow Boiling of Methane at High Heat Flux in Plate and Shell Heat Exchanger** Xuan Tao*, Tongfei Wu, Haomiao Chi, Jing Ye Hangzhou City University, China
14:15-14:30	O-0400	**Boiling Characteristics and Dynamic Behavior of a High-Temperature Sphere Entering Water** Hongxin Ye, Haoxiang Huang, Zhenhai Pan* Shanghai Jiao Tong University, China
14:30-14:45	O-0577	**Studies of Nitrogen Condensation Characteristics with the Onera M6 Wing in Cryogenic Wind Tunnels** Jiaxin Hou, Junlong Xie, Xi Pan, Jianye Chen* Huazhong University of Science and Technology, China
14:45-15:00	O-0331	**Thinning Liquid Film Flow for Efficient Capillary Evaporation on the Hybrid-Layer Surface** Rongfu Wen*, Songbai Wang Dalian University of Technology, China

Oral Sessions

Thursday, PM

Shanghai Hall

Subject: Track 19-4 Thermal Radiation

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Tao Ren (Shanghai Jiao Tong University), Kaichen Dong (Tsinghua University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	AUTSE YSA Lecture 3	**Nonreciprocal Thermal Radiation Using Magnetized Epsilon-Near-Zero Nanostructures** Mengqi Liu Shanghai Jiao Tong University, China
14:00-14:15	O-0263	**Quantitative Evaluation of Radiation Peak Intensity for Metamaterials Containing Structural Defects** Zhen Liu*, Makoto Shimizu, Ryosuke Abe, Hiroo Yugami Tohoku University, Japan
14:15-14:30	O-0618	**Angle-Selective Themal Emission Over Broad Wavelength Range Using Plasmonic Metamaterials** Makoto Shimizu*, Rihab Benlyas, Zhen Liu, Hiroo Yugami Tohoku University, Japan
14:30-14:45	O-0022	**Zero-Power Smart Thermal Management by Temperature-Adaptive Radiative Coatings** Kaichen Dong*, Jiachen Li, Kechao Tang, Tiancheng Zhang Tsinghua Shenzhen International Graduate School, China
14:45-15:00	O-0181	**Performance Anslysis of Cavity-Emitter Based Solar Thermophotovoltaic System under Transient Conditions** Shaowen Cao, Qilin Cai* Soochow University, China

Oral Sessions

Thursday, PM

Session Room 6

Subject: Track 13-10 Micro/Nano Heat Transfer

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Lin Yang (Peking University),
Shenghong Ju (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 42	**Thermal Transport and Phonon Physics in Two-Dimensional Materials** Jie Chen Tongji University, China
14:00-14:15	O-0374	**Exploring Structural and Thermophysical Properties of Crosslinked Polymers: DPD Simulations at Varied Coarse-Graining Expressions** Kaiwen Li* Tohoku university, Japan
14:15-14:30	O-0490	**Reprogrammable Thermal Metasurfaces Enabled by Manipulation of Liquid Crystals Using Magnetic Fields** Nan Chen, Zhen Chen* Southeast university, China
14:30-14:45	O-0114	**Aerodynamic Characteristic of Limited Micro-Scale Taylor-Couette Flow at Hyper-Rotate-Speed** Yuanwei Lyu*, Pu Huang, Jingyang Zhang, Yuan Liu Nanjing University of Aeronautics and Astronautics, China
14:45-15:00	O-0368	**Non-Monotonic Thermal Conductivity Modulation via Quantum Dot/Ligand Interactions** Yinong Liu, Cheng Shao*, Shiqian Hu Yunnan University, China

Oral Sessions

Thursday, PM

Session Room 7

Subject: Track 17-3 Refrigeration and Cryogenics

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Honghyun Cho (Chosun University),
Shangchao Lin (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 43	**Sustainable Zn-Based Flow Batteries for Large-Scale Energy Storage** Liwei Wang Shanghai Jiao Tong University, China
14:00-14:15	O-0430	**Experimental Study of the Energy Recovery and Jet Impingement in a Fast Cooling Joule-Thomson Cryocooler** Xing Xiao, Qianqian Mu, Xiaoqing Zhang* Huazhong University of Science and Technology, China
14:15-14:30	O-0631	**Numerical Study on the Characteristics of Liquid Nitrogen Droplet Collision with Superheated Wall** Yanan Li, Xiufang Liu*, Qingshuo Miao, Jiajun Chen, Mian Zheng, Yu Hou Xi'an Jiaotong University, China
14:30-14:45	O-0147	**Study on Energy-Saving Control of Variable Air Volume Air-Conditioning System Based on Nonlinear Model Predictive Control** Xiaoxi Hong, Ye Yao* Shanghai Jiao Tong University, China
14:45-15:00	O-0230	**Comprehensive Analysis of an Improved High-Temperature Steam Heat Pump Considering the Heat Transfer Degradation of Zeotropic Mixtures** Chunyu Feng, Yuyan Jiang* Beijing Institute of Technology, China

Oral Sessions

Thursday, PM

Session Room 8

Subject: Track 09-8 Energy Storage

Time: Thursday, June 27, 2024 13:30-15:00

Chair(s): Minsung Kim (Chung-Ang University), Jun Yan (Shanghai Jiao Tong University)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 44	**Study of High-Efficient Thermal Energy Storage Mechanism and Dynamic Regulation Methods** Mingjia Li Beijing Institute of Technology, China
14:00-14:15	O-0590	**Geometry Selection of Phase Change Material Macro-Capsule Based on Unicellular Zooplankton Shapes** Peiliang Yan, Wei Wu* City University of Hong Kong, China
14:15-14:30	O-0611	**Study of Three-Sided Liquid Cooling Battery Module for Thermal Management and Thermal Runaway Suppression** Hengyun Zhang*, Wenlin Yuan, Jiansheng Zhang, Guojun Qiu Shanghai University of Engineering Science, China
14:30-14:45	O-0065	**Investigation on the Calcium Hydroxide/Calcium Oxide System Hydration Reaction in a Stirred Reactor** Xiaojun Lv, Jun Yan, Changying Zhao* Shanghai Jiao Tong University, China
14:45-15:00	O-0207	**Development of $CuMn_2O_4/CuMnO_2$-based Porous Structure Thermochemical Energy Storage Module** Xiaoyu Chen, Mitsuhiro Kubota*, Noriyuki Kobayashi, Shusen Lin, Lisheng Deng, Jun Li, Xin Zhou, Seiji Yamashita, Hideki Kita Nagoya University, Japan

Oral Sessions

Thursday, PM

Session Room 9

Subject: Track 21-5 Thermophysical Properties and Measurements

Time: Thursday, June 27, 2024 13:30-14:45

Chair(s): Zhen Chen (Central South University),
Jie Zhu (Dalian University of Technology)

Time	ID	Title, Author(s), Affiliation(s)
13:30-14:00	Keynote Lecture 45	**Heat and Mass Transfer in Ionic Thermoelectrics** Weigang Ma Tsinghua University, China
14:00-14:15	O-0151	**Research on Measurement Methods for Thermophysical Properties of Lithium Batteries** Yue Geng* China Jiliang University, China
14:15-14:30	O-0306	**Thermophysical Properties of CoCrFeNiCu High Entropy Alloy: A Molecular Dynamics Study** Fan Liu, Xi Zhuo Jiang* Northeastern University, China
14:30-14:45	O-0251	**Research on Thermal Properties of Germanium at Micro Scale Based on Transient Thermal Grating Combined with Boltzmann Transport Equation** Yi He, Liang Guo*, Tao Li, Zhen Chen Southern University of Science and Technology, China

Poster Sessions

Poster Session 1

Monday, June 24, 2024

Location	Time	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID
Corridor outside Fuyue Hall	15:30-18:00	1	P-0032	2	P-0570	3	P-0810	4	P-0196	5	P-0809
		6	P-0120	7	P-0592	8	P-0063	9	P-0310	10	P-0140
		11	P-0175	12	P-0630	13	P-0164	14	P-0324	15	P-0381
		16	P-0202	17	P-0720	18	P-0583	19	P-0445	20	P-0608
		21	P-0217	22	P-0731	23	P-0689	24	P-0645	25	P-0694
		26	P-0364	27	P-0753	28	P-0705	29	P-0706	30	P-0727
		31	P-0399	32	P-0765	33	P-0729	34	P-0730	35	P-0783
		36	P-0421	37	P-0771	38	P-0758	39	P-0744	40	P-0808
		41	P-0473	42	P-0778	43	P-0773	44	P-0763	45	P-0772
		46	P-0505	47	P-0654	48	P-0507	49	P-0271	50	P-0675
		51	P-0554	52	P-0780	53	P-0071	54	P-0784	55	P-0259
		56	P-0680	57	P-0713	58	P-0734	59	P-0742	60	P-0746

Poster Session 2

Tuesday, June 25, 2024

Location	Time	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID
Corridor outside Fuyue Hall	16:00-18:00	1	P-0048	2	P-0538	3	P-0779	4	P-0788	5	P-0770
		6	P-0121	7	P-0586	8	P-0786	9	P-0082	10	P-0792
		11	P-0182	12	P-0625	13	P-0811	14	P-0261	15	P-0012
		16	P-0210	17	P-0674	18	P-0094	19	P-0314	20	P-0309
		21	P-0252	22	P-0721	23	P-0451	24	P-0341	25	P-0404
		26	P-0277	27	P-0733	28	P-0613	29	P-0480	30	P-0651
		31	P-0369	32	P-0751	33	P-0696	34	P-0673	35	P-0702
		36	P-0401	37	P-0760	38	P-0708	39	P-0281	40	P-0743
		41	P-0448	42	P-0766	43	P-0735	44	P-0736	45	P-0791
		46	P-0474	47	P-0775	48	P-0762	49	P-0748	50	P-0768
		51	P-0825	52	P-0676	53	P-0747	54	P-0759	55	P-0380

Poster Sessions

Poster Session 3

Wednesday, June 26, 2024

Location	Time	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID	Board No	Abstract ID
Corridor outside Fuyue Hall	15:30-18:00	1	P-0084	2	P-0539	3	P-0785	4	P-0796	5	P-0774
		6	P-0125	7	P-0587	8	P-0793	9	P-0179	10	P-0797
		11	P-0190	12	P-0626	13	P-0819	14	P-0303	15	P-0106
		16	P-0216	17	P-0691	18	P-0102	19	P-0321	20	P-0361
		21	P-0254	22	P-0722	23	P-0479	24	P-0420	25	P-0494
		26	P-0295	27	P-0749	28	P-0681	29	P-0514	30	P-0659
		31	P-0396	32	P-0752	33	P-0698	34	P-0703	35	P-0716
		36	P-0408	37	P-0764	38	P-0710	39	P-0717	40	P-0801
		41	P-0453	42	P-0767	43	P-0738	44	P-0739	45	P-0798
		46	P-0476	47	P-0776	48	P-0769	49	P-0493	50	P-0327
		51	P-0615	52	P-0345	53	P-0741	54	P-0444	55	P-0662
		56	P-0799								

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

Borad No.	Abstract ID	Title, Author(s), Affiliation(s)
1	P-0032	**Dynamic Response Characteristics of Molten Salt Steam Generation System Integrated to Coal-Fired Power Plant** Kaijun Jiang*, Qiang Zhang, Qinghua Wang, Yuguang Niu Beijing Huairou Laboratory, China
2	P-0570	**Collaborative Optimization of Thermal Conductivity Distribution and Heat Source Layout Based on Bayesian Optimization** Tian Zhao*, Chuan-Jin Su North China University of Technology, China
3	P-0810	**Development and Validation of an Advanced Thermal Model for Electric Vehicle Battery Pack** Junghyen Nam, Seunghun Jung* Chonnam National University, Korea
4	P-0196	**Multilayer TiO_2/SiO_2 Thin Film Spectral Splitter for Hybrid PV/T Solar Power Tower System** Chengxin Hou, Junming Zhao*, Linhua Liu Harbin Institute of Technology, China
5	P-0809	**Compensated Deep Reinforcement Learning Control of Boost Converter** Cheng Hangyu, Jung Seunghun* Chonnam Univ, Korea
6	P-0120	**Study of Frost Growth on Cold Plate under Forced Convection** Duo Zhang* National University of Defense Technology, China
7	P-0592	**Comparative Analysis of Aerogels Thermal Conductivity Prediction Under Different Heat Transfer Unit Models** Dongdong Yu, Jianbiao Dai, Yanjun Dai* Xi' an Jiaotong University, China

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

8	P-0063	**Anisotropic Network Endow n-Type Quasi-Solid Thermocell with Enhanced Kinetic and Mechanical Properties** Haofei Meng, Wei Gao*, Chengbin Zhang, Feng Yao Southeast University, China
9	P-0310	**Heat Transfer Enhancement of Microfluid Channel by Flow Intermittency** Wei Chen, Zhaoguang Wang* Shanghai Jiao Tong University, China
10	P-0140	**Flow-Method Optimization for Density Measurement of Supercritical Pressure Hydrocarbon Fuel** Bingtao Bian, Shenzhou Shi, Lin Tang, Xiaojia Gang, Yanchen Fu* Beihang University, China
11	P-0175	**Simulation and Analysis of Thermal-Electrical Optimization in a SOFC and PSA Integrated System** Qiao Wang, Jinyi Liu*, Lirong Fu, Na Qiu Hainan University, China
12	P-0630	**Turbulent Heat Transfer Enhancement of Diamond/n-Decane Nanofluids in Microchannels Under Supercritical Pressure** Siyi Zhang, Yuan Wang* National University of Defense Technology, China
13	P-0164	**Simulation and Experimental Study on Flow Characteristics of Dynamic Pressure Gas Thrust Bearing with Variable Cross-Section Clearance** Hongwei Wang, Yuan-wei Lyu* Nanjing University of Aeronautics and Astronautics, China
14	P-0324	**Optimization of Divergent Cooling Hole Arrangements Using Reinforcement Learning Under Non-Uniform Temperature Inflow Conditions** Xingcheng Liu, Qi Wang, Xiaopeng Li, Li Yang* Shanghai Jiao Tong University, China
15	P-0381	**Research on Fast Calculation Method of Aircraft Fuel Temperature** Mingzhe Song, Wei Wang Civil Aviation University of China, China

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

16	P-0202	**Effect of Temperature and Water Content on Thermal Conductivity in Ordered and Amorphous Proton Exchange Membranes: A Molecular Dynamics Study** Ke Ren, Xinjian Liu, Zhonghao Rao* Hebei University of Technology, China
17	P-0720	**Performance Investigation of Hydrophilic Polymeric Membrane Condenser for Water and Heat Recovery from Flue Gas** Liehui Xiao, Zhuo Ning, Minlin Yang, Haoran Yang, Wu-Zhi Yuan, Si-Min Huang* Dongguan University of Technology, China
18	P-0583	**Non-Equilibrium Coupling of Electrons and Phonons in Bilayer Metal Nanofilms Across the Interface** Donghao Li, Jie Zhu*, Xuanhui Fan, Jing Zhou, Jingye Wang, Dawei Tang Dalian University of Technology, China
19	P-0445	**Non-Destructive Reconstruction of Temperature Field in Laser Irradiated Biological Tissues Based on Model Prediction and Rolling Optimization** Guangjun Wang*, Yanlan Ji, Hong Chen Chongqing University, China
20	P-0608	**A Thermodynamic Study for the Optimum Design of Steam Heat Pump** Kijeong Seo, Soyeon Kim, Donik Ku, Jiwon Song, Hyunmin Yang, Minsung Kim* Chung-Ang University, Korea
21	P-0217	**Analysis Study on Capillary Limit of Flat Plate Heat Pipes with Composite Wick Structure** Tingting Hao*, Kai Die, Rongfu Wen, Xuehu Ma Dalian University of Technology, China
22	P-0731	**Effect of Heat Exchange Section Ratio on Heat Transport Performance of Miniatured Low Filling Ratio-Pulsating Heat Pipe** Eiji Yazaki, Koji Fumoto* Aoyama Gakuin University, Japan
23	P-0689	**Numerical Investigation on the Design and Thermodynamic Properties of Perforated Plates Heat Exchanger** Tianwei Wu, Hao Wang* Peking University, China

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

24	P-0645	**Optimization of Anode Catalyst Layer in PEMWE Considering the Presence of Oxygen** Peerapat Orncompa, Phonlakrit Passakornjaras, Mehrzad Alizadeh, Patcharawat Charoen-amornkitt*, Takahiro Suzuki, Shohji Tsushima King Mongkut's University of Technology Thonburi, Thailand
25	P-0694	**Compression-Induced Advanced Thermal Switching in Graphene Aerogels** Dongyeong Heo, Duckjong Kim* Gyeongsang National University, Korea
26	P-0364	**Performance Analysis on Coupling System of Jet Refrigeration and Humidification-Dehumidification Seawater Desalination Driven by Flue Gas Waste Heat from Ceramic Industry** Yongzhi Tang*, Yongzhi Tang Jingdezhen Ceramic University, China
27	P-0753	**Photothermal Methanol Steam Reforming Enabled by Multi-Component Catalyst and Phase Separated Reactor** Xinrui Chen, Jia Zeng* Nanjing University of Science and Technology, China
28	P-0705	**Study on Estimation of Melting Heat Transfer Coefficient Around a Heated Horizontal Cylinder by Machine Learning** Yuki Watanabe, Tsuyoshi Kawanami* Meiji University, Japan
29	P-0706	**Insights into the Oxygen Transportation Under Dynamic Currents in Proton Exchange Membrane Water Electrolysis Using Lattice Boltzmann Method** Qing Li, Yuting He, Luteng Zhang, liangming Pan* Chongqing University, China
30	P-0727	**Steady-State and Dynamic Thermal Characteristics of Integrated Thermoelectric Cooler with Microchannel** Yifan Lei*, Yuqing Wei, Xiuliang Liu, Xin Qian, Ronggui Yang Huazhong University of Science and Technology, China
31	P-0399	**Enhancement of Boiling by Electric Convection Induced by Charge Injection** Jing-Da Yao, Kang Luo*, Hua-Yuan Liu, Hong-Liang Yi Harbin Institute of Technology, China

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

32	P-0765	**Molecular Dynamic Simulation of Helium-Xenon Mixture Dynamic Viscosity with Green-Kubo Method** Si-Jun Shan, Jun Sun*, Yu-Liang Sun Tsinghua University, China
33	P-0729	**Synthesis and Evaluating Characteristics of Multifunctional Capsule** HIbiki Hanada, Koji Fumoto* Aoyama Gakuin University
34	P-0730	**Evaluation of Affected Area Temperature Considering Blood Flow in Magnetic Fluid Hyperthermia** Masaki Kaneko, Koji Fumoto* Aoyama Gakuin University, Japan
35	P-0783	**Development of Fuel Liquid Film Measurement Technique on the Engine Inner Wall and Intake Pipe** Ryuhei Yasuda*, Minglin Li, Osamu Nakabeppu, Tatsuya Kuboyama, Satoshi Takayama Meiji University, Japan
36	P-0421	**Predicting the Excitation of Magnetic Polaritons in Slit Arrays Using Transmission Line Models** Yiquan Gong, Yanming Guo*, Shuni Chen, Cao Ziqi, Qinghui Pan, Yong Shuai Harbin Institute of Technology, China
37	P-0771	**Analysis of Power Supply of Solar Integrated Latent Heat Thermophotovoltaic (LHTPV) System** Jaeman Song*, Gunwoo Baik, Hyuntak Kim, Saeyoon Kim, Inwoo Chun Kyung Hee University, Korea
38	P-0758	**Plasmon-Enhanced Fluorescence by Metallic Nanostructures in High-Temperature Environment** Guan-Yao Huang, Tairan Fu*, Yusong Wu Tsinghua University, China
39	P-0744	**A Fundamental Study on Structures and Transport Properties of Water Based on First-Principles Molecular Dynamics** Kanna Yamaji*, Kunio Fujiwara, Masahiko Shibahara Osaka University, Japan

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

40	P-0808	**Power and Uniformity Optimization of Proton Exchange Membrane Fuel Cells on the Basis of Deep Reinforcement Learning** Seunghun Jung*, Shengnan Liu Chonnam National University, Korea
41	P-0473	**Experimental Study on the Performance of Shell-and-Tube Heat Exchanger with High Flux Tubes** Yizhou Peng, Xuezhi Zhao, Ke Wang* China University of Petroleum (Beijing), China
42	P-0778	**Optimization of Cationic Surfactant DODMAC Addition for Improving Thermoelectric Performance of N-Type SWCNT Films** Hisatoshi Yamamoto, Yutarou Okano, Masayuki Takashiri* Tokai University, Japan
43	P-0773	**Effects of Pillar Spacing and Height on Droplet Impact Boiling Over a Heated Pillar-Array Surface** Shaowei Zheng, Tianrun Yue, Tao Lu, Xue Chen* Beijing University of Chemical Technology, China
44	P-0763	**Development of Simultaneous Visualization Technique for Heat Flux and Spreading Behaviors During Drop Impact Process** Yuzuki kimura, Taku Sakurai, Junnosuke Okajima, Minori Shirota, Takahiro Okabe* Hirosaki University, Japan
45	P-0772	**Ultrahigh Visible Transparency, Polymer-Free Radiative Cooling Glass Enabled by Deep Reinforcement Learning for Energy Conservation** Shilv Yu, Run Hu* Huazhong University of Science and Technology, China
46	P-0505	**Efficient Thermal Management in Graphene-Boron Nitride Planar Heterostructures at the Nanoscale** Zexin Liu, Guoqing Xin* Huazhong University of Science and Technology, China

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

47	P-0654	**Effects of Parameters on Electrochemical Impedance Spectra of Lithium-Ion Batteries** Vikrom Kiniman, Kotchakarn Nantasaksiri, Patcharawat Charoen-amornkitt* King Mongkut's University of Technology Thonburi, Thailand
48	P-0507	**Influence of Ultrasonic Field and Ribbed Surfaces on Heat Transfer in Al_2O_3 Nanofluid Pool Boiling** Shiming Sang, Ping Liu*, Lianghong Hu, Guangfeng Liu Anhui University of Science and Technology, China
49	P-0271	**Numerical Study on the Thermo-Hydraulic Characteristic of a Bifurcation-Ribbed Tube Inserted with Semi-Pipes Under Laminar Flow** Qinglin Du, Gen Ou, Zhichun Liu, Wei Liu* Huazhong University of Science and Technology, China
50	P-0675	**Real Gas Effects on the Spontaneous Ignition Limit of Pressurized Hydrogen Jet** Yaqin Tan, Rémy Mével* Tsinghua University, China
51	P-0554	**Quasi-Steady Detonation in Rich Hydrogen-Nitrogen Tetroxide Mixtures** Zihang Ni, Fernando Veiga-López, Qiang Xiao, Rémy Mével*, Bing Wang Tsinghua University, China
52	P-0780	**PEFC Ionomer-Free Catalyst Layer for Reduction of Transport Resistance Developed by Electrospray** Yuki Matsushita*, Masaya Okano, Suguru Uemura, Yutaka Tabe Hokkaido University, Japan
53	P-0071	**Numerical Research of the Factors Influencing the Flow Heat Transfer and Thermal Oxidation Coking Process of Aviation Kerosene RP-3 Under Supercritical Pressure in Miniature Serpentine Tubes** Haoxing Zhi, Juan Wang, Weitong Liu, Xiaojia Gang, Yanchen Fu* Beihang University, China

Poster Sessions

Poster Session 1

Time:Monday, June 24, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

54	P-0784	**Development of a Al-Si@ZrO_2 High Working Temperature Microencapsulated Phase Change Material** Qingda Li, Takahiro Nomura* Hokkaido University, Japan
55	P-0259	**Experimental Study on Heat Transfer and Heating Characteristics of Electric Regenerative Thermal Oxidizer (e-RTO)** Benwei Fu*, Ben Chu Shanghai Jiao Tong University
56	P-0680	**Porous Liquid Metal Coating with Micro/Nanostructure by Boiling-Induced Self-Assembly Enabling Enhancement of Boiling Heat Transfer** Vikrom Kiniman, Kotchakarn Nantasaksiri, Patcharawat Charoen-amornkitt* King Mongkut's University of Technology Thonburi, Thailand
57	P-0713	**Techno-Economic and Life-Cycle Assessment of Biomass-to-Hydrogen Based on Compact Calcium Looping Gasification in Comparison with Power-to-Hydrogen** Qiwei Luo, Wengu Xiang* Southeast University, China
58	P-0734	**Broadband Directional Thermal Radiation with Epsilon-and-Mu-Near-Zero Materials** Cunhai Wang*, Tao Chen University of Science and Technology Beijing, China
59	P-0742	**Light-Weight Mg-Based Heat Spreader with Pa-Decorated Mg Wick for Phase-Change Thermal Management** Junze Zheng, Benwei Fu* Shanghai Jiao Tong
60	P-0746	**Phytic Acid Stabilized Liquid Metal Nanoparticles for Bone-Targeted Photothermal Therapy** Ruitong Wang, Benwei Fu* Shanghai Jiao Tong University, China

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

Borad No.	Abstract ID	Title, Author(s), Affiliation(s)
1	P-0048	**Monte Carlo Simulation of Temperature Effect on Hotspot in Gan Hemt** Baoyi Hu, Jiao Chen, Zhaoliang Wang* China University of Petroleum, China
2	P-0538	**Effects of Van Der Waals and Structure on Thermal Conductivity of Multilayer Graphene by Density Functional Theory Calculation** Yuan Dong*, Renjie Hua Hangzhou Dianzi University, China
3	P-0779	**Development of an Inverse Method for Estimating Thermophysical Properties of Biomaterials Using a Flexible Thermal Sensor** Ayumi Shiroto, Yuto Hiyama, Katsuhisa Taguchi, Manabu Orito, Takahiro Okabe* Hirosaki University, Japan
4	P-0788	**Ion Current Characteristics by Comb-Teeth Type Sensors at the Head on Quench of Laminar Flame** Ikuma Tanikawa, Ikuma Tanikawa*, Osamu Nakabeppu, Keichiro Koyama, Haruki Suda, Yujin Katsube Meiji University, Japan
5	P-0770	**Enhancement in Thermal Conductivity of Graphene Aerogel by ALD Process** Jiho Kang, Duckjong Kim* Gyeongsang National University, Korea
6	P-0121	**Molecular Dynamics Simulations of the Impact and Freezing of Supercooled Water Droplet on Ice Surfaces** Shichun Wang, Leping Zhou* North China Electric Power University, China
7	P-0586	**Lateral Heterostructure Formed by Highly Thermally Conductive Fluorinated Graphene for Efficient Device Thermal Management** Fanfan Wang, Guoqing Xin* Huazhong University of Science and Technology, China

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

8	P-0786	**Thermal Response of Silica Fiber Reinforced Polymer under Shear Ablation** Meicong Wang, Yonggang Lu*, Jixiang Shan, Xin Yang Institute of Systems Engineering, China Academy of Engineering Physics, China
9	P-0082	**Thermal Management System Control Method for Hypersonic Aircraft Based on Temperature Prediction and Thermal Load Identification** Li Yang, Hong Qi*, Baohai Gao, Mingjian He, Yatao Ren Harbin Institute of Technology, China
10	P-0792	**Electrolyte/Electrode Behavior Measurement with Operando X-Ray Microscopy of Zinc-Air Batteries** Wooseok Kang*, Manabu Kodama, Shunpei Kubota, Atsunori Ikezawa, Hajime Arai, Shuichiro Hirai Tokyo Institute of Technology, Japan
11	P-0182	**Analysis of Correction Factors for Real-Time Models of the Shell Transfer Process in Investment Casting** Bang Guan*, Da Shu, Donghong Wang Shanghai Jiao Tong University, China
12	P-0625	**A Wavelet Analysis of Temperature Oscillation in the Oscillating Heat Pipe with Different Bend Structures** Zhang Peng, Ji Yu-long*, Wang Feng, Shen Ying-kai, Zhang Xin Dalian Maritime University, China
13	P-0811	**Verification of HiL for UAM with Hybrid Power System** Wonjun Kim, Seunghun Jung* Chonnam National University, Korea
14	P-0261	**Performance Optimization Design of Latent Heat Storage Device Based on Topological Optimization** Jiao Wang*, Zilong Song Jiangsu University of Science and Technology, China

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

15	P-0012	**Heat Transfer in Two-Layer Electroosmotic Flow of Power-Law Nanofluids in a Microchannel** Shuyan Deng* Guangdong University of Petrochemical Technology, China
16	P-0210	**Nonlocality of Interatomic Focre Constants Inducing the Topological Phonon Phase Transition in Nitrides** Daosheng Tang* Soochow University, China
17	P-0674	**A Transient Heat Transfer Calculation Method for Civil Aircraft Fuel Tanks** Zhengyifan Yang*, Shuai Liu Civil Aviation University of China, China
18	P-0094	**High Temperature Sensitivity of Graphene-Carbon Nanotube Composite Fibers** Yuanjuan Zhang, Lijun Zhang, Fuhua Shen, Jinbo Xu, Huan Lin* Qingdao University of Technology, China
19	P-0314	**Cascade Compression Energy Storage Pumped Thermal Storage System Operation Performance Study** Wang Yutao, Mao Ning* China University of Petroleum (East China), China
20	P-0309	**Induction-Heating-Induced Droplets Direct Deposition Method for Fully Dense Metal Structure Fabrication** Zhongkun Liao, Kaihao Zhang* The Hong Kong University of Science and Technology (Guangzhou), China
21	P-0252	**Experimental Investigation on Methane Dry Reforming in a High-Temperature Heat Pipe Fixed-Bed Reactor** Yuwen Shi, Xiaoyuan Wang* Nanjing Tech University, China

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

22	P-0721	**Multi-Parameter Optimization of Thermoelectric Cooler Geometric Structure** Yuqing Wei*, Xin Qian, Yifan Lei, Ronggui Yang Huazhong University of Science and Technology, China
23	P-0451	**Enhanced Flow Boiling Heat Transfer Study on Edm-Modified Aluminum Surface** Xin Zhang, Zhangbin Yang, Yu Wang* Institute of Electrical Engineering, Chinese Academy of Sciences, China
24	P-0341	**Transcritical Phase Change of Transpiration Cooling Plate Structure with Supercritical Fiuld** Yunchang Liu, Kai Zhang*, Gui Lu North China Electric Power University, China
25	P-0404	**Design Criteria for Solar Volumetric Methane Dry Reforming** Qiang Li*, Bingxin Liu NJUST School of Energy and Power Engineering, China
26	P-0277	**Enhancing Graphene-based Structure's Thermal Conductivity with Copper Interlayers** Jiayuan Fang, Yang Zhang, Pei Zhao* Zhejiang University, China
27	P-0733	**Optimization of Solar Spectral Transmission by Semi-Transparent Solar Cells for Greenhouse Applications** Shaohang Shi, Wei Duan, Ning Zhu* Tsinghua University, China
28	P-0613	**Laminar Flame Speeds of Supercritical CO2 Diluted Mixtures** Zifeng Weng, Yakun Zhang, Rémy Mével* Tsinghua University, China

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

29	P-0480	**Infrared Temperature Measurement on Combustion Chamber Front-End Modified by Coefficient-Matrix** Zhibin Li, Yanming Guo* Harbin Institute of Technology, China
30	P-0651	**Thermoelectric Properties of ErAs: InGaAs Quantum Dot Composite Materials** Hongda Zhu, Yang Zhao* University of Science and Technology of China
31	P-0369	**Numerical Simulation of the Dynamic Interaction Characteristics Between Wood's Metal and Water** Wenshu Jiang, Tao Lu* Beijing University of Chemical Technology, China
32	P-0751	**The Relationship Between the Effect of Ambient Gas and the Dynamic Droplet Impact Behavior on a Hot Surface** Zhengqi Shi, Takaaki Ariyoshi, Kensuke Kida, Yutaku Kita, Yasuyuki Takata, Masamichi Kohno* Kyushu University, Japan
33	P-0696	**Performance of a Thermal Management System in an Electric Vehicle Using the Induction Heater** Youn Cheol Park*, Gangsoo Ko Jeju National University, Korea
34	P-0673	**Velocity-Curvature-Driven Chemical Model Reduction for NH3-H2-Air Mixtures** Xiangrong Huang, Fernando Veiga-López, Josué Melguizo-Gavilanes, Rémy Mével*, Bing Wang Tsinghua University, China
35	P-0702	**Numerical Assessment of Newly-Developed Slip-Jump Boundary Conditions in Micro-Couette Gas Flows** Shuhua Zeng*, Junyuan Yang, Wenwen Zhao, Weifang Chen Zhejiang University, China

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

36	P-0401	**Nanoparticle Modulation of Surfactant Solution Rheological Properties and Temperature Response Mechanism** Xiaoping Li, Quanyou Jin, Zishang Zhang, Dengwei Jing* Xi'an Jiaotong University, China
37	P-0760	**Numerical Analysis and Efficiency Promotion in Hightemperature Composite Phase Change Materials Solar Thermal Storage** Tianze Ren, Yimin Xuan* Nanjing University of Aeronautics and Astronautics, China
38	P-0708	**Reactive Molecular Dynamics Analysis on Effect of MOF Glass Transition on Structure and Thermophysical Property** Issei Tanaka*, Kunio Fujiwara, Masahiko Shibahara Osaka University, Japan
39	P-0281	**Turbulent Flame Propagation and Extinction Behaviors in Solid Particle Cloud Combustion under Air Condition** Yu Xia* Hokkaido University, Japan
40	P-0743	**A Numerical Study on Natural Convection During Hydrogen Combustion on a Vertical Plate Catalyst** Dae-Hyun Kim, Young-Su Na, Dong-Wook Oh* Chosun University, Korea
41	P-0448	**Heat Transport Mechanisms in Nanoporous Amorphous Silica: The Role of Propagons, Diffusons and Locons** Gaosheng Wei*, Chao Huang North China Electric Power University, China
42	P-0766	**Energy Requirement Optimization of an Alternative CO2 Capture Process Using Multi-Objective Algorithm** Fnu Chairunnisa* Kyushu University, Japan

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

43	P-0735	**An Energy-Efficient and Durable Crop Irrigation Device via Solar-Driven Steam Generation from Seawater** Ke Mao, Yaoxin Zhang* Shanghai Jiao Tong University, China
44	P-0736	**VO_2 Nanoparticle Based Smart Window for Synchronous Solar and Infrared Thermal Radiation Regulation** Kewei Sun, Yinmo Xie* Harbin Institute of Technology, China
45	P-0791	**Measurement of Interface Contact Thermal Resistance in APG-Cu Based on Continuous Frequency-Domain Thermal Reflectance Method** Dong Li*, Xiaoyang Li Xi'an Jiaotong University, China
46	P-0474	**Highly Thermally Conductive Super-Aligned Boron Nitride Nanotube Film for Flexible Electronics Thermal Management** Yue Yue, Xiaoran Yang, Kai Yang, Kangyong Li, Zexin Liu, Fanfan Wang, Rong Zhang, Jian Huang, Guoqing Xin* Huazhong University of Science and Technology, China
47	P-0775	**Development of Portable Evaporative Cooling Swcnt Thermoelectric Generators with Addition of g-C_3N_4 Toward Hydrogen Generation** Reon Okutsu, Yuto Nakazawa, Masayuki Takashiri* Tokai University, Japan
48	P-0762	**Condensation Heat Transfer Characteristics of R454C in a Single Horizontal Rectangular Mini-Channel** Itsuki Hashimoto, Kazushi Miyata* Fukuoka University, Japan
49	P-0748	**A Molecular Dynamics Study on Wetting Behavior of Water Droplets on Heterogeneous SAM-Modified Surfaces** Ziyi Zhao*, Hiroki Kusudo, Gota Kikugawa Tohoku University, Japan

Poster Sessions

Poster Session 2

Time:Tuesday, June 25, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

50	P-0768	**Numerical Simulation of Heat Transfer in Enclosures Using Various Openfoam Radiation Models** Igor Miroshnichenko*, Mikhail Sheremet Tomsk State University, Russia
51	P-0825	**Predicting Thermal Contact Resistance by Integrating Physical Knowledge and Machine Learning** Bo Zhang, Zhen Li* Tsinghua University, China
52	P-0676	**Enhancing the Boiling Heat Transfer of Metallic Surface Using High-Aspect-Ratio Microstructures Fabricated by Elliptical Vibration Chiseling** Zhiwei Li, Jianjian Wang* Tsinghua University, China
53	P-0747	**Radiative Cooling Performance of $BaSO_4$ Printed Films** Messie Ranjatoson, Toshiharu Chono, Renjiro Emoto, Kosuke Watanabe, Koji Miyazaki* Kyushu University, Japan
54	P-0759	**Measurement of Thermophysical Properties of Aluminum Samples by the Three-Omega Method** Takumi Shimizu, Asuka Miura, Tomomi Kawahara, Masamichi Kono, Hsin-Ni Ho, Kosuke Watanabe, Koji Miyazaki* Kyushu University, Japan
55	P-0380	**A Two-Dimensional Material With Ultra-High Thermal Conductivity In Diamond Structure: Aa Stack Nitrogen Substituted Diamane** Biao Wang, Yurong He, Xingchun Xu, Jiaqi Zhu* Harbin Institute of Technology, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

Borad No.	Abstract ID	Title, Author(s), Affiliation(s)
1	P-0084	**Numerical Calculation Model of Temperature Field and Residual Stress in Ring Welding of X80 Pipeline of China-Russia Eastern Route** Ze Yun, Yan Li* China University of Petroleum(Beijing), China
2	P-0539	**Auto-Deposited Microparticle Composite Coating for Low-Cost and Efficient Daytime Radiative Cooling** Xuefeng Tian, Huaiyuan Wang, Yuanwei Lu, Meiqi Wang, Jihui Gao* Harbin Institute of Technology, China
3	P-0785	**Single-Particle Tracking of Diffusion Behavior in Porous Media** Yusaku Abe*, Naoki Tomioka, Yu Matsuda Waseda University, Japan
4	P-0796	**A Dual-Height Wick to Improve Capillary Performance of Vapor Chambers** Hongpeng Jiang, Jie Xu* Harbin Institute of Technology, China
5	P-0774	**Recovery of Waste Heat Generated in Thin Film Solid Oxide Fuel Cells Using Near-Field Thermophotovoltaic Energy Conversion** Jaeman Song*, Namwoo Kim, Seonggyu Yang, Wonjong Yu Kyung Hee University, Korea
6	P-0125	**Heat Exchange Network Design for an e-Fuel Synthesis System Integrating a Solid Oxide Electrolyzer and a Fischer-Tropsch Reactor** Chen Zhang*, Biaowu Lu, Zijie Zhang, Lei Zhu, Zhen Huang Shanghai Jiao Tong University, China
7	P-0587	**Research of Heat Transfer Enhancement on Evaporation Surface with Micro-Column Array Structure** Jing Wang, Zhichun Liu* Huazhong University of Science and Technology, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

8	P-0793	**Investigating the Heat Transfer Performance of a Novel Hypervapotron Cooling Channel for High Heat Flux Components in Nuclear Fusion Reactors** Zhen Chen* University of Science and Technology of China, China
9	P-0179	**Numerical and Experimental Study on Leaf Vein Manifold Microchannels for Embedded Cooling of Power Devices** Keyi Huang, Yuandong Guo* Beihang University, China
10	P-0797	**Design, Fabrication, and Optimization of Superbiphilic-Pillar Structures for Extreme Efficient Boiling** Xiaoliang Wang, Hongpeng Jiang, Jie Xu*, Debin Shan, Bin Guo Harbin Institute of Technology, China
11	P-0190	**A Heat Transfer Model for Dropwise Condensation in the Absence of Curvature Resistanc** Jie Pang*, Ziping Liu, Ruiqi Wang, Zhenhai Zou, Chonghai Huang Wuhan Second Ship Design and Research Institute, China
12	P-0626	**Study on Shape Oscillation of a Detached Bubble in Quiescent Liquid** Chunxiao Zhu, Licheng Sun*, Zhengyu Mo, Min Du, Yi Feng, Wei Yang, Xin Xu, Qinyi Zhang, Jiaxin Zheng Sichuan University, China
13	P-0819	**Preparation and Thermal Performance of Erythritol Nano SiO_2 Composite Phase Change Materials for Passive Thermal Protection of Aircraft Cabin** Zihan Ju, Dinghua Hu*, Tianci Qi Nanjing University of Science and Technology, China
14	P-0303	**Design of a New Type of Oil Cooled Blade Structure in the Face of Complex Incoming Flow** Cao Bo, Sun Jingchuan* Beihang University, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

15	P-0106	**Flow and Heat Transfer Performance of Hierarchical Sheet Triply Periodic Minimal Surface Lattices** Hong Xu, Xiaohu Liu* Huazhong University of Science and Technology, China
16	P-0216	**Numerical Simulation of Phase Distribution Characteristics in a Parallel Longitudinal Corrugated Narrow Channel** Ruizhi Hao, Qi Lu, Jian Deng, Tao Lu* Beijing University of Chemical Technology, China
17	P-0691	**Energy Performance of Domestic Refrigerator Using R-600A with Different Sub-Cooling Levels** Syed Ashfaq Husnain, Ji Hwan Jeong*, Zhanzhe Wang Pusan National University, Korea
18	P-0102	**Enhanced Thermal Storage and Transfer in Molten Salt Nanocomposite Due to Interfacial Effect Revealed by Molecular Dynamics Simulations** Shule Liu*, Jing Ding, Fei Liang Sun Yat-sen University, China
19	P-0321	**New Fuel Cooling Structure Design for Non-Uniform Incoming Flow** Rui Zou, Jingchuan Sun* Beihang University, China
20	P-0361	**Sorption and Desorption Characteristics with Polymer Sorbent Nonwoven Fabrics in Comfortability Clothing Microclimate** Naoto Haruki*, Takuma Kato Okayama Prefectural University, Japan
21	P-0254	**Analysis and Simulation of Droplet Evaporation in Mipcc** Yulong Li*, Zhengnan Yang Beihang University, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

22	P-0722	**A Heat Transfer Model for Liquid Film Boiling** Pengkun Li, Qifan Zou, Xiuliang Liu*, Ronggui Yang Huazhong University of Science and Technology, China
23	P-0479	**Enhancement of Thermal Boundary Conductance Between MoS_2 and Dielectric Layer by Self-Assembled Monolayers** Jian Huang, Xiaofeng Wang, Fanfan Wang, Zexin Liu, Yue Yue, Guoqing Xin* Huazhong University of Science and Technology, China
24	P-0420	**Theoretical Analysis on Steam Reforming Integration in Primary Combustion of Boron-Based Fuel-Rich Propellant** Gan Yang, Binbin Chen*, Zhixun Xia, Likun Ma, Yunchao Feng National University of Defense Technology, China
25	P-0494	**Study on Thermal Insulation Performance of Ultra-Light Microporous Foamed Concrete** Yukuan Zhang, Hailiang Yang, Song Zhou, Liang Zhang*, Zitao Yu Zhejiang University, China
26	P-0295	**Research on the Ejection Performance of the Ejector with Low Pressure and Back Pressure** Cong Chen*, Haijing Liu, Pengfei Duan Wenzhou University of Technology, Zhejiang, China
27	P-0749	**Study of Flow Behavior Around a Single Liquid Bubble Injected to High Viscosity Molten Liquid** Takumi Higashi, Tsuyoshi Kawanami* Meiji university, Japan
28	P-0681	**Investigation on Heat Transfer Characteristics of He-Xe Mixed Gas Flow in Rectangular Narrow Channels Based on CFD Method** Zhenghao Hu, Lei Li* Harbin Engineering University, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

29	P-0514	**A Two-Stage Ultra-Low Temperature Module Based on p-Type MgAgSb and n-Type BiSb** Yuqing Cai, Liang Chen* Xi'an Jiaotong University, China
30	P-0659	**Size Effect in Monolayer MoS_2 and the Thermal Management of the Electronic Devices** Ruiwen Dai, Guoqing Xin* Huazhong University of Science and Technology, China
31	P-0396	**Improvement of Heat Transfer by Regulating Flow in a Double-Layered Internal Cooling Channel** Jie Liu, Jiabing Wang, Kun Yang* Huazhong University of Science and Technology, China
32	P-0752	**Density Calculations and Residual Entropy Viscosity Scaling Model for R1234ze(E) and R1234YF** Yanbiao Xu, Kai Zhang, Gui Lu* North China Electric Power University, China
33	P-0698	**Performance Analysis of a Solid Oxide Fuel Cell and Gas Turbine System Combined with a Dual-Loop Transcritical Rankine Cycle Heat Recovery System** Nan Zhang, Wenbo Chen, Yanan Yue*, Shijing Wu Wuhan University, China
34	P-0703	**Effects of Pulsation Parameter on Heat Transfer and Fluid Flow in Liquid Metal Cross Flow Inline Tube Bundles with Different Pitch Ratios** Hantao Jiang, Yingwen Liu* Xi'an Jiaotong University, China
35	P-0716	**Effects of Ammonia Injection Temperature on Supersonic Film Drag Reduction and Cooling Characteristics** Xin Lu, Silong Zhang, Jiang Qin* Harbin Institute of Technology, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

36	P-0408	**High-Speed Interfermetric Visualizaton of a Turbulent Mini-Channel Flow of Suprecritical CO_2 Fluid under Local Thermal Disturbances** Zeng Gang, Dong Yang, Lin Chen* Institute of Engineering Thermophysics Chinese Academy of Sciences, China
37	P-0764	**Flame Stabilization in a Supersonic Combustor Equipped with a Cavity and a Backward-Facing Step** Bin An*, Menglei Li, Jiaoru Wang, Jikai Chen, Yu Xie, Peibo Li, Changhai Liang, Taiyu Wang National University of Defense Technology, China
38	P-0710	**The Self-Propelled Jumping of Multiple Gallium-Based Liquid Metal Droplets and the Energy Conversion Prediction Based on Convolutional Neural Networks** Liyu Dai, Xiaomin Wu*, Zhiping Yuan Tsinghua University, China
39	P-0717	**Magnon-Phonon Coupling Modulation via Dimensional Reduction in Thin Antiferromagnet MnPSe3 Nanoribbons** Wenkang Chen, Xiangfan Xu* Tongji University, China
40	P-0801	**Computational Insights into Enhancing Silicon Carbide'S Thermal Transport through Structural Manipulation and Ion Irradiation** Yanwei Wang*, Kairolla S. Sekerbayev, Omid Farzadian, Zhandos N. Utegulov Nazarbayev University, Kazakhstan
41	P-0453	**The Feasibility Study of Shallow Geothermal Energy for Industrial Processes in Chengdu, China** Jiaxin Zheng, Xiting Long* Sichuan University, China
42	P-0767	**Hemodynamic Effects of Local Hyperthermia in Coronary Arteries After Pci** Xiaotong Yan, Kai Yue* University of Science and Technology Beijing, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

43	P-0738	**Speed of Sound Measurement for Refrigerant Mixture R454B and R454C in Liquid Phase** Haruto Yamauchi*, Takashi Nishiyama, Lei Gao Fukuoka University, Japan
44	P-0739	**Analysis of the Effect of Solute Molecules at a Liquid-Vapor Interface on the Evaporation Flux of Water Using Molecular Dynamics Simulations** Daisuke Fukumitsu*, Hiroki Imai, Kohei Sato, Ikuya Kinefuchi The University of Tokyo, Japan
45	P-0798	**Efect of Rotating Speed on Array Impinging Jet in a Confined Channel** Chayut Nuntadusit*, Chayut Nuntadusit Prince of Songkla University, Thailand
46	P-0476	**Experimental Study on the Heat and Mass Transfer Characteristics of Falling Film Evaporation in a Closed Cooling Tower with an Inclined Round Tube Bundle** Zefang Zhao*, Jiawen Lv, Xiaojing Zhu, Qinggang Qiu Dalian University of Technology, China
47	P-0776	**Enhanced Thermoelectric Performance of n-Type Composite Films with Swcnts and Bi2Te3 Nanoplates for Pn-Junction Swcnt Devices** Koki Hoshino, Hisatoshi Yamamoto, Ryota Tamai, Sugo Miyake, Masayuki Takashiri* Tokai University, Japan
48	P-0769	**Exploring Machine Learning Approaches for Early Lung Cancer Serum Diagnosis Based on Raman Spectroscopy Analysis** Xiangqian Liu* Tsinghua University, China
49	P-0493	**Interfacial Evaporation-Induced Traction of Microbubble Using Laser-Microbubble Interaction** Weizheng Cheng, Benwei Fu*, Tao Deng Shanghai Jiao Tong University, China

Poster Sessions

Poster Session 3

Time:Wednesday, June 26, 2024 15:30-18:00
Room:Corridor outside Fuyue Hall

50	P-0327	**Topology Optimization for Enhancing Film Cooling Coverage at High Blowing Ratios** Huidong Tang, Jianqin Zhu, Zhi Tao, Lu Qiu* Beihang University, China
51	P-0615	**Study on Transformation Characteristics of Organic Components and Heavy Metals in Supercritical Water Gasification of Hyperaccumulators** Chengwei Huang, Shanke Liu*, Jialing Xu, Lijun Yu Shanghai Jiao Tong University, China
52	P-0345	**An Analytical Method to Simulate the Transient Phase Change Process of a Water Sublimation Heat Sink** Yuying Wang* Beijing Institute of Spacecraft System Engineering, China
53	P-0741	**Layer-By-Layer Assembled Multi-Walled Carbon Nanotube–Polyethylenimine Coatings for Enhanced Thermal Performances of Polymer-Based Heat Sinks** Chanho Song, Wonjoon Choi* Korea University, Korea
54	P-0444	**Temperature Field Reconstruction of Unknown Heat Source Based on Response Spatiotemporal Correlation Model** Zhaohui Mao, Hong Chen, Guangjun Wang* Chongqing University, China
55	P-0662	**Green-Kubo Formalism for Thermal Conductivity with Slater-Koster Tight Binding** Ying-Hui Ren, Dong-Bo Zhang*, Jian-Gao Li, Tao Sun Beijing Computational Science Research Center, China
56	P-0799	**Performance Simulation of a Car Seat Heat Pump** Young Soo Chang*, Faris Hakiem Kookmin University, Korea

Notes

Notes

Notes

Notes

Organizers: Chinese Society of Engineering Thermophysics

Shanghai Jiao Tong University

Co-organizers: Heat Transfer Society of Japan

Korean Society of Mechanical Engineers

Australasian Fluid and Thermal Engineering Society

Indian Society for Heat and Mass Transfer

Sponsors: Asian Union of Thermal Science and Engineering

International Centre for Heat and Mass Transfer