



EHST
2022

**PROCEEDINGS OF THE 6TH
INTERNATIONAL CONFERENCE
ON ENERGY HARVESTING, STORAGE,
AND TRANSFER (EHST'22)**

June 08 - 10, 2022 | Niagara Falls, Canada

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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 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22).

EHST'22 is aimed to become one of the leading international annual conferences in the fields related to energy harvesting, storage, and transfer. This conference 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.

EHST is a series of international conferences held yearly. These conferences focus on all aspects of Energy Harvesting, Storage, and Transfer. The 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22) is going to be held in a hybrid format, i.e. in person as well as online.

In the sixth meeting of this conference, one plenary Speaker and five keynote speakers will share his expertise with the aim of exposing participants to a wide spectrum of applications, and to foster crosspollination of ideas and develop new research interests. In addition, approximately 16 papers will be presented from professors, students, and researchers across the world.

We thank you for your participation and contribution to the 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22). We wish you a very successful and enjoyable experience.

Dr. Boguslaw Kruczek

*Conference Chair and Proceedings Editor
EHST'22*

Dr. Xianshe Feng

*Conference Co-Chair and Proceedings Editor
EHST'22*

Dr. Wael H. Ahmed

*Technical Program Chair
EHST'22*

ABOUT EHST'22

The 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22) aims to become the leading annual conference in fields related to energy harvesting, storage, and transfer. The goal of EHST'22 is to gather scholars from all over the world to present advances in the fields related to energy harvesting, storage, and transfer and to foster an environment conducive to exchanging ideas and information. This conference will also provide an ideal environment to develop new collaborations and meet experts on the fundamentals, applications, and products of the mentioned fields.

These conferences focus on all aspects of Energy Harvesting, Storage, and Transfer. After successfully holding EHST'17 to EHST'21 in Canada, EHST'22 is hosted in **Niagara Falls - Canada** as well this year. EHST'22 is going to be held in a hybrid format, i.e. in person as well as online.

EHST is an acronym for **E**nergy, **H**arvesting, **S**torage, and **T**ransfer.

- All papers were peer-reviewed
- The conference proceedings are published under an ISSN and ISBN number
- Each paper is assigned a unique DOI number by [Crossref](#)
- The conference proceedings are indexed by [Google Scholar](#)
- The proceedings are permanently archived in [Portico](#) (one of the largest community-supported digital archives in the world)

 Google Scholar

 Crossref

 PORTICO

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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 EHST'22 Conference:

Scientific Committee Chairs



Dr. Boguslaw Kruczek
University of Ottawa, Canada
Conference Chair



Dr. Wael H. Ahmed
University of Guelph, Canada
Technical Program Chair



Dr. Xianshe Feng
University of Waterloo, Canada
Conference Co-Chair

Scientific Committee Members

- **Dr. Dorota Chwieduk**, Warsaw University of Technology, Poland
- **Dr. Eduard Doujak**, Vienna University of Technology, Austria
- **Dr. Akhtar Hussain**, University of Alberta, Canada
- **Dr. Prasad Kaparaju**, Griffith University, Australia
- **Dr. Sylvie Lorente**, INSA Toulouse, France
- **Dr. Eugen RUSU**, University of Lisbon, Portugal
- **Dr. Mohtada Sadrzadeh**, University of Alberta, Canada
- **Dr. Sascha Stegen**, Griffith University, Australia
- **Dr. Ali Tarokh**, Lakehead University, Canada
- **Dr. Igor Zhitomirsky**, McMaster University, Canada

KEYNOTE SPEAKERS

The keynote information for the 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22) is as follows:

Plenary Speaker



Dr. Andreas Mandelis
University of Toronto, Canada

Keynotes Speakers



Dr. Aicheng Chen
University of Guelph, Canada



Dr. Mohammed Farid
The University of
Auckland, New Zealand



Dr. Adrian Ilinca
Université du Québec à
Rimouski, Canada



Dr. Sébastien Poncet
University Of Sherbrook,
Canada



Dr. S.A. Sherif
University of Florida, USA

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EHST'22 PLENARY LECTURE



Titles: Carrier Diffusion Waves in Electronic Solids used in Clean Energy Technologies

[Dr. Andreas Mandelis, University of Toronto, Canada](#)

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Andreas Mandelis, FRSC, FCAE, FAPS, FSPiE, FAAAS, FASME, DF-IETI, PhD, is a Full Professor of Mechanical and Industrial Engineering; Electrical and Computer Engineering; and the Institute of Biomaterials and Biomedical Engineering, University of Toronto. He is the Canada Research Chair (Tier 1) in Diffusion-Wave and Photoacoustic Sciences and Technologies. He is the Director of the Institute for Advanced Non-Destructive and Non-Invasive Diagnostic Technologies (IANDIT) and of the Center for Advanced Diffusion-Wave and Photoacoustic Technologies (CADIPT) at the University of Toronto. He is also the President and CTO of Diffusion-Wave Diagnostic Technologies, Inc., Toronto, ON (www.diffusewavetech.com). He received his BS degree (Magna cum Laude) in physics from Yale University, and MA, MSE, and Ph.D. degrees from the Applied Physics and Materials Laboratory, Princeton University. He is the author and co-author of 440+ scientific papers in refereed journals and 190+ scientific and technical proceedings papers. Currently he is an Associate Editor of the AIP Journals Review of Scientific Instruments, Journal of Applied Physics and a member of the editorial board of the SPIE Journal of Biomedical Optics. He is also a Contributing Editor of the AIP flagship magazine Physics Today. He has several inventions, 40 patents and patents pending in the areas of photothermal tomographic imaging, signal processing and measurement, biosensors and hydrogen sensors, dental laser diagnostics (biothermophotonics), several semiconductor non-destructive diagnostic technologies and laser biophotoacoustic and biothermophotonic tissue imaging.

EHST'22 KEYNOTE LECTURE



Titles: Design of Nanostructured Catalysts and Nanocomposites for Hydrogen Production and Storage
[Dr. Aicheng Chen, University of Guelph, Canada](#)

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Aicheng Chen is Professor of Chemistry, Tier 1 Canada Research Chair in Electrochemistry and Nanoscience, and Director of the Electrochemical Technology Centre at the University of Guelph. He received his MSc from Xiamen University under the supervision of Prof. S.-G. Sun and his PhD from the University of Guelph in 1998 under the direction of Prof. J. Lipkowski. His research interests span the areas of Electrochemistry, Photoelectrochemistry, Green Chemistry, and Nanoscience. Prof. Chen has received numerous awards, including the Ontario Premier's Research Excellence Award, the Japan Society for the Promotion of Science (JSPS) Invitation Fellowship, the Lash Miller Award and the R.C. Jacobsen Award of the Electrochemical Society Canada Section, the Fred Beamish Award, the Keith Laidler Award and the W.A.E. McBryde Medal of the Canadian Society for Chemistry, the Canadian Catalysis Lectureship Award, and the RBC Innovation Award. He has also been named as Fellow of the Chemical Institute of Canada, Fellow of the Royal Society of Chemistry (UK), Fellow of the International Association of Advanced Materials, and Fellow of the International Society of Electrochemistry.



Titles: Forty Years of Innovations in Energy storage With Phase Change
[Dr. Mohammed Farid, The University of Auckland, New Zealand](#)

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Professor Mohammed Farid has completed his BE at University of Baghdad, ME and PhD at University of Swansea, Wales. He is Fellow of the Institution of Chemical Engineers and has published more than 400 papers in international journals and refereed conferences, 6 patents, 5 books, and 13 chapters in books. He has received several international awards and was invited as a keynote speaker to many international conferences. He is a world leader in energy storage for better environment and has provided significant contribution to the field worldwide.

EHST'22 KEYNOTE LECTURE



Titles: Optimization of Renewable Energy Penetration in Hybrid Systems through Pneumatic Hybridization of Diesel Generators

[Dr. Adrian Ilinca, Université du Québec à Rimouski, Canada](#)

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Adrian ILINCA is Professor at Université du Québec à Rimouski since 1994 after receiving his Ph.D. from École Polytechnique de Montréal. The main areas of interest are renewable energies, hybrid energy systems, energy storage, and, more recently, optimization in these areas using artificial intelligence. The main contributions are the adaptation of wind energy technologies to cold climates, optimization of hybrid systems allowing higher renewable energy penetration, different energy storage systems. The resulting technologies are applied for remote areas' electricity production and in rail and maritime transport industries to reduce GHG emissions.



Titles: Advanced CFD Modeling Of Slurry Flows: A Practical Review

[Dr. Sébastien Poncet, University Of Sherbrook, Canada](#)

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Sébastien Poncet received his engineering diploma and his master degree in physical oceanography from Seatech (Toulon, France) in 2002 and the Ph.D. degree in complex systems from Aix-Marseille University (Marseille, France) in 2005, for a thesis on turbulent rotor-stator interdisk flows (two national awards). He was then assistant lecturer for one year before getting a position of assistant professor at Aix-Marseille University in 2006. He joined the University of Sherbrooke as an Associate Professor of Mechanical Engineering in 2014, where he currently is the chairholder of the NSERC/Hydro-Québec/Natural Resources Canada/Emerson Industrial Research Chair in Industrial Energy Efficiency. He is now full professor in the mechanical engineering department and the director of LMFTEUS lab (<https://lmfteus.wordpress.com>). His research interests include the experimental characterization of the thermophysical properties of complex heat transfer fluids (nanofluids, slurries, PCMs) and the advanced numerical modelings of thermal systems (supersonic ejector, vortex tube, magnetocaloric refrigeration, heat exchanger, turbomachineries...). He is the coauthor of about 250 research papers whose about 100 in international journals.

EHST'22 KEYNOTE LECTURE



Titles: Mass-Based Optimization of Thermal Management and Power Systems for Space-Based Applications
[Dr. S.A. Sherif, University of Florida, USA](#)

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Dr. S.A. Sherif is a tenured Professor of Mechanical and Aerospace Engineering and is the Founding Director of the Wayne K. and Lyla L. Masur HVAC Laboratory, the Director of the Industrial Assessment Center and the Director of the Mobile Energy Laboratory at the University of Florida. He served as Co-Director of the Southeastern Center for Industrial Energy Intensity Reduction at the University of Florida (2009-2013). He also served on the faculties of the University of Florida (1991-present), University of Miami (1987-1991), and Northern Illinois University (1984-1987). He is a Life Fellow of ASME, a Life Fellow of ASHRAE, a Fellow of the Royal Aeronautical Society, and an Associate Fellow of AIAA. He served as Technical Editor of the ASME Journal of Thermal Science and Engineering Applications (2014-2019), Technical Editor of the ASME Journal of Solar Energy Engineering (2020-2025), and as Subject Editor of the International Journal of Hydrogen Energy (2005-2011). He has also served as Subject Editor, Associate Editor, or Editorial Board Member of 22 other journals. He has one book, more than 500 publications, and two US patents.

LIST OF PAPERS

The following papers were presented at the 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22).

Biomass, Biofuel, and Bioenergy

[Utilization of Agro-Residue Wastes Through Clean Combustion for Sustainable Energy Solutions in Jaggery Production](#)

Authors: Himanshu, Alok Kumar, Aditya Gupta, S. K. Tyagi

[Study of Eco-Efficiency Based On Quantitative Ecological Trade-Offs](#)

Authors: Usman Akbar, Rocky J. Dwyer

Sustainable Energy

[Photo-Excited Charge Transfer Between A-Si:H/C-Si](#)

Authors: Haili Li, Mitsuhiro Matsumoto

[Effect of Oil Consumption over an Innovative Exhaust After-Treatment System Suitable For Cogeneration Plants](#)

Authors: Francesca Maria Grimaldi, Pietro Capaldi

[Effect of Dust on the Efficiency of Solar PV Panel in Khartoum](#)

Authors: Ahd Farah, Esra Khalfalla, Omer E Mohamed

[Heat Transfer Analysis of Heat Pump Ground-Sourcing Using Large Boreholes and Concentric Flow](#)

Authors: Kent Udell, Kevin Maher

[Maximizing Performance of Ground-Coupled Heat Exchanger under Hot-Wet Climate Condition: Experimental and Numerical Analysis](#)

Authors: Ghalib Kahwaji, Muhannad Ali, Giada Boudekji, Davide Capuano, Abdelrahman NaserIdin, Abdullah Khan, Mohamed Samaha

LIST OF PAPERS

The following papers were presented at the 6th International Conference of Energy Harvesting, Storage, and Transfer (EHST'22).

Sustainable Energy

Solidification Process inside a Novel Toroidal Tube Heat Exchanger

Authors: Mohammad Reza Mohaghegh, Mehran Bozorgi, Kasra Ghasemi, Syeda Tasnim, Shohel Mahmud

Setting Up a Thermal Energy Storage System for Peak Load Management through Airconditioning Load Shift

Authors: Suresh Chandra Srivastava, Sameer Khandekar, Shiv Kumar Singh, Vinay Kumar Tiwari, Ankush Sharma

The Effectiveness Of ICEV Phase Out At 2035 In Terms Of CO2 Emission Reduction In The Italian Scenario

Authors: Francesca Maria Grimaldi, Pietro Capaldi

Theoretical and Computational Models of the Performance of a Cylindrical Thermo-Chemical Battery During Charging and Operational Modes

Authors: Ali Hedayat, Kent S. Udell

The Design of a Savonius Wind Turbine with Guide Vanes - A Computational Approach

Authors: Wimukthi Senarathna, Madhawa Fernando, Tharindu Silva, Chamil Abeykoon

Optimization of High-Capacity Ground-Coupled Heat Exchanger under Hot-Wet Climate Condition: Numerical Approach

Authors: Ghalib Y. Kahwaji, Davide Capuano, Giada Boudekji, Mohamed A. Samaha

LIST OF PAPERS

Sustainable Energy

Investigating Phase Change Material Foam Configuration in a Heat Exchanger

Authors: Kasra Ghasemi, Mohammad Reza Mohaghegh , Mehran Bozorgi , Syeda Tasnim, Shohel Mahmud

Performance Improvement of Nanofluid Based Direct Absorption Solar Collector (DASC) by Pulsating Flowrate

Authors: Mehran Bozorgi, Kasra Ghasemi , Mohammadreza Mohaghegh , Syeda Humaira Tasnim , Shohel Mahmud

An Indoor Experimental Study on the Effect of Dust on a Solar PV Panel

Authors: Esra Khalfalla, Ahd Farah, Omer E Mohamed

SPONSORS

International ASET Inc. would like to thank the following sponsors for their support of EHST'22:



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JOURNAL PUBLICATION

Selected articles from the conference will be published in the [Journal of Fluid Flow, Heat and Mass Transfer \(JFFHMT\)](#) after a secondary review process.

This journal has adopted to the open-access model, meaning all free access to the journal's articles and content with no need for subscription. This ensures larger audience and therefore higher citations.

Users are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles in this journal without asking prior permission from the publisher or the author. This is in accordance with the **BOAI** definition of open access.

All published papers of **JFFHMT** will be submitted to Google Scholar. Additionally, they will be permanently archived in Portico (one of the largest community-supported digital archives in the world) and will be assigned unique DOIs.

This journal has been approved by the Committee on Publication Ethics (COPE). Please visit the following websites for the respected journals: **JFFHMT**: <https://jffhmt.avestia.com>

EHST'23

The 7th International Conference on Energy Harvesting, Storage, and Transfer (EHST'23) will be held on June 7, 2023 - June 09, 2023 in Canada.



For inquiries and to obtain further information on the congress, please visit the [website](http://www.2023.ehstconference.com)

You can also email info@ehstconference.com or

call us at: +1-613-834-9999

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ETHICS & MALPRACTICE

At International ASET Inc., we take matters that relate to ethics in publishing very seriously. We believe that the peer-review publication process is a vital building block of academia, and its integrity must be maintained at all costs, which is why every article will be peer-reviewed by several experts in the field. Under peer-review, experts in the related fields are required to provide opinions and comments on the improvements of the submissions.

We are pleased to announce that Avestia Publishing (a publisher of International ASET Inc.) has been approved by the [Committee on Publication Ethics \(COPE\)](#). We are proud of our efforts towards abiding by the guidelines of ethics, integrity, and high standards in publishing.

Following are the ethics guidelines set by the organizers for the authors and the reviewers of the conference:

Scientific Committees

Scientific committees consisting of experts in the fields are established. The committees oversee the peer-review and publication process. To see the scientific committee members, please follow the link: [Scientific Committee](#)

Equality and Decisions

One or more reviewer, scientific committee member, or chair, (internal or external), are responsible for evaluating the relevance of the submitted manuscripts to the proceedings, technical and scientific merit, originally, and impact. These evaluations are to be carried out regardless of ethnicity, religion, gender, sexual orientation, political beliefs, and institutions. Successive to peer-review, the Chair has full authority and is solely responsible for the published content and the process thereof.

Confidentiality

Scientific committee member(s) and publishing staff may not disclose manuscripts or their content, directly or indirectly, to anyone other than individuals invited to review the manuscript (whether they accept or not), other reviewers of the same publications, and publishing staff.

Conflicts of Interest

Scientific committee member(s) and publishing staff may not utilize the contents of submitted manuscripts whether accepted or rejected, directly or indirectly for their own research purposes without prior written consent by the authors.

ETHICS & MALPRACTICE

Reviewers

Contribution to Decisions

In order for final decisions to be made regarding acceptance or rejection of papers, we rely on peer-review. Peer-review is the process of experts in the field reading, understanding, and objectively commenting on submitted papers. Through peer-review, scholars give back to the academic and scientific community by helping the chair(s) make decisions regarding manuscripts.

Promptness

Reviewers should promptly notify the chair(s) if they are unable or unqualified to carry out their reviewing duties. Reviewers should do their best to provide the reviews to the chair(s) as promptly as possible, and within the designated time-frame.

Acknowledgment of Source

The reviewer should notify the chair(s) if they find any similarities in the paper being reviewed and any other work that has been published previously.

Confidentiality

Reviewers must not share the contents of the manuscripts they receive for review, regardless of their decision to review or contents of the review, directly or indirectly, with anyone other than the person who has assigned the review.

Fairness

Reviewers should review manuscripts fairly and objectively, with supporting evidence or arguments, regardless of personal feelings or biases.

Conflicts of Interest:

Invited reviewers should immediately inform the chair(s) in case of a conflict of interest based on competitive, collaborative, personal, family, and other relationships with the authors or people involved in the work.

ETHICS & MALPRACTICE

Authors

Reporting Standards

The paper being submitted for the proceedings should be based on clear objective, discussion, and references. The findings, data, and the arguments being used in the paper should be accurate. It is author's responsibility to guarantee the authenticity of the data in the paper.

Authorship

Only persons who have significantly contributed to the work and the manuscript can be named authors on a paper. These contributions include the idea/concept, design, experiments, evaluation, analysis, drafting or revision of the manuscript, and others. Authors must all have agreed to be named as such and for the manuscript to be submitted. Anyone who has contributed based on the above, but the level of contribution is not significant, may appear in the acknowledgement section of the manuscript.

Acknowledgement of Source

Acknowledgement to other's work being used in the paper must be given at all times. Authors of the paper should give comprehensive credit where it is necessary, by citing the work, they use for supporting their own research.

Accuracy, Originality, and Plagiarism

Authors should describe their work and the results of their work accurately and in full. The level of provided accuracy and detail should be such that a reader can replicate the work independently. Inaccurate, incomplete, fraudulent, and misleading statements are considered unacceptable and unethical. Direct or indirect use of other people's work is not allowed, unless properly cited. Previous works that have influenced the current work should also be cited. Presenting someone else's work as one's own is strictly prohibited and is considered plagiarism.

Data and Material

Authors are encouraged to share their data, software, or other sharable material online, provided copyright and ownership laws surrounding that particular project permit. Authors may also be asked to share such material with the chair(s), and/or reviewers, and must be willing to do so if asked.

ETHICS & MALPRACTICE

Dual Submissions

Submitting a manuscript to more than one venue (conference, journal, etc) simultaneously is not allowed. Presenting previously published work to be considered as a new submission, without a significant new interpretation or analysis, is prohibited.

Conflicts of Interest

Authors must notify the chair(s) at the time of submission, if any factor outside the scope of the research has influenced any step of the work and manuscript writing. Examples of such factors include but are not limited to funding, grants, advisory and consultancy, stock ownership, current or past employment, and memberships, among others. All funding sources should be disclosed in the manuscript.

Animal and Human Subjects

Works involving human and/or animal subjects must ensure that the work has abided by institutional guidelines, and pre-approved by required bodies. Moreover, consent must be acquired from participants, and privacy of subjects must be ensured. All of the above must be specified with clear statements in the manuscript.

Hazardous Material

It should clearly be identified in the manuscripts if the works have involved hazardous chemicals and material, or devices that can be harmful.

Reporting of Mistakes, Errata, and Retractions

If an author identifies a major error in a published paper, he/she must immediately inform the publisher. Regardless of whether a significant error is reported by the authors of the work or other readers, authors are obligated to take the necessary steps to correct the issue. It is decided on a case-by-case basis whether an erratum will be submitted to notify future readers of the error and correction, or whether the paper will be retracted. Unethical/plagiarism issues mostly result in a retraction, while unintended mistakes will mostly result in the publication of an erratum.

ETHICS & MALPRACTICE

Publisher

Errata and Retractions

The publisher takes the necessary steps to prevent mistakes, academic and scientific misconduct, and unethical behavior, both intended and unintended. When mistakes are reported, the publisher works with chair(s) and authors to publish an erratum clarifying the issue. In cases where the mistakes are severe and significant, the paper might be retracted. If unethical behavior, plagiarism, academic and scientific misconduct, or other such activities are proven to have taken place by an author or authors, the publisher will retract the paper.

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Schedule:

This conference proceeding accompanies the conference, meaning a new proceedings will be published every year for the corresponding annual conference of this series.

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at: +1-613-834-9999

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