



**EHST**  
2019

**PROCEEDINGS OF THE 3RD  
INTERNATIONAL CONFERENCE  
ON ENERGY HARVESTING, STORAGE,  
AND TRANSFER (EHST'19)**

**June 18 - 19, 2019 | Ottawa, 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 3<sup>rd</sup> International Conference of Energy Harvesting, Storage, and Transfer (EHST'19).**

EHST'19 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.

In the first meeting of this conference, three 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 20 papers will be presented from professors, students, and researchers across the world.

We thank you for your participation and contribution to the 3<sup>rd</sup> International Conference of Energy Harvesting, Storage, and Transfer (EHST'19). We wish you a very successful and enjoyable experience.

**Dr. Boguslaw Kruczek**

*Conference Chair and Proceedings Editor  
EHST'19*

**Dr. Xianshe Feng**

*Conference Co-Chair and Proceedings Editor  
EHST'19*

# ABOUT EHST'19

**The 3<sup>rd</sup> International Conference of Energy Harvesting, Storage, and Transfer (EHST'19) aims to become the leading annual conference in fields related to energy harvesting, storage, and transfer.** The goal of EHST'19 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.

EHST is a series of international conferences held yearly. These conferences focus on all aspects of Energy Harvesting, Storage, and Transfer. After successfully holding EHST'18 in Canada, EHST'19 is hosted in Canada as well this year.

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

- The proceedings is published in Niagara Falls, 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 [Google Scholar](#)
- The proceedings is 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'19 Conference:

## Scientific Committee Chairs



[Dr. Boguslaw Kruczek](#)  
**University of Ottawa, Canada**  
Conference Chair



[Dr. Xianshe Feng](#)  
**University of Waterloo,  
Canada**  
Conference Co-Chair

## Scientific Committee Members

**Dr. Prabir Basu**, Dalhousie University, Canada

**Dr. Ming-Jyh Chern**, National Taiwan University of Science and Technology, Taiwan

**Dr. Eduard Doujak**, Vienna University of Technology, Austria

**Dr. Cees van der Geld**, Eindhoven University of Technology, Netherlands

**Dr. Kamel Hooman**, The University of Queensland, Australia

**Dr. Tai-Chou Lee**, National Central University, Taiwan

**Dr. Sylvie Lorente**, INSA Toulouse, France

**Dr. Wasim Saman**, University of South Australia, Australia

**Dr. Liang Yu**, Beijing Institute of Technology, China

**Dr. Igor Zhitomirsky**, McMaster University, Canada

# KEYNOTE SPEAKERS

The keynote information for the 3rd International Conference of Energy Harvesting, Storage, and Transfer (EHST'19) is as follows:



[Dr. Jean-Luc Meunier](#)  
McGill University, Canada



[Dr. Jean Duquette](#)  
Carleton University, Canada



[Dr. Saeid Habibi](#)  
University of Waterloo, Canada

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# EHST'19 KEYNOTE LECTURE



**Titles:** Bottom-up Thermal Plasma Approach for Graphene: Tuning catalyst materials for PEM-FC

**Dr. Jean-Luc Meunier, McGill University, Canada**

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Prof. Meunier has been active in the field of advanced materials and plasma technology at McGill University since 1986, following his work as a Research Engineer at the Hydro-Québec Research Institute (IREQ) from 1982. His research and development work has a strong emphasis on the design of plasma reactors in particular for carbon-based nanoparticles and their applications in the energy sector (fuel cells, supercapacitors, electrical energy storage, catalysis), and on advance nanocomposite materials or nanofluids for structural, electronic or medical applications. He is also involved in a series of coating technologies and applications for protective or functional surfaces. Among the technologies developed are the generation and functionalization of graphene nanoflakes or carbon nanotubes and associated nanofluids, non-noble metal catalysts, TP-CVD of diamond films, arc-PVD of diamondlike films, and 3D-structured film architectures for various applications. Prof. Meunier is also well known for extensive work on the physics of electric arc-surface interactions and the erosion phenomena on cathodes, particularly in the case of carbon electrodes.



**Titles:** Opportunities for Municipal Low-grade Waste Heat Recovery and Potential Applications in Canada's Remote Communities

**Dr. Jean Duquette, Carleton University, Canada**

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Dr. Jean Duquette is an assistant professor in the department of mechanical and aerospace engineering at Carleton University. He has been involved in various aspects of sustainable energy research for approximately fifteen years in Canada and Europe. Prior to working at Carleton, Dr. Duquette was an active researcher in the areas of solid oxide fuel cells (McMaster University, Canada), wave energy (Hydraulics and Maritime Research Centre, University College Cork, Ireland), and district energy networks (Institute for Integrated Energy Systems, University of Victoria, Canada). His current work focuses on numerical modelling and simulation of alternative energy systems, thermal networks and conversion processes, and low energy buildings.

# EHST'19 KEYNOTE LECTURE



**Titles:** Battery Characterization and SOC/SOH Estimation  
**Dr. Jean-Luc Meunier, McGill University, Canada**

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Saeid Habibi is a Senior NSERC Industrial Research Chair and a Professor in the Department of Mechanical Engineering at McMaster University. He obtained his Ph.D. in Control Engineering from the University of Cambridge, U.K. His academic background includes research into intelligent control, state and parameter estimation, fault diagnosis and prediction, Variable Structure Systems, actuation systems, mechatronics and fluid power. The application areas for his research have included automotive, aerospace, and robotics. He has developed his own theory related to estimation referred to as the Smooth Variable Structure Filter (SVSF). He has a number of patents and has co-authored close to 200 refereed papers.

Dr. Habibi has held a number of managerial and industrial positions. He is presently the Director of the Centre for Mechatronic and Hybrid Technology (CMHT) at McMaster University. He was the Chair of the Department of Mechanical Engineering from 2008 to 2013. He also spent a number of years in industry as a Project Manager and Senior Consultant for Cambridge Control Ltd, U.K., where he was involved in automotive and aerospace related projects. He then moved to AlliedSignal Aerospace Canada (presently part of Honeywell) where managed their Systems Engineering Department. Dr. Habibi has been the recipient of a number of awards including the 2012 Best Paper Prize from IEEE Transportation Electrification Conference, 2 corporate awards for his contributions to the AlliedSignal Systems Engineering, and the Institution of Electrical Engineers (IEE) F.C. Williams best paper award for his contribution to the Variable Structure Systems theory. He is a Professional Engineer and a Fellow of ASME and CSME.

# LIST OF PAPERS

The following papers were presented at the 3rd International Conference on Energy Harvesting, Storage, and Transfer (EHST'19)

## Energy Conversion and Storage

### [Detailed Kinetic Modelling for Tar Species Evolution in a Downdraft Gasifier](#)

Authors: Ahmed Salem, Manosh paul

### [Modeling and Simulation Approach to Inform TEG Waste Heat Harvesting Prototype for Fossil Fuel Exhaust](#)

Authors: Lauren Howard, Dragoslav Grbovic, Anthony Pollman

### [Sensitivity analysis of building physical parameters to maximize heating energy saving using MPC](#)

Authors: Behrang Vand, Yuri Kaszubowski Lopes, Elizabeth Abigail Hathway, Peter Rockett

### [Crystal Hybridized Pyro-Piezoelectric Ferrofluidic Harvester](#)

Authors: Abdullahi Isse

### [Development of an Indigenously Made Diesel Fired Crucible Furnace](#)

Authors: Tolulope Olukokun, Adefemi Adekunle, Ismaila Alabi, Mudasiru Aderonmu, Mutiu Kareem

# LIST OF PAPERS

The following papers were presented at the 3rd International Conference on Energy Harvesting, Storage, and Transfer (EHST'19)

## Sustainable Energy

### [Numerical Study On OWC Devices Integrated Into A Floating Breakwater](#)

Authors: Madjid Ghodsi Hassanabad, Mojtaba Shegeft

### [Performance of salt impregnated matrix materials for the long term thermochemical storage of low grade solar thermal energy](#)

Authors: Robert J. Sutton, Eifion Jewell, Jonathon Elvins, Justin R. Searle

### [Self-powered Wireless Occupancy Detector based on Flexible Piezoelectric Film](#)

Authors: Sherif Keddis, Rafik Mitry, Norbert Schwesinger

### [Comparison and Applicability Analysis of Dynamics Models for Piezoelectric Energy Harvester](#)

Author: Bing Chen, Yu-tong Shi, Li-jie Zhang

### [Assessment of Thermochemical Processes of MSW Feedstocks in a Downdraft Gasifier](#)

Author: Ahmed M. Salem, Prashant R. Kamble, Tan Piemsinlapakunchon, Loizos Christodoulou, Nader Karimi, Ian Watson, Manosh C. Paul

### [Spectral Splitting Luminescent Solar Concentrator Panels for Agrivoltaic Applications](#)

Author: Quinn Daigle, Nima Talebzadeh, Paul G. O'Brien, Ijaz A. Rauf

# LIST OF PAPERS

The following papers were presented at the 3rd International Conference on Energy Harvesting, Storage, and Transfer (EHST'19)

## CFD

### [Influence of Mesh Resolution of Boundary Layer on Numerical Simulation of Full-scale Tidal Turbine](#)

Authors: Shujie Wang, Xiancai Si, Peng Yuan, Junzhe Tan, Xiaodong Liu

## Heat Transfer

### [The Dairy Farm Model With Low Cost Alternative Energy](#)

Authors: N. Kaewprathum, K. Taweeyanyongkul, S. Pangchuntherk, S. hoengthong, K. Boonyanuwat, G. Podjanaaree, A. Saraboon

# SPONSORS

International ASET Inc. would like to thank the following sponsors for their support of EHST'19:



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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.**

**The publication fee will be waived for papers that win the best paper award. Other attendees will receive a 25% discount towards the publication fee of the journal.**

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, Microsoft Academic Search, Open J-Gate, Mendeley, Index Copernicus International, Academic Index, Mendeley, Primo Central, and Genomics JournalSeek for possible indexing. 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.

# 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.

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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.

# ETHICS & MALPRACTICE

## ***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.

## ***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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