



PROCEEDINGS OF THE 8TH WORLD CONGRESS ON MECHANICAL, CHEMICAL, AND MATERIAL ENGINEERING (MCM'22)

JULY 31 - AUGUST 02, 2022 | PRAGUE, CZECH REPUBLIC

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WELCOME MESSAGE FROM THE CONFERENCE CHAIR

On behalf of the International Academy of Science, Engineering and Technology (International ASET Inc.), the organizing committee would like to welcome you to the 8th World Congress on Mechanical, Chemical, and Material Engineering (MCM'22).

MCM is aimed to become one of the leading international annual congresses in the fields of mechanical, chemical, and material engineering. This congress will provide excellent opportunities to the scientists, researchers, industrial engineers, and university students to present their research achievements and to develop new collaborations and partnerships with experts in the field.

While each conference consists of an individual and separate theme, the 4 conferences share considerable overlap, which prompted the organization of this congress. The goal of this undertaking is to bring together experts in each of the specialized fields, and at the same time allow for cross pollinations and sharing of ideas from the other closely related research areas.

We thank you for your participation and contribution to the 8th World Congress on Mechanical, Chemical, and Material Engineering (MCM'22). We wish you a very successful and enjoyable experience.

Dr. Huihe Qiu

*Congress Chair and Proceedings Editor
MCM'22*

Dr. Yuwen Zhang

*Congress Co-Chair
MCM'22*

Dr. Marcello Iasiello

*Congress Local Chair
MCM'22*

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ABOUT MCM'22

MCM is aimed to become one of the leading international annual congresses in the fields of mechanical, chemical, and material engineering.

This congress will provide excellent opportunities to the scientists, researchers, industrial engineers, and university students to present their research achievements and to develop new collaborations and partnerships with experts in the field.

There are 4 conferences included in the MCM Congress:

[HTFF'22](#) - 9th International Conference on Heat Transfer and Fluid Flow

[ICMIE'22](#) - 11th International Conference on Mechanics and Industrial Engineering

[MMME'22](#) - 9th International Conference on Mining, Material and Metallurgical Engineering

[ICCPE'22](#) - 8th International Conference on Chemical and Polymer Engineering

While each conference consists of an individual and separate theme, the 4 conferences share considerable overlap, which prompted the organization of this congress. The goal of this undertaking is to bring together experts in each of the specialized fields, and at the same time allow for cross pollinations and sharing of ideas from the other closely related research areas.

MCM is an acronym for **M**echanical, **C**hemical and **M**aterial Engineering.

The proceedings is published in Ottawa, Canada.

All papers were peer-reviewed

The congress proceedings is published under an ISSN and ISBN number

Each paper is assigned a unique DOI number by [Crossref](#)

The conference proceedings is indexed by [Scopus](#) and [Google Scholar](#)

The proceedings is permanently archived in [Portico](#) (one of the largest community-supported digital archives in the world)

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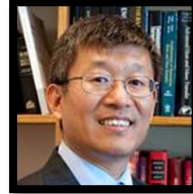
SCIENTIFIC COMMITTEE

We would like to thank the following for accepting to act as a member of the Scientific Committee for the MCM'22 Congress:



Dr. Huihe Qiu

The Hong Kong University of Science & Technology, Hong Kong
Congress Chair



Dr. Yuwen Zhang

University of Missouri, USA
Congress Co-Chair



Dr. Marcello Iasiello

Università degli Studi di Napoli
Federico II, Italy
Congress Local Chair

Scientific Committee Members for HTFF'22

- **Dr. Jalel Azaiez**, The University of Calgary, Canada
- **Dr. Fotini Labropulu**, University of Regina, Canada
- **Dr. Ahmet Selamet**, The Ohio State University, USA
- **Dr. Yulia Plaksina**, Moscow State University, Russia
- **Dr. Chamil Abeykoon**, The University of Manchester, UK
- **Dr. Yang Liu**, The Hong Kong Polytechnic University, Hong Kong
- **Dr. Hui Hu**, Iowa State University, USA
- **Dr. Dongsheng Wen**, University of Leeds, UK
- **Dr. Krishnaswamy Nandakumar**, Louisiana State University, USA
- **Dr. Yulong Ding**, University of Birmingham, UK
- **Dr. Sylvie Lorente**, Villanova University, USA
- **Dr. Jan Havlík**, Czech Technical University in Prague, Czech Republic
- **Dr. Christos Markides**, Imperial College, UK
- **Dr. Ziad Saghir**, Ryerson University, Canada
- **Dr. Tassos G. Karayiannis**, Brunel University London, UK
- **Dr. Frank Gerner**, University of Cincinnati, USA
- **Dr. Mohamed Hamed**, McMaster University, Canada
- **Dr. Yuwen Zhang**, University of Missouri, USA
- **Dr. Marc Miscevic**, Université Paul Sabatier, France
- **Dr. Perumal Nithiarasu**, University of Wales, UK
- **Dr. Karthik Remella**, Ansys, USA
- **Dr. Gerardo Maria Mauro**, Università degli studi del Sannio, Italy
- **Dr. Marcello Iasiello**, Università degli Studi di Napoli Federico II, Italy

SCIENTIFIC COMMITTEE

Scientific Committee Members for ICMIE'22

- **Dr. Alvaro Aguinaga**, Escuela Politécnica Nacional, Ecuador
- **Dr. Carlos Avila**, California Institute of Technology (Caltech), USA
- **Dr. Luca Greco**, CNR-INM Institute of Marine Engineering, Italy
- **Dr. Surendra M. Gupta**, Northeastern University, USA
- **Dr. Satyandra Gupta**, University of Southern California, USA
- **Dr. Angel Huminic**, Transilvania University of Brasov, Romania
- **Dr. Aslan Deniz Karaoğlu**, Balikesir University, Turkey
- **Dr. Ying Liu**, Cardiff University, UK
- **Dr. Marton Takacs**, Budapest University of Technology and Economics, Hungary
- **Dr. Duc Truong Pham**, University of Birmingham, UK
- **Dr. Mohammad Mehdi Rashidi**, University of Electronic Science and Technology of China, China
- **Dr. Biswajit Sarkar**, Yonsei University, South Korea
- **Dr. Monica Sharma**, Malaviya National Institute of Technology, India
- **Dr. Min Xie**, City University of Hong Kong, China
- **Dr. Dan Zhang**, York University, Canada

Scientific Committee Members for MMME'22

- **Dr. Zdzislaw Adamczyk**, Silesian University of Technology, Poland
- **Dr. Pura Alfonso**, Escola Politècnica Superior d'Enginyeria de Manresa (EPSEM), Spain
- **Dr. Corby Anderson**, Colorado School of Mines, USA
- **Dr. Marc Bascompta**, Universitat Politècnica de Catalunya, Spain
- **Dr. Frank Cheng**, University of Calgary, Canada
- **Dr. Tung-Han Chuang**, National Taiwan University, Taiwan
- **Dr. Ioanna Giannopoulou**, National and Kapodistrian University of Athens, Greece

SCIENTIFIC COMMITTEE

Scientific Committee Members for MMME'22

- **Dr. Fernanda Margarido**, Instituto Superior Técnico, Portugal
- **Dr. Paul H. Mayrhofer**, Technische Universität Wien, Austria
- **Dr. Katarzyna Nowińska**, Silesian University of Technology, Poland
- **Dr. Willie Nheta**, University of Johannesburg, South Africa
- **Dr. Andre Carlos Silva**, Universidade Federal de Goiás, Brazil
- **Dr. Flávio de Andrade Silva**, Pontifícia Universidade Católica, Brazil
- **Dr. Zi-Kui Liu**, The Pennsylvania State University, USA

Scientific Committee Members for ICCPE'22

- **Dr. Farhang Abbasi**, Sahand University of Technology, Iran
- **Dr. Eric S. Fraga**, University College London, UK
- **Dr. Jaharah Ghani**, Universiti Kebangsaan Malaysia, Malaysia
- **Dr. Masami Okamoto**, Toyota Technological Institute, Japan
- **Dr. Dimitrios Sidiras**, University of Piraeus, Greece
- **Dr. Jingbo Wang**, Borealis Polyolefine GmbH, Austria

PLENARY & KEYNOTE SPEAKER

The keynote information for the 8th World Congress on Mechanical, Chemical, and Material Engineering (MCM'22) is as follows:

Plenary Speaker



Dr. Zhongyun Fan

Imperial College, UK
MMME'22 Keynote Speaker

Keynote Speakers



Dr. Xinwei Wang

Iowa State State University, USA
HTFF'22 Keynote Speaker



Dr. Sylvie Lorente

Villanova University, USA
HTFF'22 Keynote Speaker



Dr. Dan Zhang

York University, Canada
ICMIE'22 Keynote Speaker

PLENARY SPEAKER



Titles: The Critical Role of Metallurgy in the Transition from Linear To Circular Economy

Dr. Zhongyun Fan, Brunel University London, UK

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Fan is a professor of metallurgy, the founder and current Director of BCAST at Brunel University London. He is the principal investigator/director of the EPSRC funded LiME Research Hub, a national centre of excellence in liquid metal engineering. He is also the principal investigator for the UKRI Interdisciplinary Circular Economy Centre for Circular Metals. He has published over 400 scientific papers with an H-Index of 57 and a total citation of 12554 (Google Scholar). He has led a wide range of research projects as principal investigator with grants totalling over £70M. He has been chairman of 4 major international conferences and members international scientific committee of 6 international conferences. He was the co-chairmen of the Casting and Solidification Society (IOM3, 2012-2018), is a Board Member of the Light Metals Division (IOM3), a Fellow of the Institute of IOM3 and the Institute of Cast Metal Engineers (ICME). He was the recipient of the Elegant Work Prize (1995), the Cook/Ablett Award (2003) and Dowding Medal and Prize (2012) of the Institute of Materials, Minerals and Mining (IOM3). Fan's research has been focused on (1) understanding of early stages of solidification covering prenucleation, heterogeneous nucleation, Grain initiation and Grain refinement; (2) developing metallic materials for closed-loop recycling; and (3) developing innovative techniques for processing light metals.

KEYNOTE SPEAKERS



Titles: Conjugated Phonon and Hot Carrier Transport in 2D Materials

Dr. Xinwei Wang, Iowa State State University, USA

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Dr. Xinwei Wang is a full professor at Iowa State University (<http://web.me.iastate.edu/wang>). He obtained his Ph.D. from the School of Mechanical Engineering, Purdue University in 2001, M.S. (1996) and B.S. (1994) from the University of Science and Technology of China. Over the past 20 years, he has led his laboratory to develop new techniques for characterizing thermal transport at the micro/nanoscale, including the TET, ET-Raman, TD-Raman, and FR-Raman techniques. His lab reported the first work on distinguishing the optical and acoustic phonon temperatures under intense photon excitation, and determining their energy coupling factor. His work on conjugated phonon and hot carrier transport represents the first accomplishment in distinguishing these two physical processes and quantifying their transport diffusivities.

For more information Please visit:

https://avestia.com/MCM2022_Proceedings/files/speakers.html



Titles: Efficient Energy Architectures

Dr. Sylvie Lorente, University of Wales, UK

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Sylvie Lorente is the Associate Dean for Research & Innovation in the College of Engineering at Villanova University, PA, USA. She is the College of Engineering Chair Professor in Mechanical Engineering at Villanova, and Professor (Exceptional Class) at the National Institute of Applied Sciences (INSA), University of Toulouse, France.

She is also Hung Hing-Ying Distinguished Visiting Professorship in Science and Technology at Hong Kong University (Hong Kong), Extraordinary Professor at the University of Pretoria (South Africa), and Adjunct Professor at Duke University (USA). She is a member of the Academy of Europe.

KEYNOTE SPEAKER



Titles: Innovation Design and Applications of Robotic Manipulators in Intelligent Manufacturing System

Dr. Dan Zhang, York University, Canada

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Dr. Dan Zhang is a Kaneff Professor and Tier 1 York Research Chair in Advanced Robotics and Mechatronics in the Department of Mechanical Engineering at York University. Dr. Zhang was a Canada Research Chair in Advanced Robotics and Automation, was a founding Chair of the Department of Automotive, Mechanical, and Manufacturing Engineering with the Faculty of Engineering & Applied Science at Ontario Tech University. He received his Ph.D. in Mechanical Engineering from Laval University, Canada, in June 2000.

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Numerical and Experimental Evaluation of High-Efficiency Savonius Type Wind Turbine at Low Reynolds Number

Authors: Ivo Marinić-Kragić, Damir Vučina, Igor Pehnec, Petar Latinac

CFD Study Of Flow And Heat Transfer During Compression Process In A Liquid Piston For Isothermal Compressed Air Energy Storage

Authors: GOUDA El Mehdi, BENAOUICHA Mustapha, NEU Thibault, FAN Yilin1, LUO Linga

Simultaneous Heat and Moisture Transport in 3D Printed Walls

Authors: Andrea Fragnito, Marcello Iasiello, Gerardo Maria Mauro, Costantino Menna

Comparison of Air-Cooling on Metal Heat Sinks Using Numerical Modelling

Authors: : Wannarat Rakpakdee, Teerapat Thungthong, Weerachai Chaiworapuek, Kanet Katchasuwanmanee, Sangkla Kreuawan, Vu Tran Tuan

Pseudospectral Modelling For Flow past a Long Flexible Cylinder

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Authors: Eoin Guinan, Conor Macken, Vanessa Egan

Modeling a Large Thermal Energy Storage System Using RANS Turbulence Models and High-Resolution Measurement Data

Authors: Benno Krüger, Frank Dammel, Peter Stephan

Ansys Mechanical Automation using Python for the Steady State Thermal Analysis of Fins

Authors: Mohamed Shaimi, Rabha Khatyr, Jaafar Khalid Naciri

Experimental investigation and Numerical Analysis of Horizontally Placed Flat Pulsating Heat Pipe for Electronic Cooling

Authors: Roshan Devidas Bhagat, Samir Deshmukh

Temperature Gradient Impact on Heat Exchanger Leaks Using CFD Analysis

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Heat Transfer Study for Oil-in-Water Emulsion Jets Impinging onto hot Metal Surface

Authors : K. Nabbout, L. Pasternak, M. Sommerfeld, B. Bock-Marbach, J. Kuhnert², E. Barth and E. Uhlmann

Mechanical Helminth Eggs Separation for Wastewater Purification: Analysis of the Fluid Dynamics

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Authors : Sandeep Aryal, Mohammad Abutayehb, Young Min Kim, Kwangkook Jeong

Numerical Study of Cavitation Bubble Collapse under Various Conditions

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Authors : Jihyun Kim, Wonseok Yang, Yongchan Kim

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A Coupled PIV/PTV Technique for the Dispersed Oil-Water Two-Phase Flows Within a Centrifugal Pump Impeller

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Authors: Andoniaina M. Randriambololona, Mohammad Reza Shaeri, Soroush Sarabi

Prediction Accuracy of Artificial Neural Networks in Thermal Management Applications Subject to Neural Network Architectures

Authors: Mohammad Reza Shaeri, Andoniaina M. Randriambololona, Soroush Sarabi

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Authors: Anthony G. Straatman, Cole T. Fleet

A Heat Transfer Analysis of Axial and Radial Functionally Graded Ceramic Foams Solar Air Receivers

Authors: Assunta Andreozzi, Marcello Iasiello

Dehumidification Performance Evaluation of a Desiccant Rotor Coated With MIL-100 (Fe) Under Process Air Conditions

Authors: Jun Yeob Chung, Myeong Hyeon Park, Sewon Lee, Yongchan Kim

Simulation of the Spectral Conducto-Radiative Exchanges within Semi-Transparent Heterogeneous Media

Authors: Cyril Daoût, Denis Rochais, Olivier Rozenbaumk

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