

International Association for Fire Safety Science

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Fire Safety Science News

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Rita Fahy, Editor

Associate Editors: Michael Gollner (USA), Nils Johansson (Sweden), Naian Liu (China), Ai Sekizawa (Japan), and Michael Spearpoint (UK).



IAFSS2020.CA
REGISTRATION IS OPEN



IAFSS was founded in 1988 with the primary objective of encouraging research into the science of preventing and mitigating the adverse effects of fires and of providing a forum for presenting the results of such research

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Our Aims

Fire Safety Science News aims to be a platform for spreading the work of IAFSS members, and to be the place where fire safety scientists can read what is not readily found elsewhere, thus favoring news and trending research. A digital archive of previous issues can be found [online](#).

IF YOU HAVE NEWS TO POST TO THE WEBSITE

The newsletter only comes out twice a year, but the IAFSS website is always available for current association news and information. If you have information that you'd like posted on the website, contact the team of webmasters at webmaster@iafss.org and they'll help you out.

MEMBERSHIP REGISTRATION

Both current and new members can easily register online at www.iafss.org. *Current members: please sign-in before registering to maintain your account!*

One-Year Membership – 2019 (£25) Lifetime Membership (£300) Student Membership – 2019 (£5*)

BENEFITS OF MEMBERSHIP

- Symposia attendance at special member rates
- Free Digital Access to Elsevier's *Fire Safety Journal*
- Fire Safety Science News (Official Newsletter of the IAFSS)
- A vote in Association affairs
- Discounted Symposium Proceedings

Fire Safety Journal: IAFSS members receive special print subscription rates. Please contact office@iafss.org for updated pricing.

* Registered IAFSS academic members can nominate their students for free IAFSS student membership. Check website for details.

Please contact office@iafss.org with any questions about membership or how to register.

LETTER FROM THE CHAIR



As I write my last introduction for this newsletter as Chair, preparations for our 13th symposium, to be held in Waterloo, Canada, are at full speed. The programme is now available and registration is already open. As usual, there will be a variety of topics on the programme, from wildfires to advanced combustion modelling and human behaviour.

With wildfires in Australia creating a buzz and a growing awareness of fire around the world, there has never been a better time to be a part of the fire safety conversation. Come and hear about the latest advances in fire safety research and discuss our future grand challenges with your colleagues. Come **join us at the 13th International Symposium on Fire Safety**

Science! You will not regret it. Just visit the symposium website: IAFSS2020.ca and register.

But apart from the symposium itself, we have also a variety of other activities such as pre-meetings with our two working groups, namely MACFP (Measurement and Computation of Fire Phenomena) and LOF&BE (Large Outdoor Fires and the Built Environment). They will complement our workshops on the Saturday and Sunday before the symposium. The workshops cover both traditional topics and hot topics such as façades and Li-ion batteries which are an ongoing challenge for our community and need international discussion. An important workshop on education will help us to look into how the expanding knowledge base and improved tools can be incorporated into fire engineering education in the future!

In addition to the working groups and workshops, two very important initiatives will take place: a networking event for Early Career Researchers and a Diversity and Inclusivity Gathering -- two initiatives I strongly recommend! Beth Weckman and her team have also organised many other evening and specialty events; check the programme. **A big thanks to all involved in the symposium organisation.**

In order to have a good overview on our member status for our business meeting, we will close our full membership on **March 15th**. So, do not hesitate to renew your membership or to introduce your peers to our Association. The more members we have, the more activities we can organise in the future, with broad member participation. If you have colleagues who want to join IAFSS, they can still do so after this date, but that will be under membership for 2020.

Our **student membership campaign** is still ongoing. In this campaign, we will register students from universities for free membership, when their names are provided by an academic supervisor. (In batches, please; not one-by-one.) We already have a number of student contact points but if you want to become one for your university, please contact our secretariat or me. I feel it is extremely important to connect our Association with the younger people since they are the future for us!

Last but not least, I would like to remind you again that we are facing the challenge of bringing our organisation into a new structure e.g. with a new secretariat. More information will follow on this but this is a bigger challenge than one would expect. The last hurdle will be a modification to our bylaws. They need to be able to change more easily and more frequently, instead of every three years. I hope we can get **your support for changing to a modern IAFSS.**

I will close with a wish to see you all in Waterloo for our next symposium, which we hope will be as successful as the Lund symposium, despite the uncertainties we always live with today.

I also would like to **thank you for the trust** you had in me during the last six years as Chair. It was a pleasure for me to serve the Association! I wish my successor good luck.

Signed: Patrick Van Hees, Chair IAFSS, Lund University, Sweden

13TH INTERNATIONAL SYMPOSIUM ON FIRE SAFETY SCIENCE

Registration is now open for the [13th International Symposium on Fire Safety Science](#) to be held April 27 – May 1, 2020, Waterloo, Ontario, Canada, the premier fire safety science meeting in the world. It has been organized triennially since 1985 by the International Association of Fire Safety Science (IAFSS). Students are encouraged to participate in all facets of Symposium activities.



[Parallel sessions](#) highlight research in areas of material behaviour in fires, fire dynamics, fire chemistry, structures in fire, fire suppression, wildland and WUI fires, evacuation and human behaviour, fire risk analysis and fire safety design. Other topics include fire detection and smoke control, instrumentation, fire codes and standards and fire safety management. The Symposium also features poster sessions, which provide an excellent opportunity to interact individually with researchers and discuss their most recent work, both in-progress and completed. Awards are given for 'best' presentations and posters in various categories.

In addition to the technical sessions, numerous social activities are planned to promote informal meetings and networking with colleagues and friends. More information about the different [events](#) planned is available on the conference website.

KEY HIGHLIGHTS OF THE SYMPOSIUM

April 25 and 26, 2020

A wide range of specialty workshops take place prior to the 13th International Fire Safety Symposium. In addition to the *Second Workshop on Measurement and Computation of Fire Phenomena* (MaCFP) and *Large Outdoor Fires & the Built Environment* (LOF&BE) working group meetings, a series of eight topical workshops have been organized to promote dialogue on important issues in fire science. These range from *Façades to Smart Firefighting* and *Li Batteries to Fire Retardants and Toxicity of Fires*. [More Information is available here.](#)

April 27 - May 1, 2020

The 13th International Symposium on Fire Safety Science takes place at the [University of Waterloo, Ontario, Canada](#). Over the five days of the event, the [program](#) features invited lectures from the world's top fire science researchers, three parallel sessions with presentations of fully peer-reviewed papers and two poster sessions. All Symposium papers were independently peer reviewed. Poster presentations were reviewed on the basis of submitted abstracts.

May 01, 2020

Immediately following conclusion of IAFSS 2020, a post-symposium, event discussing, [An International Dialogue to Inform an Update to the Canadian Total Cost of Fire](#) will take place. Light refreshments will be provided.

Invited Plenary Speakers

- Mark Finney (Research Forester with the US Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory) **"The Wildland Fire System and Challenges for Engineering"**
- Anne Steen-Hansen (Norwegian University of Science and Technology (NTNU)) **"Learning from fire investigations and Research – from Reactive to Proactive Fire Safety Management"**
- Erica Kuligowski (Wildland-Urban Interface (WUI) Fire Group of the Fire Research Division of the Engineering Laboratory at the National Institute of Standards and Technology (NIST)) **"Evacuation Decision-making and Behavior in Wildfires: Past Research, Current Challenges, and a Future Research Agenda"**

13th IAFSS Symposium Timeline

Registration

Early Bird Deadline: February 29
Regular Deadline: March 25
On-site fees apply beginning April 26

Workshops

Saturday and Sunday, April 25-26

Symposium Sessions

Monday through Friday, April 27-May 1

Post-Conference Dialogue on Total Cost of Fire

Friday afternoon, May 1

Social Events (evenings)

Sunday – Welcome reception
Monday – Early career researchers networking
Monday – Oktoberfest Evening (optional)
Tuesday – Diversity/inclusivity gathering
Tuesday – Marché-style dinner (optional)
Wednesday – Fire services experience (optional)
Thursday – IAFSS awards ceremony and symposium banquet

- Tara McGee (University of Alberta in Edmonton, Canada) **“Evacuating First Nations during Wildfires in Canada”**
- Jinhua Sun (Vice Director of State Key Laboratory of Fire Science and the Director of Energy Fire Safety Institute) **“Progress on Research of Fire Behavior and Fire Protection of the Lithium Ion Battery”**

Awards to be presented at IAFSS Symposium Ceremony

Several awards will be presented on the last evening of the symposium. Details on the awards and the winners were included in the last edition of the IAFSS newsletter.

Kunio Kawagoe Gold Medal -- *Prof. Ai Sekizawa*

Emmons Invited Plenary Lecture – *Prof. Bogdan Dlugogorski*

International Forum of Fire Research Directors Awards

- 2019 Sjölin Award - *Prof. Brian Y. Lattimer*
- 2020 Sjölin Award - *Prof. Haukur Ingason*
- 2019 Mid-Career Researcher Award - *Prof. Guillermo Rein*
- 2020 Mid-Career Researcher Award - *Prof. Thomas Rogaume*

Proulx Early Career Award – *Dr. Xinyan Huang*

Magnusson Early Career Award -- *Dr. Enrico Ronchi*

2020 Best Thesis Awards

- Americas: *Joshua D. Swann*
- Europe and Africa: *Eric V. Mueller*
- Asia and Oceania: *Yongzheng Yao*
- Honorable mentions:
 - *James L. Urban*
 - *Francesco Restuccia*

About the Venue

The Symposium host venue is The University of Waterloo – a world-class university, located in Waterloo, Ontario, Canada. The University of Waterloo, established in 1957, is situated in the heart of Waterloo Region in the center of Canada’s technology hub. For the past 27 years, Waterloo has been noted as Canada's most innovative university.

The Faculty of Engineering is the largest engineering school in Canada with more than 9,900 students and offers 15 bachelor degree programs and 37 graduate degree programs.

Waterloo Engineering offers a full graduate program, as well as professional Certificates in Fire Safety. The Department of Mechanical and Mechatronics Engineering is home to the \$5.6M Live Fire Research Facility of the UW Fire Research Group.

Waterloo Region is easily accessible from major Canadian cities by train, bus, or airplane. Locally, there is the Region of Waterloo Airport (20 minutes away). Toronto Pearson International Airport (approx. 1.5 hours away) has frequent shuttle service to and from the Waterloo campus and hotels throughout the region. Discount rates will be available on Airways Transit (a third party) for conference attendees.



Registration and Accommodation

Symposium registration for participants and their companions is available on the Symposium website at <http://www.iafss2020.ca>.

Links to accommodations are also available on the website. Blocks of rooms have been arranged at three area hotels, with buses between those hotels and the conference. Reservations should be made by March 2020 for the group rates. Information about visas for non-Canadian conference attendees can be found on the Registration and Visas page on the symposium website.

If you would like more information on the arrangements for the upcoming Symposium, please visit the IAFSS website at <http://www.iafss.org> or contact the Local Host Committee at <http://www.iafss2020.ca>.

Proceedings to be Published in Fire Safety Journal

The Proceedings will be published as a Special Issue of *Fire Safety Journal*, the official IAFSS journal, conditional upon the successful completion of an additional review step and presentation at the symposium (<http://www.journals.elsevier.com/fire-safety-journal>).



13th Symposium Committees

IAFSS Chair

Prof P van Hees, Lund University, Sweden

Local Host Co-Chairs

Prof E Weckman, Chair, U of Waterloo, Canada

Prof C Devaud, U of Waterloo, Canada

Symposium Co-Chairs

Prof M McNamee, Lund University, Sweden

Prof A Trouvé, U of Maryland, USA

Program Scientific Committee Co-Chairs

Prof N Liu, U of Science and Technology of China

Dr S McAllister, USDA Forest Service, USA

Program Communication Committee Co-Chairs

Dr K Boyce, Ulster University, UK

Dr Y Wang, FM Global, USA

Symposium Poster and Image Co-Chairs

Dr T Hakkarainen, VTT Technical Research Center, Finland

Dr J Floyd, Jensen Hughes, USA

English Language Mentoring Chair

Dr C Wade, Building Research Assoc, New Zealand

Awards Committee

Prof C Fleischmann, U of Canterbury, New Zealand

Prof M Gollner, U of California, Berkeley, USA

Prof J Wen, U of Warwick, UK

Symposium Proceedings Co-Chairs

Prof L Bisby, U of Edinburgh, UK

Prof B Merci, Ghent University, Belgium

Symposium Workshop Co-Chairs

Dr A Hamins, National Institute of Standards and Technology, USA

Prof G Rein, Imperial College, UK

Diversity Group Co-Chairs

Dr A Steen-Hansen, RISE Fire Research, Norway

Dr S Suzuki, National Research Institute of Fire and Disaster, Japan

Dr I Vermesi, Bureau Veritas, UK

Prof E Weckman, U of Waterloo, Canada

IAFSS Working Groups

MaCFP, Prof A. Trouvé, U of Maryland, USA

LOF&BE, Dr S. Manzello, NIST, USA

UPDATES FROM IAFSS WORKING GROUPS

Measurement and Computation of Fire Phenomena (MaCFP) Working Group

Call for Participation in the 2nd Workshop Organized by the MaCFP Working Group-April 25-26, 2020

In early 2015, a new initiative called “the IAFSS Working Group on Measurement and Computation of Fire Phenomena” (*aka* the MaCFP Working Group) was launched (<http://www.iafss.org/macfp/>). This initiative is endorsed and supported by the International Association for Fire Safety Science (IAFSS). The first workshop organized by the MaCFP Working Group was held in June 2017 as a pre-event to the 12th IAFSS Symposium in Lund, Sweden. Details are found on <https://iafss.org/3770-2/> and in Brown *et al.*, *Fire Safety J.*, **101** (2018) 1-17. The primary objective of this news item is to engage the members of the fire research community to participate in the second MaCFP workshop, scheduled on April 25-26 2020 as a pre-event to the 13th IAFSS Symposium in Waterloo, Canada (<http://iafss2020.ca>). Continued updated information on the MaCFP Working Group effort is found at <http://www.iafss.org/macfp/>.

Background and motivation

The general objective of the MaCFP Working Group is to establish a structured effort in the fire research community to make significant and systematic progress in fire modeling, based on a fundamental understanding of fire phenomena. This is to be achieved as a joint effort between experimentalists and modelers, identifying key research topics of interest as well as knowledge gaps, and thereby establishing a common framework for fire

modeling research. The MaCFP Working Group is intended as an open, community-wide, international collaboration between fire scientists. It is also intended to be a regular series of workshops. The first MaCFP workshop was held on June 10-11 2017; the second MaCFP workshop will be held on April 25-26 2020, as a pre-event to the 13th IAFSS Symposium in Waterloo, Canada (<http://iafss2020.ca>).

Objectives

The central objective of the MaCFP Working Group is to develop a fundamental understanding of fire phenomena and to advance predictive fire modeling. The strategy is based on the study of elementary academic problems and a gradual move towards complexity and realism by following a building block approach to model development. The MaCFP workshop series is intended to be complementary to both the existing Verification and Validation guides developed in support of the FDS fire modeling software (<https://pages.nist.gov/fds-smv/>) and the FM Global Open Source Fire Modeling Workshop series (<https://sites.google.com/site/firemodelingworkshop/>). More information on the specific objectives of the MaCFP Working Group are found at <http://www.iafss.org/macfp/>.

MaCFP Repository

The MaCFP Working Group has established a list of target experiments that are suitable for CFD model validation. These target experiments correspond to basic configurations (building blocks) with carefully-controlled conditions and quality instrumentation and diagnostics. They also correspond to available open databases. Digital archives of the data corresponding to the selected target experiments are available on the MaCFP repository, hosted on GitHub at <https://github.com/MaCFP>. The repository also contains digital archives of the CFD simulations performed in 2017 in preparation of the first MaCFP Workshop.

Condensed Phase Phenomena Subgroup

Historically, the fire modeling community has self-organized into two distinct groups: a first group that studies combustion and heat transfer in the gas phase, and a second group that studies thermal degradation and pyrolysis in the condensed phase. The early discussions of the MaCFP Working Group have focused on gas phase phenomena, but with the understanding that quantitatively predicting flame spread and fire growth requires modeling of coupled gas phase and condensed phase processes. The MaCFP Working Group was since then expanded to include a subgroup dedicated to the predictive modeling of condensed phase phenomena. More information on the respective efforts of the Gas Phase and Condensed Phase Phenomena subgroups are found at <http://www.iafss.org/macfp/>.

Second MaCFP Workshop

The second MaCFP workshop will take place on April 25-26, 2020, as a pre-event to the 13th IAFSS Symposium in Waterloo, Canada (<http://iafss2020.ca>). The workshop will feature activities organized by both the Gas Phase Phenomena subgroup (on **Saturday April 25, 2020**) and the Condensed Phase Phenomena subgroup (on **Sunday morning April 26, 2020**).

Gas Phase Phenomena subgroup

As previously advertised, the Gas Phase Phenomena subgroup is planning to hold discussions corresponding to the following target experiments:

- Case 1 (Turbulent buoyant plumes): the Helium plume experiment previously studied at Sandia National Laboratories (T.J. O'Hern, E.J. Weckman, A.L. Gerhart, S.R. Tieszen, R.W. Schefer, *J. Fluid Mech.* 544 (2005) 143-171);
- Case 3 (Turbulent pool fires with liquid fuel): the methanol pool fire experiments previously studied at the University of Waterloo (Case 3a, E.J. Weckman, A.B. Strong, *Combust. Flame* 105 (1996) 245-266) and also currently studied at the National Institute of Standards and Technology (Case 3b, S.C. Kim, K.Y. Lee, A. Hamins, *Fire Safety J.* 107 (2019) 44-53);
- Case 5 (Flame extinction): the controlled co-flow round ethylene diffusion flame experiment currently studied at FM Global (D. Zeng, P. Chatterjee, Y. Wang, *Proc. Combust. Inst.* 37 (2019) 825-832; N. Ren, D. Zeng, K. Meredith, Y. Wang, S. Dorofeev, *Proc. Combust. Inst.* 37 (2019) 3951-3958; G. Xiong, D. Zeng, P. Panda, Y. Wang, *Proc. 11th US National Combustion Meeting*, Pasadena CA, March 24-27, 2019).

The MaCFP repository (<https://github.com/MaCFP>) has been updated in Fall 2019 and now contains experimental data corresponding to Cases 1, 3a, 3b, and 5. These data are available to computational groups for CFD model validation. Work is also in progress to develop a library of MATLAB-based post-processing tools to facilitate comparisons between experimental data and computational results for these cases.

Condensed Phase Phenomena Subgroup

For the second MaCFP workshop, the focus of the Condensed Phase Phenomena subgroup will be on using milligram-scale and bench-scale tests to determine the relevant physical/chemical properties of solid fuel sources for computational fire models. A specific reference material was selected for the workshop: cast black

poly(methyl methacrylate).

The four main objectives of the Condensed Phase Workshop are listed as follows:

- To catalogue current approaches used to parameterize pyrolysis models;
- To quantify the interlaboratory variability for comparable experimental datasets;
- To assess the impact of the variability of model parameters on predictions of sample burning rate; and
- To present a rigorous analysis of these results in the Fire Safety Journal.

Call for Participation

The MaCFP Working Group is inviting the members of the entire fire research community to participate in the second workshop. While the workshop topic is of direct interest to experimental and computational fire researchers, the workshop should also be of broad interest to the community at large. Registration to the April 2020 workshop is fully open (to register, follow instructions at <http://iafss2020.ca/>).

The exact format of the second MaCFP workshop is not finalized yet but is likely to be similar to that adopted at the first Workshop, *i.e.*, a mix of invited oral presentations and group discussions, guided by plenary introductions and concluded by reports of main outcomes. Proceedings will be produced after the workshop and submitted for publication in Fire Safety Journal.

Gas Phase Phenomena Subgroup (Saturday April 25, 2020)

Members of the fire research community can participate in the gas phase subgroup effort in one or both of the following ways:

- From now until April 2020: participate in the planning of the workshop by interacting with the organizing committee, making suggestions and generating/contributing simulation results to be discussed at the workshop;
- April 25, 2020: attend and participate in the discussions at the workshop.

Condensed Phase Phenomena Subgroup (Sunday morning April 26, 2020)

The Condensed Phase Phenomena Subgroup is inviting the members of the entire fire research community to participate in the second workshop. Experimentalists may participate by submitting measurements from pyrolysis experiments (*e.g.*, TGA, DSC, Cone Calorimeter, FPA, Gasification tests) performed on the specific reference material selected for this workshop: cast black poly(methyl methacrylate). Experimental Results are available on the MaCFP Repository (<https://github.com/MaCFP>).

Modelers may participate by developing complete pyrolysis model parameter sets on the basis of these experimental results and by using them to predict a series of target simulations: zero-dimensional Thermogravimetric Analysis (TGA) experiments and one-dimensional gasification scenarios.

For further details on how to participate, please read the Guidelines for Participation in the 2020 MaCFP Condensed Phase Workshop document linked on <http://www.iafss.org/macfp/>.

Points of contact

Gas Phase Phenomena Subgroup: Bart Merci (bart.merci@ugent.be); Arnaud Trouvé (atrouve@umd.edu)

Condensed Phase Phenomena Subgroup: Morgan Bruns (brunsmc@vmi.edu); Isaac Leventon (Isaac.Leventon@NIST.gov)

Large Outdoor Fires and the Built Environment (LOF&BE) Working Group

Announcement: Workshop on 'Large Outdoor Fires & the Built Environment (LOF&BE 2020) – April 25-26, 2020

The 'Large Outdoor Fires & the Built Environment' (LOF&BE) working group, sponsored by the *International Association for Fire Safety Science* (IAFSS), is attempting to address problems with key phenomenological shared characteristics relevant to urban fires, wildland-urban interface (WUI) fires, wildland fires, and informal settlement fires. The LOF&BE permanent working group consists of three subgroups, prioritized into the following topics:

- Ignition Resistant Communities (IRC)
- Emergency Management and Evacuation (EME)
- Large Outdoor Firefighting (LOFF)

The IRC subgroup is being co-led by Daniel Gorham (IBHS, USA) and David Rush (UoE, UK). The EME group is being co-led by Maria Theodori (Reax Engineering, USA) and Sayaka Suzuki (NRIFD, Japan). The LOFF subgroup is being led by Len Garis (UFV, Canada), Brian Lattimer (Virginia Tech, USA), and Xinyan Huang (HKPolyU, China).

The overall objectives are to bring the full depth of knowledge of the IAFSS community to work on these priority topics. In this workshop, following up on two previous workshops, we will present why large outdoor fires are an

important issue in the world, what this working group is doing about it, and what our progress is so far. (The work of the previous workshops was documented in two NIST publications, 'Large Outdoor Fires and the Built Environment: Summary of Kick-Off Workshop', *NIST Special Publication 1236*, February 2019 and 'Large Outdoor Fires and the Built Environment (LOF&BE): Summary of Workshop at Interflam 2019', *NIST Special Publication 1241*, August 2019, which can be found at this website: <https://www.nist.gov/nist-pub-series/special-publication-nist-sp>.)

As problems being addressed by IRC, EME, and LOFF subgroups are complex and interdisciplinary, the planned workshop will devote a half day to each of the following topics:

- What research has been done so far on this problem? Fire safety science community research efforts on Large Outdoor Fires and the Built Environment (Saturday, April 25, morning)
- What mechanisms exist to protect communities from large outdoor fire exposures? Overview of codes, standards, and regulatory framework (Saturday, April 25, afternoon)
- What knowledge has been garnered from actual large outdoor fires? Lessons learned from real fire events (Sunday, April 26, morning)

Details of presentations and presenters will be updated at <https://iafss.org/committees/large-outdoor-fires-wg/workshops/> before the LOF&BE 2020. We are looking forward to having your participation and hope you will also formally join LOF&BE! If you are interested, please join us.

Signed: Sayaka Suzuki (NRIFD), Sara McAllister (USDA Forest Service) and Samuel Manzello (NIST)

2020-2023 IAFSS MANAGEMENT COMMITTEE NOMINATIONS

The IAFSS Nominating Committee, chaired by Professor Bogdan Dlugogorski, Charles Darwin University, Australia, has proposed 24 candidates to the Management Committee of the Association for the 2020-2023 term. The nominees, in alphabetical order, are as follows:

- | | |
|---|---|
| 1. Professor Luke Bisby, UK | 13. Professor Longhua Hu, China |
| 2. Professor Pascal Boulet, France* | 14. Professor Brian Lattimer, USA* |
| 3. Professor George Boustras, Cyprus* | 15. Professor Naian Liu, China* |
| 4. Professor W-K Chow, Hong Kong, China | 16. Dr Cristian Maluk, Australia* |
| 5. Professor Ritsu Dobashi, Japan | 17. Professor Ken Matsuyama, Japan* |
| 6. Dr Rita Fahy, USA | 18. Professor Margaret Simonson McNamee, Sweden |
| 7. Professor Charles Fleischmann, New Zealand | 19. Dr. Brian Meacham, USA |
| 8. Dr Jason Floyd, USA | 20. Professor Bart Merci, Belgium |
| 9. Professor Edwin Galea, UK | 21. Professor Arnaud Trouvé, USA |
| 10. Professor Michael Gollner, USA | 22. Dr Yi Wang, USA |
| 11. Professor Kazunori Harada, Japan* | 23. Professor Beth Weckman, Canada |
| 12. Professor Patrick van Hees, Sweden | 24. Professor Jennifer Wen, UK |

*Denotes candidates nominated for election to the Committee for the first time, who have not served on the Committee before. The remaining candidates are members of the present Committee.

Please noted that any current full Member of the Association may also be nominated for election to the Management Committee by a petition signed by at least ten other full Members and submitted in writing via email to the IAFSS Honorary Secretary. The deadline for submission of petition nominees is **14 March 2020**. The submissions should be emailed to: Dr. Brian Meacham, IAFSS Honorary Secretary, brian@meachamassociates.com

In the case of verified petition candidates being nominated, there will be an election by email vote of the members in April 2020, to be conducted by the Honorary Secretary. In the other instance, the nominees, as proposed by the Nominating Committee, will be deemed to be elected to the Management Committee without further action.

On behalf of the International Association for Fire Safety Science, I would like to take this opportunity to express our sincere words of thanks to the Committee members who wish to retire in this year: Professor Alexis Copalle (France), Professor Bogdan Dlugogorski (Australia), Dr Tuula Hakkarainen (Finland), Professor Guillermo Rein (UK), Dr Anthony Hamins (USA), Mr Peter Johnson (Australia), Dr Björn Karlsson (Iceland), and Professor Yoshifumi Ohmiya (Japan), for their many outstanding contributions to our Association.

Signed: Brian J. Meacham, IAFSS Honorary Secretary

NEWS FROM MEMBERS

Swedish Fire Protection Association 100 years Anniversary 2019

The Swedish Fire Protection Association celebrated its 100-year Anniversary in May 2019. It was celebrated by two seminars, one of them international, in cooperation with Brandforsk – Swedish Fire Research Board, with the topic *FIRE SAFETY KNOWLEDGE FOR THE FUTURE - Challenges and opportunities*. The program and links to the talks may be found at



www.brandskyddsforeningen.se/forskning/international-seminar-2019/

Awards were also given to several people for "extremely meritorious nationwide operations for development of highly significant services for a fire safer Sweden". *Kathleen Almand*, NFPA, was the only foreign person to receive the award and one of two women. Some of the other award winners (with former affiliations) have been active abroad, incl. *Robert Jönsson*, Lund University, *Vilhelm Sjölin*, Brandforsk (posthumously), *Ulf Wickström*, SP, *Kai Ödeen*, KTH, and *Birgit Östman*, SP/Träteknik.

Signed: *Birgit Östman* (Birgit.Ostman@lnu.se), Linnaeus University, Växjö, Sweden

News from the International Master of Science in Fire Safety Engineering (IMFSE)

New IMFSE website

The IMFSE Consortium is very happy to announce the launch of their brand new program website in September 2019! Check it out on www.imfse.com

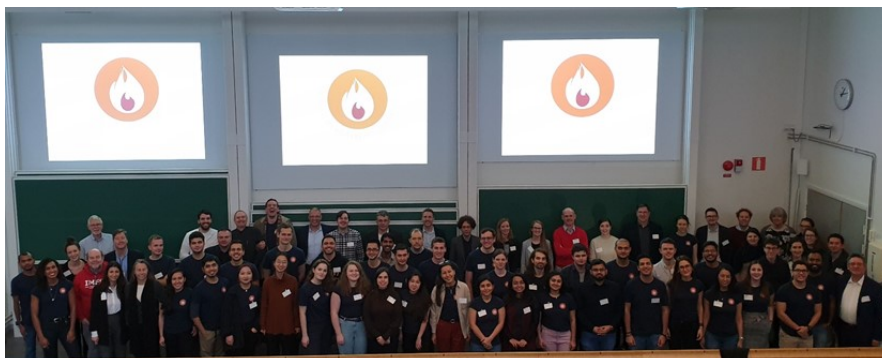
IMFSE Sponsorship Consortium

The IMFSE Sponsorship Consortium is still going strong, with several sponsors extending their financial commitment to the IMFSE program for the coming years. In addition, one new member joined the Sponsorship Consortium this academic year 19-20: EHR S.A. This sets the total of sponsoring companies to 15! Many thanks to all for their continued support, which contributes a lot to the success of the program.



The 6th IMFSE FSE Day – 4 February 2020, Lund, Sweden

The 6th IMFSE Fire Safety Engineering Day at Lund University on Tuesday, February 4, 2020, was a big success with over 70 participants! The central theme of the day was 'Fires in Urban Settlements'. Many interesting presentations were given by our sponsors, followed by a fascinating panel debate. The next edition will take place in Belgium during the fall semester of AY 2020-2021.



IMFSE Graduation Ceremony – 24 June 2019, Ghent, Belgium

On 24 June 2019, the IMFSE class of 2019 graduated in Ghent during the IMFSE Graduation Ceremony. It was a wonderful event where all graduating students gave a thesis presentation and presented their thesis poster. The day was concluded with dinner during a lovely boat cruise. Congratulations to all graduates! Check out [our Facebook page](#) or [website](#) for more pictures.

Awards & publications IMFSE staff, students and alumni

IMFSE Assoc. Prof. Enrico Ronchi won the [IAFSS 2020 Magnusson Award](#) in September 2019.

The SFPE IMFSE Student Chapter was awarded the silver Award for Chapter Excellence (ACE) from SFPE on 29 July 2019.



The graduated students - class of 2019!

<https://www.sfpe.org/page/ChapterAwdRecipients>

IMFSE alumna Silvia Arias won the [2019 SFPE Dr. Guylène Proulx Scholarship Award](#). Her research at Lund University relates Virtual Reality (VR) with studying human behavior in fire scenarios.

IMFSE student Laura Schmidt won the first prize in the 'Early Career Researcher Poster Competition' at the ACIC (Advanced Composites in Construction) conference in Birmingham in September 2019 with the following published paper: Schmidt, L. & Fernando, D. (2019). [Fire behaviour of a timber composite with GFRP reinforcement compared to unreinforced laminated timber](#). Advanced Composites in Construction Conference. September 3-5, Birmingham, United Kingdom.



Antonela Čolić next to her award-winning poster

IMFSE student Antonela Čolić won the best poster award at the [2019 FSF conference](#) in Paris in September 2019.

IMFSE alumnus Davood Zeinali received the SFPE Foundation Student Scholar Award at the [2019 SFPE Annual Conference & Expo New Frontiers in Fire Safety](#) in October 2019.

IMFSE alumna Farah Binte Mohd Faudzi won the IFV-VVBA Thesis Award at the International Congress Fire Safety & Science in Arnhem, The Netherlands on 14 November 2019. [More information available in Dutch here](#).

Signed: Lies Decroos, IMFSE, Ghent University



Farah Binte Mohd Faudzi accepting the IFV-VVBA Thesis Award

News from Ghent University

PhD defense Davood Zeinali

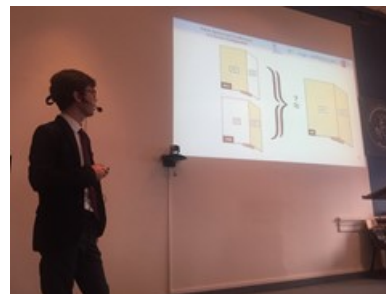
On 9 October 2019, IMFSE alumnus Davood Zeinali successfully defended his PhD, entitled 'Flame spread and fire behavior in a corner configuration'. The academic supervisors are Prof Bart Merci and dr. Georgios Maragkos. The full text is available on <https://lib.ugent.be/>



José Felipe Pérez Segovia defending his PhD

PhD defense José Felipe Pérez Segovia

On 6 November 2019, José Felipe Pérez Segovia successfully defended his PhD, entitled 'Numerical Study on Oscillatory Fire Behaviour in Confined and Mechanically-Ventilated Enclosures'. The academic supervisors are Prof Bart Merci and dr. Tarek Beji. The full text is available on <https://lib.ugent.be/>



Davood Zeinali defending his PhD

Master of Science in Fire Safety Engineering

In 2019, 10 students graduated from the Ghent University Master of Science in Fire Safety Engineering (<https://studiegids.ugent.be/2019/EN/FACULTY/E/MABA/EMFSEN/EMFSEN.html>). Best wishes to all alumni!

Submitted: Prof Bart Merci, Ghent University

News from the University of Ulster (UK)

Education

The MSc Fire Safety Engineering programme, now in its 30th year, was excited to welcome 16 new students (some pictured here) including students from India, Saudi Arabia, Oman and France. Our international students bring a wonderful dynamic and dimension to the learning experience for all.

The course, which is accredited as Further Learning for CEng by the IFE, EI and CIBSE, continues to thrive and from 2020 will offer an extended Masters (2-year programme) with a more substantial research element.

Students once again, in addition to theory, have benefitted from

practical activities designed to gain understanding of the wider context of fire engineering. As usual they attended workshops with fire engineering consultants and worked on real design projects kindly provided and supported by RPS Consulting Engineers.

They were also recently engaged as volunteers in a simulated fire incident entitled 'Stage Fright'. This exercise, organized by a local company (FRSNI Ltd) and involving emergency services, was designed to test the emergency evacuation procedures in a large concert venue – a fantastic opportunity for the students to understand the implications of their designs for management practice. Next month they will spend a day engaged in training at the Northern Ireland Fire and Rescue Service's new training centre.

At winter graduation in December Alexandre Audoin (pictured here) received the Jensen Hughes award for the Best Student MSc Fire Safety Engineering 2018-19. The Best Dissertation Award went to Joe Twomey.



Recent projects:

1. TRAFIR: Characterization of TRAvelling FIRes in large compartments

Partners: Arcelor Mittal, Ulster University, Edinburgh University, RISE, Liege University.

As part of the European RFCS TRAFIR project, three large compartment fire tests, involving steel structures, were conducted by Ulster University in the last months. The purpose of these tests was to understand the conditions in which a travelling fire develops, as well as how it behaves and impacts the surrounding structure.

During the experiments, the path and geometry of the travelling fire was studied and temperatures, heat fluxes and spread rates were measured. The influence of the travelling fire on the structural elements was also monitored during the tests.



Figure 1. Traveling fire tests with different openings and gas temperatures at ceiling levels along the length of compartment

2. EENSULATE

This Horizon 2020 project which involves 14 European partners, aims to develop innovative lightweight (35% weight reduction compared to the current best performing modules), highly insulating energy efficient components as well as associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades. Experimental testing of the flammability of single-component and multi-component insulation foams based on Polyisocyanurate (PIR) has been carried out using TGA, DCC and cone calorimeter. Fire behaviour of insulation foams in spandrel were assessed using single burning item (SBI) tests. A series of furnace tests will be carried out for to characterize the fire performance of the complete system consisting of insulation foams, spandrel and vacuum insulation glazing (VIG) can also to compare with that of triple glazed units (TGU).

3. New Generation of Precast Concrete Sandwich Panel Façade Resistant to Fires.

FireSERT at Ulster University and FP McCann Ltd have been awarded a KTP project for two years to develop a highly innovative next generation product for Façade Precast Concrete Insulated Panels for all sorts of buildings

and heights. The focus will be to develop a product that can satisfy current and future demands for a high level of fire safety rating. This KTP enables the company to access the extensive research expertise and unique experimental facilities here at Ulster which is key to the company's precast concrete product innovation strategy.

4. Improving fire resistance of styrene-based polymers through P-N synergism of reactive fire retardants.

In January 2020, recently appointed lecturer Dr Svetlana Tretsiakova-McNally, received a prestigious award from the Royal Society of Chemistry (RSC) Research Fund to support her 12-month project focusing on the improved fire retardance of styrenic polymers widely used for the production of insulating materials. The overall aim of this study is to explore the possibility of incorporating nominal amounts of P-bearing monomers, diethyl(acryloyloxymethyl)phosphonate and diethyl-p-vinylbenzyl phosphonate along with N-containing unsaturated compound, maleimide, into the polystyrene chains with the view to enhance fire retardance through P-N synergistic action and to study the mechanism of the flame retardance.

Phd Study

FireSERT is pleased to welcome to new Phd researchers – Aloshy Baby and Hossein Tavanarezai who both joined in September 2019 - both have since successfully completed their initial assessments. Aloshy works under the supervision of Dr Svetlana Tretsiakova-McNally and Dr Jianping Zhang in the area of fire dynamics and flammability of synthetic polymers. Hossein is supervised by Dr Karen Boyce and Dr Nigel McConnell – his research will relate to the investigation of the presence of older adults on the flow dynamics of a crowd. Both studies build on previous research at FireSERT and we look forward to seeing where the research leads.

Since the last newsletter, we congratulate Naveed Alam who received the award of Phd at our recent Winter graduation ceremony. Naveed will be able to continue his research, which relates to the development of design guidance for slim floor systems with colleagues in FireSERT having recently obtained an academic post in the department.

Sadly, one of our much respected and loved researchers, Michael Isirima, passed away in November 2019, as he was nearing completion of his Phd.

Michael was extremely industrious and was continuing research right up until the end; his work will be published and is likely to make a significant contribution to fire safety protection and mitigation of large-scale tank fires. In recognition of his achievements, Michael was posthumously awarded the degree of Phd. His wife, Sandra, received the award on behalf of Michael, along with one of their four young sons (pictured here).



Signed: Karen Boyce, FireSERT, University of Ulster

News from the University of Waterloo

The Fire Research Group is excitedly preparing to welcome our colleagues from around the world to the 13th International Symposium on Fire Safety Science to be held April 25th through May 1st at University of Waterloo. See the articles on this premiere event elsewhere in the Newsletter.

In March 2019, the Group hosted a full-day networking workshop entitled 'Canadian Perspectives on Research and Education in Support of Fire Resilient Societies' with aim to engage various stakeholders in discussions around current and emerging Canadian perspectives on research and education in support of fire resilient societies. A group of approximately 70 attendees from government, industry and academia learned about international fire safety initiatives. Dr. Margaret Simonson McNamee from Lund University shared EU experiences around Fire Safety in Tomorrow's World and the IAFSS Agenda 2030 for a Fire Safe World and Chris Jelenewicz from SFPE discussed the SFPE Roadmap for Fire Safety Engineering. Other presentations focused on the Canadian Blueprint for Wildland Fire Science (Brian Wiens, Natural Resources Canada) and an overview of fire safety research and resources in Canadian universities (Prof. Beth Weckman, University of Waterloo). Attendees then brainstormed current and emerging fire safety issues from a Canadian perspective and prioritized needs including

opportunities to leverage government funding to increase the power of research. [Slides](#) from the presentations are posted to the [UW Fire Research and Safety](#) website.

Research

At the UW Fire Lab, we conduct world class research in a many areas of fire safety science. Current projects investigate pyrolysis, thermal response and smoke evolution of materials under building and pool fire exposure, and of full-scale assemblies in compartment fire environments. Demand for small-scale and custom testing continues to grow as researchers and graduate students work with our many industrial partners to examine the fire performance of their materials and scaled assemblies, to help in the development of next generation of fire-safe products. Larger-scale, custom experiments are designed to investigate fire behaviour and improve understanding of the fundamental fire dynamics which influence occupant safety and fire fighter training. Other projects involve industry tailored fire safety and risk assessments through to development of advanced CFD fire modeling algorithms towards performance based design.



We are continuing with our exciting full scale, house fire experiments this summer. We are measuring and characterizing compartment environments throughout a two storey residence as they evolve during sofa fires under conditions of limited ventilation. Collaborating with industry, government and several universities, the two storey UW burn house is instrumented with around 250 sensors and cameras to measure variations in heat release rate, temperature, opening velocity, smoke flow, and concentrations of oxygen, carbon monoxide and other potentially noxious gases within the fire room and adjacent rooms on each floor. As well as analyzing the wealth of data from an original set of tests, researchers are developing unique video and image analysis methods to better investigate the impact of ventilation limited conditions on fire growth and spread, on available time to evacuate from the dwelling and on risks to fire service personnel. Recently, we have teamed up with colleagues in Applied Health Sciences and together will interface the data with models of human physiological response to assess impact of the environment on occupants in the various spaces. The rich, full-scale dataset is intended to advance development and validation of fire models and support fire investigation and decision making related to occupant egress and overall fire safety in design of newer, more airtight buildings.

Our new wall-fire test unit supports several new research projects detailing the thermal response and endurance of 6ftx6ft multi-layer construction assemblies, with and without penetrations, under thermal gradients encountered during real fire exposure, as well as through-wall heat transfer of interior partition walls. Graduate students investigate heat transfer through exterior wall assemblies, smoke migration through in-wall penetrations and implications of new shipboard insulation standards on fire response tactics. With new understanding of performance of assemblies under thermal gradients typical early in a fire, this data feeds information to the UW Fire Modeling Group and helps toward the development of better wall response models, including treatment of gas to surface heat transfer and through-wall penetrations in their CFD compartment fire models. Learn more about our research through our many publications at InterFlam, IFireSS and in Fire and Materials in 2019.



Education

The Fire Safety program at University of Waterloo (UW) continues to expand! We currently offer nine graduate courses taught by instructors from around the world. To meet requests from our students, we will pilot a new graduate course in Advanced Fire Investigation for Fall 2020. All courses continue to be delivered in an intense, week-long (36-40 hours) format, with the coursework electronically submitted over several months following each offering. With more industry-based students than ever, there is growing demand to join lectures via the state-of-the-art, interactive Live-Link system. Lectures are recorded so many students have accessed our courses through video-based training this year as well. In the past year, over 90 students, including many from industry and other UW engineering departments, completed courses through the UW Fire Safety program.



There are currently 23 graduate students, and another 12 industrial certificate students, at various stages of completion of their studies. Eleven of these are Master of Engineering students who will obtain their degrees entirely by coursework. On the research side, an additional nine students are working towards their MASc and three towards their PhD degrees with thesis topics in various areas of fire safety. We have hosted many short and longer term research placements at the UW Fire Research Facility this year and always welcome students from UW and other institutions to use the Fire Lab resources for their research.

Awards and Recognition

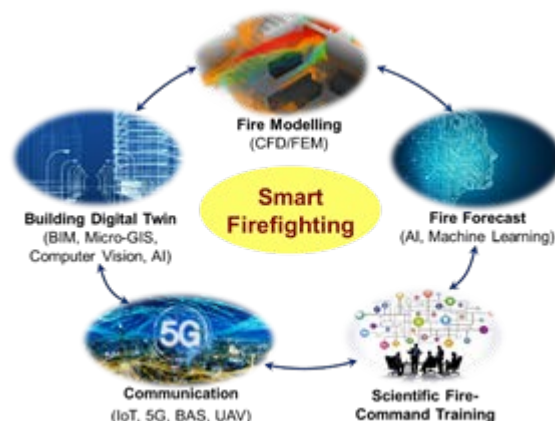
In December 2019, Prof. Beth Weckman received an Award of Recognition from Committee E05 on Fire Standards of ASTM International for her work on subcommittee E05.33 Fire Safety Engineering.

Signed: Prof Beth Weckman, University of Waterloo

News from the Hong Kong Polytechnic University

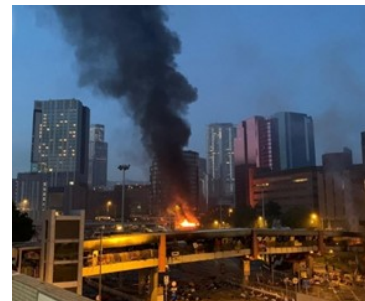
Breaking Ground in Smart Firefighting Research

The PolyU Fire Research Group, led by **Prof. Asif Usmani**, was awarded the Theme-based Research Scheme award, funded by Hong Kong Research Council, with HKD 33 Million (USD 4.3 Million) for their ground-breaking project titled “*SureFire: Smart Urban Resilience and Firefighting*”. This is the largest fire safety project funded in Hong Kong. SureFire is a multidisciplinary project that aims to deliver a live tracking and prediction system for monitoring of infrastructure and buildings. It involves the contribution of a multi-disciplinary expert team from experts in Hong Kong and abroad. The first open meeting was held in December 2019. Various work package leaders explained their path forward, i.e., from digitally cloning buildings digitally, training AI for fire forecasting, to scale tunnel and hospital fire experiments. Please see the [Project Webpage](#) for the latest news.



PolyU Community Comes Together to Rebuild Campus

Students, staff, and alumni all congregated together and offered their support during and after the now-concluded campus incident. The situation on campus has now been concluded as more than one thousand protestors left the campus voluntarily. Since 2020, most of the campus is operational and the new semester is set to start as originally planned. In particular, the damage to PolyU Fire Research activities is limited. Restoration works have already been spearheaded by the PolyU alumni community and associated construction company. It was a challenging period, but with the support of PolyU community that built its international reputation over the last 80 years, the university is moving ahead and continuing its unwavering dedication to free speech, academic integrity, and scientific progress.



Burning PolyU campus

First SFPE Student Chapter in China

PolyU Ph.D. student Aatif Ali Khan is the first and founding president of the officially recognized Hong Kong Student Chapter for the Society of Fire Protection Engineers (SFPE). This is the first student chapter in China, and the third in Asia. With

over 20 members attended before the semester starts, the chapter is set to promote fire safety engineering amongst students by hosting workshops, lectures, and events targeted at University Students in



Hong Kong. The first group meeting was held on 24th December 2019. President Aatif Ali Khan delivered a presentation about the fire suppression system. After the meeting, members of this chapter swapped their gifts to celebrate the Christmas holiday and the New Year. For the latest updates, please see the official twitter: <https://twitter.com/HkSfpe>

Research output of 2019 and IAFSS symposium papers

For the year 2019, the PolyU fire group has received over USD 5 Million of research funds and published more than 20 journal papers. Particularly, 3 papers were accepted for the oral presentation at the 2020 IAFSS Symposium, led by Dr. Xinyan Huang, Dr. Caiyi Xiong, and Yanhui Liu. These papers covered topics of fire spread, acoustic flame extinction, and Li-ion battery fire, which will be further published in Fire Safety Journal. In addition, more than 6 posters will be submitted to the symposium.

Excellence Recognized



Dr. Xinyan Huang, Asst. Prof. at the PolyU Fire Group, received the 2020 *IAFSS Proulx Early Career Award*. This prize awards to the researcher who has succeeded in reaching the extraordinary achievements in their early career. He has also received the 2019 *Fire Engineering Grand Award* from Hong Kong Institution of Engineers (HKIE). This excellent award is a recognition for the fire professionals who has an excellent performance in the fire engineering project and related research. Dr. Huang is also the first fire researcher who receives the *Bernard Lewis Fellowship* from the Combustion Institute.



Four PolyU Ph.D. students were awarded the *HKIE Fire Engineering Student Essay Competition Award*, with Shaorun Lin receiving the Top Award. To receive this award, the students had to demonstrate both acute critical thinking skills and excellent writing skills in a competition open to all student members who attended the HKIE symposium in 2019.

Updates in Group Members

The current PolyU Fire Research Group includes four professors, three postdoctoral fellows, two research assistants, and more than 10 research students. Prof. Asif Usmani is the group lead and the head of Dept. of Building Services Engineering. The vigorous development of PolyU Fire group is foreseeable. More talented researches are welcomed to join this big family.

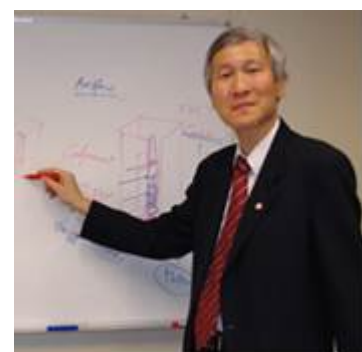
Dr. Liming Jiang, a lead developer of the OpenSEES for Fire project, joined PolyU Fire Group as an Assistant Professor in 2019. Dr. Jiang was awarded his Ph.D. from the University of Edinburgh, and then became a postdoctoral research assistant there, and at Brunel University in London, UK. After that, Dr. Jiang joined PolyU as a part-time postdoc and simultaneously worked full time in a famous real estate company as the property development manager. Dr. Jiang brings a wealth of technical know-how, research experience, and industrial experience to the team. He is currently looking for Ph.D. students to work on some sophisticated projects in computational structural-fire engineering.



Dr. Mustesin Alikhan also joined the team as a Research Assistant Professor in the late 2019. He completed his Ph.D. from Brunel University where he pursued his further study on the technology of hybrid simulation of structures in fire. His aim is to integrate computational tools and laboratory experiments in order to get the merging of both series.



Prof. Wan-Ki Chow, after almost four decades of service at PolyU, has retired and now acts as an Emeritus Professor. He is the founder of PolyU fire research and the Founding Director of Research Centre for Fire Engineering. Prof. Chow graduated from the University of Hong Kong with a first-class honors BSc degree in 1977, and from Portland State University with an MSc degree in teaching in 1979. He obtained his Ph.D. degree in Computing Physics from the University of Hong Kong in 1983. Prof. Chow joined PolyU since 1981, where he has successfully (co-)supervised over 60 Ph.D. students.



Prof. Chow was elected as a Fellow of Hong Kong Academy of Engineering Sciences in 2012, the Fellow of American Society of Mechanical Engineers, and appointed as a Justice of the Peace by HK government in 2013. He has served in IAFSS committee for many years, and the President of the Asia-Oceania Association for Fire Science and Technology (AOAFST). He has been also awarded the Harold E. Nelson

Prof. Chow was elected as a Fellow of Hong Kong Academy of Engineering Sciences in 2012, the Fellow of American Society of Mechanical Engineers, and appointed as a Justice of the Peace by HK government in 2013. He has served in IAFSS committee for many years, and the President of the Asia-Oceania Association for Fire Science and Technology (AOAFST). He has been also awarded the Harold E. Nelson

Service Award in 2006 and John L. Bryan Mentor Award in 2011 by SFPE, the Lifetime Contribution Award by AOAFAST in 2015, and Gold Medal from HKIE in 2018.

Exclusive Fire Safety Engineering BEng course in Hong Kong

The future market of construction demands the “versatile engineer” who equips with the combination of both construction and fire safety knowledge. To keep up the demand of the market, Poly U will offer a full-time degree course in “**Structural and Fire Safety Engineering**,” which is the first and exclusive undergraduate course available in Hong Kong. This course covers the major of civil engineering, structural engineering and fire safety engineering. This program aims to train and develop the undergraduate students who will devote themselves to the career in the building and construction works.



Signed: XY Huang, The Hong Kong Polytechnic University, Hong Kong, China

A long-term collaboration with City University of Hong Kong (CityU) under a Theme-Based Research Scheme (TBRS) project on railway safety and reliability for the Asia-Oceania areas funded 4 years ago was led by CityU with support from University of Hong Kong, Chinese University of Hong Kong and the Research Centre for Fire Engineering (RCFE) of The Hong Kong Polytechnic University. TBRS passed the 1st interview review and just evaluated the 2nd review in November 2019.

The fire and building services engineering expert, Professor Richard K.K. Yuen, Chair Professor of Architectural Engineering, Head of Department of Architecture and Civil Engineering, and Acting Director (Communications and Public Relations Office) of CityU has been appointed as Chief-of-Staff of CityU effective from 27 December 2019.

Several public safety conferences with fire science and engineering as one of the focused areas were held in China in 2019 strongly supported by CityU and RCFE led by Professor W.K. Chow. The first one “2019 International Conference on Urban



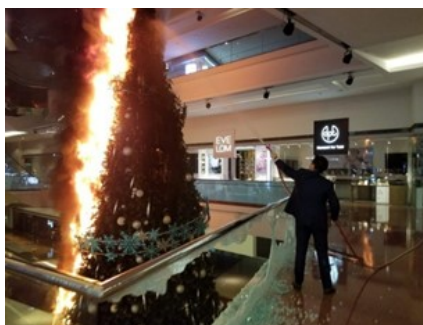
Public Safety and Emergency Rescue” was held at Changzhou University from 24 to 26 May 2019. Education programmes on the first class subject Public Safety were discussed. There, fire science and engineering was a key area. Chinese Academy of Engineering (CAE) academicians Fan and Cao, and Hong Kong Academy of Engineering Sciences (HKAES) academician Chow gave keynote speeches. In addition to Technology and Management, Safety Culture is agreed to be another key element to provide public safety in the first keynote speech by Professor Fan.

The 9th International Conference on Fire Science and Fire Protection Engineering led by the Department of Architecture and Civil Engineering, CityU was organized at Southwest Jiaotong University from 18 to 20 October 2019. The first keynote speech was presented by W.K. Chow on High-Speed Railway System fire coming from the TBRS project.



PolyU bridge occupied

The 3rd International Symposium on Urban and Industrial Safety was held at Nanjing University of Technology from 15 to 17 November 2019. How Safety Science was applied to Fire and Explosion Hazards was focused on. The first keynote speech was delivered by Professor Hans Pasman from Texas A&M University, USA on resilience.



Burning a tall Christmas tree in a mall

Many arson fires were set in Hong Kong in the past few months. Shops, restaurants, banks, railway stations, trains and university buildings were burnt. Two university campuses including The Hong Kong Polytechnic University (PolyU) were occupied by students and outsiders with many areas burnt. More fire service installations for protecting those buildings against arson are expected. Several footbridges, including the PolyU one, were burnt on



Bridge after fire

purpose. The consequence can be very hazardous if the fire occurred during rush hour with many pedestrians walking on the footbridge and heavy traffic underneath the footbridge. Those footbridges in heavy traffic areas must have adequate fire safety provisions against heat and smoke.

Signed: Prof. Wan-Ki Chow, Emeritus Professor

News from Lund University

Education

During this spring a new cohort of IMFSE students came to Lund. The student group consists of more than 20 students with different backgrounds. During the spring semester they study Advanced Fire Dynamics, CFD modelling, Human Behaviour in Fire and Fire Risk Assessment. Some of the courses are shared with our Swedish students which means that many of the lectures are filled with up to 70 future fire safety engineers.

Research

The planning of our new tunnel facility is under way and we are currently preparing the building permit. The facility will, in the first stage, consist of a 25 m long tunnel with some supplementary spaces and measurement equipment.

Prof. Margaret McNamee have received a 4-year project from the Swedish Civil Contingencies Agency to develop a new multi-hazard risk index, EXTREME-INDEX, to assist prediction of emerging risks on a local, regional and national level to support various stakeholders for strategic training and resource planning. The first work package includes a thoroughly study of risk index methods for forest fires and flooding risks.

Research on Oxygen Reduction Systems have recently been finished at the division and the results are available on the [NFPA website](#).

There are several other on-going research projects and the result from many of them are reported in open access Lund University reports. You can access our publications through our webpage: www.brand.lth.se/publications

Positions and personnel

Dr. Enrico Ronchi has been awarded the prestigious Magnusson award by the International Association of Fire Safety Science (IAFSS). Dr. Ronchi will receive the award at the 13th IAFSS Symposium in April, 2020. The award commemorates Prof. Sven Erik Magnusson (1938-2014), pioneer of parametric fires and risk management at Lund University, and a driving force in creating the first education curriculum for fire safety engineering.

Haukur Ingason, adjunct professor at the division, receives the 2020 Sjölin award. The Sjölin Award recognizes an outstanding contribution to the science of fire safety or an advance in the state of the art in fire safety engineering practice of extraordinary significance. The award will be delivered to Prof. Ingason at the 13th IAFSS Symposium.

Prof. Patrick van Hees was awarded the The Interflam trophy for overall contribution to fire safety science (a large wooden spoon) at Interflam 2019 in London.

Silvia Arias was awarded the 2019 Proulx Scholarship. Silvia's research includes how Virtual Reality (VR) can be used to study human behavior in fire. The award is one of the prestigious SFPE Educational and Scientific Foundation awards and is presented by the Society of Fire Protection Engineers.

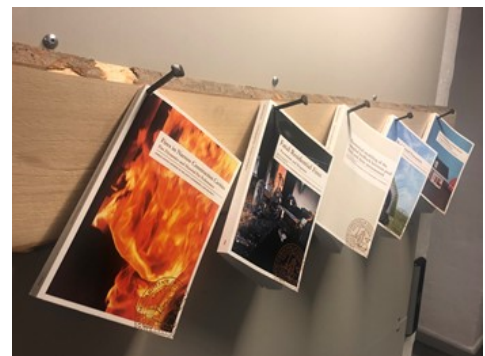
Dr. Nils Johansson has been appointed Senior Lecturer. Dr. Johansson will continue his research and lecturing with in the area of fire dynamics. Dr. Johansson has also been appointed deputy program manager for the bachelor program in fire safety engineering and master program in risk management at the faculty of engineering.

Erik Smedberg and Claude Pagnon Eriksson have been enrolled as new PhD students at the division. Erik will work with in the area of egress of elderly, while Claude will work in the EXTREME-INDEX project.

Upcoming events

A total of five PhD thesis defences are taking place during winter and early spring at the Division of Fire Safety Engineering. The PhD candidates are:

- Marcus Runefors – Fatal residential fires – prevention and response
- Jonathan Gehandler – Fire safety design of road tunnels
- Frida Vermina Plathner - Limiting conditions for a sustained flame
- Karlis Livkiss - Fires in narrow construction cavities
- Abhishek Bhargava - Fire behaviour of selected polymeric building materials - Numerical modelling and validation using micro-scale and bench scale test methods



The theses will be available online, visit www.brand.lth.se for more information.

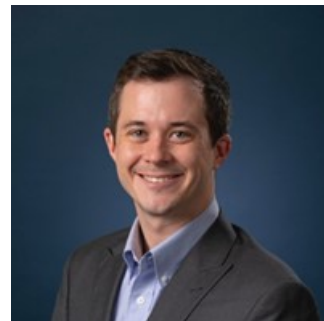
For more information about the Division, please visit www.brand.lth.se. Our website is continuously updated with news.

Signed: Nils Johansson, Lund University

News from Worcester Polytechnic Institute (WPI)

We are delighted to announce that, on July 2019, James Urban has joined the department of Fire Protection Engineering at Worcester Polytechnic Institute (WPI) as an Assistant Professor.

Prof. Urban received his PhD degree in Mechanical Engineering from the University of California, Berkeley in 2017. His thesis and research examined how hot metal sparks from sources such as clashing powerlines, welding, and abrasive metal cutting can ignite flammable material. From 2017 to 2019 he held dual appointments as a postdoctoral researcher and lecturer in the department of Mechanical Engineering at UC Berkeley. During this time, he did research related to firebrand/ember spotting, burning of wildland fuels, and terrestrial tests in support of new flammability screening procedures for materials to be used in spacecraft cabin environments.



Prof. Urban's areas of active research include: developing sensors and detectors for wildland and wildland-urban interface fires, performing complementary simulations and experiments to better understand ignition and burning of wildland and manufactured materials, and smoke toxicity.

Dr. Kuibin Zhou, an associate professor from Nanjing Tech University in China, was recruited as a research engineer for a one-year visit at WPI. He is working on wildland fire behavior measurements in the laboratory and in the field. He will use our wind tunnel, and focus on the canopy flow and vortex flow phenomena in wildland fire spread. His field of research covers fire whirls, pool fires, high-pressure leakages and jet fires.



Two visiting students joined our team. PhD student Bo Li obtained an award from the Chinese Scholarship Council to visit us for 1 year. Bo is conducting his PhD at USTC, in the State Key Laboratory of Fire Science and is supervised by Prof. Jie Ji. He is working on the influence of cross wind on multiple fires and he will be supervised at WPI by Prof. Simeoni. Julia Ferri obtained a Globalink Research Award granted by Mitacs in Canada. She is working on fires with Prof. John Gales from York University and will be working on external fire exposure under the supervision of Prof. Simeoni at WPI.

We are looking for an assistant professor in Fire Science. This position is a great opportunity to develop your research and teaching in Fire Science and Engineering in one of the leading FPE programs globally. The link to the position profile and the application page is at: https://wpi.wd5.myworkdayjobs.com/en-US/WPI_External_Career_Site/job/Worcester/Assistant-Professor_R0000814

Research:

Understanding of ice melting-induced flow using luminescent imaging

Hirota Sakaue, Tatsunori Hayashi

Department of Aerospace and Mechanical Engineering, University of Notre Dame

Ali S Rangwala, Hamed Farahani

Department of Fire Protection Engineering, Worcester Polytechnic Institute

An oil spill in the Arctic regions absorbs heat either from flames if oil is ignited or from the sun. Heat absorption will cause surface tension driven flows and result in different melt patterns on the ice wall. This can cause a shift in the structure and geology of floating ice blocks thereby impacting the Arctic ecosystem in unknown ways. Profs. Sakaue and Rangwala are tackling to this problem by using a luminescent imaging (Fig. 1). They focus on the ice melting-induced flow based on the heating rate and thermophysical properties of the liquid. Both the rate and geometry of ice melt change, the ice melting-induced flow carves out lateral cavities inside the ice wall. By employing a temperature-sensitive luminescent probe with particle tracking velocimetry, the complicated flow

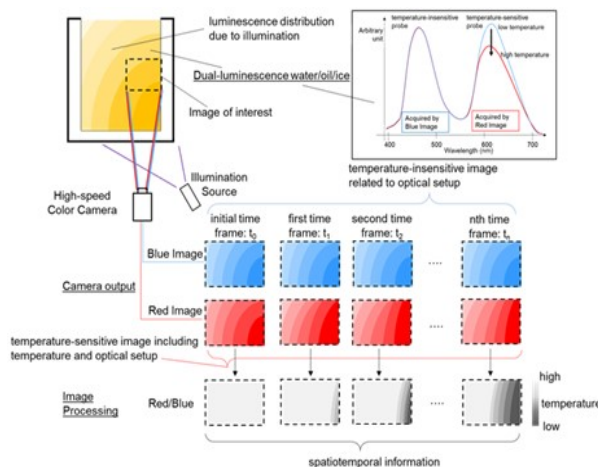


Fig. 1: Schematic description of dual-luminescence

features can be extracted with spatiotemporal manner. This project has started since January 15, 2020 sponsored by National Science Foundation.

Understanding Explosions in Coal Mines

V'yacheslav Akkerman, associate professor of mechanical and aerospace engineering at West Virginia University, and Ali Rangwala, professor of fire protection engineering at Worcester Polytechnic Institute, are working on a collaborative research related to gas and dust explosions in coal mines sponsored by the Alpha Foundation. Akkerman and Rangwala are developing a Dust and Gas Explosion Model, or D-GEM, a joint analytical and computational platform quantifying mining fire hazards, namely, the probability of spontaneous ignition, the evolution of a flame front and the likelihood of a deflagration-to-detonation transition in the presence of combustible dust. The computational backbone for D-GEM is a fully compressible, finite-volume fluid mechanics code, which is used for solving for the set of hydrodynamics and combustion equations. The Alpha Foundation for the Improvement of Mine Safety and Health is a private foundation with the mission to improve mine safety and health through funding research and development projects at qualified academic institutions and other not-for-profit organizations.

Wildland fires

From the collaborative project funded my SERDP (Project Number: RC-2641) between the University of Notre Dame (UND), Worcester Polytechnic Institute (WPI), and USDA Forest Service (FS), a field-deployable wind tunnel has been designed and fabricated. The participating researchers are Prof. Seongkyun Im and Mr. Giovanni DiCristina at UND, Profs. Ali Rangwala and Albert Simeoni at WPI, Drs. Nicholas Skowronski and Michael Gallagher at USDA FS. The wind tunnel is designed to be used at both laboratory and field conditions providing up to 8 m/s wind speed for 1.5 m by 2.1m cross-sectional area.

The wind tunnel was inaugurated in 2017 hosted at WPI Fire Laboratory and now under flow characterization. The tunnel is planned to be deployed for the field experiments in the near future. The tunnel could simulate directional wind conditions in the field, and the results is expected to contribute to understanding the flame spread mechanisms for wildland fires. Photo shows graduate student,



Photo shows graduate student, Giovanni Di Cristina (UND) and the wind tunnel in the WPI Fire Laboratory.



PhD student Nadia Mofidi has conducted a series of large-scale laboratory experiments to improve the understanding of the evolution of 3-D flame structure under cross wind. Experiments have been conducted in the WPI wind tunnel where both fire and wind were turbulent. The propane burner was set to generate fires of different powers and the wind speed varied from 0.3 to 3 m/s to investigate the role of the buoyancy and momentum forces for different conditions. The picture at left shows one of the experiments with a 60x60 cm burner at 300 kW HRR and 2 m/s wind speed.

Experimental study of fire spread through discontinuous fuels without flame contact :

In order to increase the basic understanding of the propagation mechanisms in wildfires, several large-scale experiments were conducted. The experiments were specially designed to study how radiation affected fire spread through a gap. The experiments consisted of a group of three trees that were simultaneously ignited and a target tree that was located at a small distance from the grouped trees. The distance prevented fire spread due to flame contact. The target tree was instrumented to capture heat transfer and temperature inside groups of needles. The vegetation was characterized in details by using terrestrial laser scan reconstruction. Nine experiments were carried out. In four cases the fire spread to the target tree and in the remaining cases a strong smoldering in the needles was observed but the fire did not spread. This study showed that radiation is an important mechanism leading to propagation through discontinuous fuel. It also highlighted that convection was playing the role of diluting and cooling the pyrolysis gases, which delayed or prevented the spread through the gap.



Signed: Albert Simeoni, Worcester Polytechnic Institute

News from State Key Laboratory of Fire Science, University of Science and Technology of China

Paper on Line Fire: Distinguished Paper Award of the Combustion Institute

A new physical model developed at the State Key Laboratory of Fire Science (SKLFS) could accurately predict the flame length of turbulent line fire under different conditions. Dr Wei Gao, under the supervision of Prof. Naian Liu, presented the work at the 37th International Symposium on Combustion and received the Distinguished Paper Award in the Fire Research Colloquium (<https://www.combustioninstitute.org/resources/awards/distinguished-papers/>). The paper was entitled "**Flame length of buoyant turbulent slot flame**".

In past studies on flame length, circular flame has drawn the major attention, whereas slot flame has been rarely studied, although it is a kind of most typical flame in wildland fires (e.g., linear flame front), building fires (e.g., façade fire and wall fire), and industrial fires (e.g., line-source jet fire). For wildland fire research, flame length correlation of linear flame front is of basic importance in calculating the radiative pre-heating of fire front for developing fire spread models. For building fire or industrial fire, knowledge of flame length is valuable in determining the safety separation distance between buildings or industrial facilities.

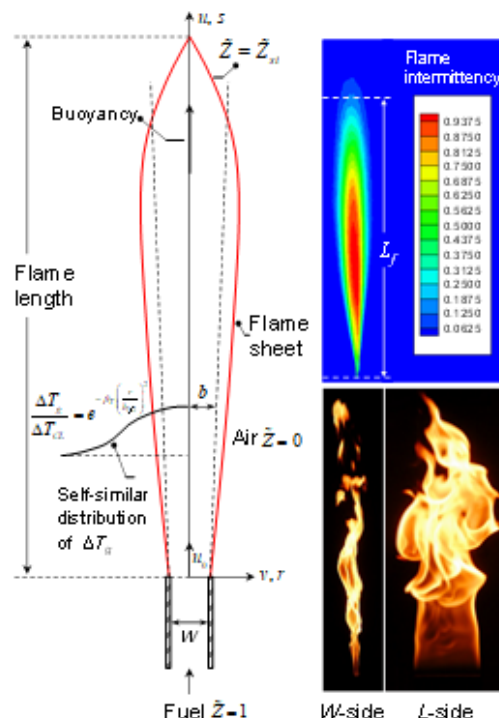
Traditionally, the flame length (L_f) of a turbulent slot fire has been correlated with the power law of $L_f \sim (Fr)^{1/3}$ or $L_f \sim (Q)^{2/3}$, where Fr and Q denote Froude number and heat release rate, respectively. However, two problems remain unsolved. One is that, the scaling laws are generally obtained by empirical dimensional analysis, lacking physical verification. The other is that, studies have shown that the scaling laws change with increasing initial flame momentum, but existing models cannot predict this.

The paper effectively addresses these issues. By introducing the governing equations of turbulent line fire and solving them analytically, a new predictive correlation of flame length is obtained. By the correlation, for the first time, the classic scaling laws of L_f are physically verified. In addition, the model captures the transition from buoyancy-dominated to momentum-dominated of the line fire, and formulates it using a modified Fr number.

The model is validated by line fires produced by four kinds of high-purity hydrocarbon gas fuels (methane, acetylene, ethane and propane). Since the model is physical rather than empirical, it is applicable to line fires with different fuel types and fire scales.

Prof. Naian Liu and Dr. Wei Gao are excited about the potential of the new model. Beneficiaries of the model may include modelers who intend to develop (wildland, wall, façade) fire spread models based on the fire front preheating calculations. For fire safety, the model may help firefighters evaluate the fire risk during building fires or oil/gas fires.

Signed by: Prof. Naian Liu, State Key Laboratory of Fire Science, University of Science and Technology of China



Workshop on Pedestrian Traffic and Evacuation Dynamics 2019

The Workshop on Pedestrian Traffic and Evacuation Dynamics 2019 was held successfully on September 8th, 2019 in Hefei, China, hosted by the State Key Laboratory of Fire Science (SKLFS) at University of Science and Technology of China (USTC). The Working Committee on Personnel Safety of China Association for Public Safety co-hosted this workshop. Prof. Weiguo Song and Prof. Jun Zhang chaired the workshop. Prof. Renyong Guo (Beijing University of Aeronautics and Astronautics), Prof. Shuguang Kuai (East China Normal University) and Prof. Jun Zhang (USTC) were invited to give speeches on pedestrian traffic, social grouping behaviors and heterogeneous pedestrian flows. Dr. Mohcine Chraïbi (Research



Centre Juelich in Germany), Prof. Jian Ma (Southwest Jiaotong University), China, Prof. Tao Chen (Tsinghua University) and Prof. Weiguo Song (USTC) gave invited speeches on pedestrian modeling, multi-agents exit selecting online games, evacuation psychology and intersecting pedestrian flows. This workshop gathered nearly 100 participants from 24 Universities and institutes for communicating and discussing the latest theories and techniques in the field of pedestrian and evacuation dynamics.



In the last two decades, the group of Pedestrian Evacuation Dynamics at SKLFS, led by Prof. Song, has made persistent investigations on evacuation models that reflect the fundamental forces of crowd evacuation under fire environment, as well as

evacuation analysis methods considering both efficiency and accuracy. Research results have been applied in dozens of large public buildings such as the Beijing Olympic Stadiums, Potala Palace and so on. In the past years, Prof. Song achieved China National Award for Youth in Science and Technology, the second-class National Award of Science and Technology Progress, Lu Jia Xi Youth Excellence Prize of Chinese Academy of Sciences, and other awards.

Signed by: Prof. Naian Liu and Prof. Jun Zhang, University of Science and Technology of China

News from the University of Maryland

Combustion Institute Summer School on Fire Safety Science

This summer school will be held at the University of Maryland, College Park, USA from June 8-12 2020. For more information, please contact Arnaud Trouvé at atrouve@umd.edu. You can also find a separate item on this event below.

Swann Wins the IAFSS Best Thesis Award

Dr. Joshua Swann's dissertation research, entitled, "A comprehensive characterization of pyrolysis and combustion of intumescent and charring polymers using two-dimensional modeling: a relationship between thermal transport and the physical structure of the intumescent char," focused on the characterization of pyrolysis and combustion properties for five commonly used charring and intumescent polymers. The study required the development of novel, experimental techniques and numerical tools to parameterize comprehensive pyrolysis models for each material. Swann was advised by Stanislav Stoliarov.

Donlin Wins UL Fellowship

M.S. student Katie Donlin is the third recipient of the UL Firefighter Safety Research Institute Fellowship, established in 2017. The funding will go towards Donlin's research topic, which is geared towards the fire service community. She is advised by James Milke.

NSF and NIST Fund New Wildland Fire Research Projects at UMD

The NSF study is called Fire Spread at the Wildland-Urban Interface: Modeling and Data Assimilation for Prediction and Risk Assessment. The NIST study is called Ember Exposure Characterization in WUI Fires. The PI for both projects is Michael Gollner (UC Berkeley). Arnaud Trouvé and Stanislav Stoliarov are Co-Is for the NSF and NIST projects, respectively.

Trouvé Delivers Plenary at China National Symposium on Combustion

Arnaud Trouvé's plenary considered the coupling between combustion and radiation, emphasizing the specific scientific challenges associated with fire problems.

Quintiere and Trouvé Teach at the 1st Asia-Pacific Fire Science Summer School

James Quintiere's talk was titled Development of Fundamental Bench Scale Testing, and Arnaud Trouvé's talk was titled Compartment Fire Modeling. Trouvé also facilitated the Numerical Workshop. The summer school took place in Viña del Mar, Chile.

Gollner Moves to UC Berkeley

Michael Gollner has accepted the position of Assistant Professor in the Department of Mechanical Engineering at UC Berkeley. We certainly will miss him. We hope he will be every bit as successful at UC Berkeley as he was at UMD.

Signed: Prof Peter Sunderland, University of Maryland

News from the University of Cantabria

Collaboration with the ASGARD project

On November 22, 2019 Prof. Daniel Alvear, director of GIDAI group, participated in the Hackathon of the 'Analysis System for GAThered Raw Data', ASGARD project (<http://www.asgard-project.eu/>) that took place in Europol headquarters in The Hague, as a member of the Stakeholder Advisory Group. This project, funded by the European Commission within the calls of H2020 (GA 700381), has the purpose of developing a set of tools for the extraction, exchange and analysis of Big Data adapted to the needs of the security forces (LEAs). In addition, what makes this action unique is the collaborative approach, developing a stable community between LEAs, industrial technology developers and universities.

As a methodology to validate technological developments, ASGARD proposes the holding of periodic hackathons in which tools can be evaluated through team games to solve similar actions to those required by LEAs. On this occasion, they were able to analyze the developments of several applications for the analysis of texts, audios and videos, as well as the interaction between several tools.

PRISME/FIRE benchmark Follow-up Meeting

On November 19, 2019, the follow-up meeting of the PRISME/FIRE benchmark took place. The GIDAI Group of the University of Cantabria, in coordination with the Nuclear Safety Council of Spain (CSN), participated in this meeting. The benchmark focuses on the analysis of the fire spread through cable trays in nuclear power plants using computational models. The final goal is to establish a common methodology for the fire spread modelling in cable trays using computational models. Dr. David Lázaro presented the advances made in the fire spread modeling of the common scenario introducing a modification in the Flash-CAT methodology for the estimation of the total heat released by the cable trays.

On this occasion, the follow-up meeting of the PRISME/FIRE benchmark took place in Aix in Provence, France, due to its proximity to the facilities of the Institute of Radioprotection and Nuclear Safety (IRSN) in which the fire experimental test campaign of PRISME projects is carrying out.

Kick-off meeting of the General Assembly of the COST FireLinks action

On October 8 and 9, 2019, the first meeting of the General Assembly of the COST FireLinks Action took place at Sofia (Bulgaria). The main objective of FIRElinks is the development of a network of EU scientists and professionals involved in forest fire research and land



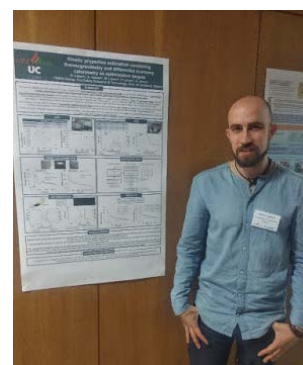
management, and to connect communities of different scientific and geographical origins, allowing the discussion of different experiences and the emergence of new approaches to fire investigation.

This first scientific meeting of the COST Action was focused on setting the agenda for the next 4 years in which the Action will take place. Through different invited talks, key issues about forest fires in Europe were discussed, and an exposition of the situation in more than 27 EU countries was also made through the presentations of delegates from each country. Finally, a poster session was held with the specific work of the different participants to encourage interaction and collaboration between them.

FENIX Project Kick-off Meeting

On June 14, 2019, we attended the Kick-off meeting of the project "Advanced research in materials with fire resistance for public transport (FENIX)", funded by the Center for Industrial Technological Development CDTI, under the 2018 call for large R&D projects.

The FENIX project consists of a consortium of six companies, CROMOGENIA UNITS (coordinator), AERNNOVA, GRUPO COPO, ANTEX, E.CIMA and GRUPO ABN. Each will work in a complementary manner in the development of the activities. Additionally, there will be the support of four Public Research Organizations such as LEITAT, CETIM, TECNALIA and our GIDAI group from the University of Cantabria. Each of these companies and Public Research Organizations will actively collaborate within the project to achieve all the scientific-technical objectives



presented. The main objective of the FENIX project is to improve the fire retardant properties of the materials used in the enclosures of the public mass transport, such as rail transport, aeronautical transport, buses, etc.

Signed: Dr. Mariano Lázaro Urrutia, University of Cantabria

News from the University of Queensland

New Recruitments and PhD students

Dr Felix Wiesner joined the Fire Safety Engineering research group at The University of Queensland as a lecturer in timber engineering in October. His research, which is funded by the National Centre for Timber Durability, will investigate the effectiveness of fire-retardant treatment options for timber products and how these can be best utilised to meet performance-based fire safety measures. Special focus will be placed on the link between fire performance and durability of timber and engineering timber products, to ensure that modern timber buildings can achieve their design life targets. He will also investigate the influence of different physical parameters on the fire performance of different Australian timber species; this will enable a better selection of timber species to meet required performance criteria.



Near the end of 2019, **Julian Mendez Alvarez** (Colombia) started his PhD titled *“External fire spread risk in tall building design”* under the supervision of Dr Martyn McLaggan and Dr Juan Hidalgo. His project will focus on developing intermediate-scale experiments of façade configurations and better understanding their behaviour.

UQ has formed collaboration with IIT Delhi India under the UQIDAR scheme, there will be two new joint UQ-IIT PhD students starting. **Yazan Abu-Tahnat** has started his PhD titled *“Fire Behaviour of Reinforced Concrete Connections”* supervised by Dr Cristian Maluk, Dr Ripti Ranjan Sahoo, and Dr David Lange, and **Akshay Satishkumar Baheti** will be studying *“Multihazard fragility of structures exposed to extreme loading events over their entire lifecycle”*, supervised by Dr David Lane and Prof. Vasant Matsagar.

Upcoming conferences

SiF2020

The University of Queensland will be hosting the 11th International Conference on Structures in Fire (SiF) on June 24-26th 2020 in Brisbane, Australia. Abstract submission is now closed, and the decision announcement will be made in early March. Up-to-date on dates can be found on the website (<https://sif2020.com/>) or by contacting us at <sif2020@uq.edu.au>. We look forward to welcoming delegates to the vibrant city of Brisbane, and to an exciting conference.

Completions

Dr Andres Osorio has moved to the US to start a new job and has transitioned his role in UQ to be Adjunct Professor. He will continue to take an active role in student supervision, and will also continue work on projects relating to bushfires and cladding materials. Dr Osorio was a key member of our team and his presence here will be sadly missed.

Carlo Paneni been awarded an MPhil with a thesis entitled *“Development of Fire Engineering Solutions for Modular Construction”* supervised by Prof. Jose Torero (now at UCL, UK), Dr Cristian Maluk, and Dr Angus Law (now at University of Edinburgh, UK).

Competitions

The University of Queensland has managed to win the NIST Annual Christmas Tree Heat Release Rate prediction competition 2019 the second year running. The team put in a dominant performance, and Mateo Gutierrez impressively managed to clinch the top award for best individual prediction also for the second year running. On behalf of the whole team, we thank Dr Isaac Leventon and NIST for taking the time and effort to organise the competition to spread the important message on making sure that Christmas trees are properly maintained. On another note, if anyone requires the skills of a team to look at trees and guess their burning rate, please contact us.

Publication of the Cladding Materials Library

The Cladding Materials Library (<https://claddingmaterialslibrary.com.au>) has now been published and is freely available for anyone to use. This contains a comprehensive database of common cladding materials, and provides details on their chemical composition, thermal degradation, gross heat of combustion, ignition behaviour, flammability, and flame spread characteristics. Just under 1,100 samples from publicly-owned buildings in Queensland were analysed. This project required a monument amount of work, headed up by Dr Juan Hidalgo and Dr Martyn McLaggan, with support from Dr Andres Osorio, Mr Jeronimo Carrascal, Dr Michael Heitzmann (Mechanical Engineering), Dr David Lange, Dr Cristian Maluk and Prof. Jose Torero (UCL). A huge number of

individuals worked tirelessly to complete the testing, with the majority performed by Tam Do, Angela Solarte, Camilo Montoya Giraldo, Janal Numapo, Ruby Fritz, Sohan Roopra and Alvaro Gomez. We thank all of them for their help and the Queensland Government for their funding and support, and UQ will continue to analyse and publish their data to help tackle the cladding crisis.

Signed: Dr Martyn McLaggan, on behalf of the UQ Fire team.

News From Technical University of Denmark (DTU)

Kristian Hertz of the Department of Civil Engineering has recently published a textbook on fire resistant design of concrete structure, *Design of Fire-resistant Concrete Structures*. The book gives a coherent presentation of methods for fire safety design of concrete structures mainly found by the author during 40 years research and presented to IAFSS from the first meetings. The methods are implemented in practice, in teaching, and in the Eurocodes.

An initial chapter explains high-temperature strength, stiffness, and stress-strain curves for all light and heavy concrete and all reinforcement. The material chapter explains the nature of transient strain for calculation of deflection and stability. The book in particular deals with the mechanisms of explosive spalling of high-strength concrete first discovered by the author and it presents recommendations for how to avoid that. Following chapters introduce design methods for all kinds of concrete structures. They present derivations of the methods improving the users' understanding and application. Examples show how the methods are applied, and they present results for fire-resistance of typical concrete structures including prefabricated concrete elements.

The book in particular presents new design methods and new knowledge for example for walls of heavy and light concrete, where thermal deflection and support conditions for the normal load are of a special importance to the load-bearing capacity. By writing the book the author intends to give a coherent presentation of the methods for design of fire-resistant concrete structures and the data and properties needed for the design.

Signed: Luisa Giuliani, Technical University of Denmark

News from Imperial College London

Hello! Welcome to another update from Imperial College London. For more information, follow us on twitter @ImperialHazelab, visit our [website](#) or watch our [video](#).

New Arrivals

In January, Erika Tomita joined us for a 5-month research project working on façade fires. She is an undergraduate student at Toyohashi University of Technology in Japan, supervised by Prof Yuji Nakamura. Welcome to Hazelab, Erika!

Graduating Students

Franz Richter successfully passed his PhD thesis defence in October – congratulations Franz! He has now taken a position as a postdoc with us funded by EPSRC. Soon he will be moving to sunny California to take on a postdoc position at UC Berkley.

Departures

Francesco Restuccia accepted a lectureship position at Kings College. Francesco has joined and is helping to create the brand-new engineering department at Kings College London. After many years of exemplary research in Hazelab with us we are sad to see him go, but proud of his achievement and excited for his bright future. Good luck, Francesco!

Conferences

Harry presented his master's thesis at the England and Wales Wildfire Forum (EWWF) in November, hosted at the principality stadium in Cardiff. During his masters project, he developed PERIL (Population Evacuation Trigger algorithm), a toolkit for developing evacuation triggers for communities in the wildland urban interface in the case of a wildfire.

A large group from Hazelab participated in the 1st International Fire Science Workshop in Valparaiso, Chile. They enjoyed learning from leaders in the field of fire science, meeting researchers from all around the globe, and then chilling with them in the sun by the pool with pisco sours in the evening. Best week of the year!

Guillermo gave a talk at the EU Fire Safety Week on performance-based design to the Institute of Mechanical Engineers in London. Guillermo and all the Arup funded PhD's of the group gave seminars for the UK Arup fire team on their recent research. The seminars were part of the CPD weekly sessions organized by the fire team.

Awards

Yuqi Hu won the 2019 Katapodis Prize for the best PhD thesis in Thermofluids division at Imperial College. His thesis 'Experimental Investigation of Peat Fire Emissions and Haze Phenomena' showcases his work on fire science. Great job Yuqi! Also, a big congratulations to Franz for winning the 2019 Lloyd's Register Foundation 'Student Communicator of the Year' competition!

Francesco's PhD thesis on self-heating ignition of porous media got honorary mention for 2019 IAFSS best thesis award.

Guillermo won the President's Award for Excellence in Research Supervision. This is an annual award to recognize staff at Imperial College who have made outstanding contribution in education. He was also conferred the FORUM 2019 Mid-Career Researcher Award.

Matthew Bonner won the photo competition at Imperial's Mechanical Engineering Department with a beautiful shot of three high rise buildings in the City of London. One of the captured buildings is the Scalpel, a 40-story building designed using the Improved Travelling Fire Methodology developed by Hazelab.

Large-scale Experiments

A second round of travelling fire experiments were performed in Poland under the name Obara x-TWO. These experiments are the fruit of a long collaboration between Hazelab, Arup UK, ITB Poland and CERIB France. The data collected from these will be used to verify and validate the Improved Travelling Fire Methodology.

Also in Poland, our façade team, in collaboration with ITB and Arup, performed a series of original experiments on façade systems with flammable components. The cladding panels investigated for fire performance included HPL and ACP.

Our team of peat fire researchers went to Flow Country (North Scotland) and spent two days in the field collecting peat from locations near the fire scar. The peat samples they brought back will be used to perform several experiments in our lab at Imperial College; the experiments are aimed at understanding the fundamental mesoscale science of smouldering peatland fires.

Launch of Leverhulme Centre for Wildfires



Hazelab goes to Chile



Team haze in Flow Country

Hazelab is part of the £10m centre for Wildfires, Environment and Society which was created in Imperial and King's College. In November, Hazelab took part in the launch of the centre and exhibited posters showcasing our research on forest and peatland fires. In the next few months we will be hiring a PhD student who will be working on the fundamentals fire dynamics of arctic fires as part of this project.



Franz, Student communicator of the year!



The Scalpel and co.

Outreach

In October we exhibited at New Scientist Live, the biggest science festival in Europe. In the 2019 edition our stand was very successful with kids and grown-ups alike thanks to Sirocco, our homemade fire tornado, therefore this year we were invited again and were assigned a bigger stand. Guillermo also gave a public talk on one of the main stages, the engineering stage of course.

Matt's research on façade fires featured on the front page of the [Financial Times](#) and Guillermo was cited in an article of [The Economist](#) on arctic fires.



Imperial College stand at New Scientist Live 2019

In January we had the pleasure of presenting our research at the London Fire Brigade Headquarters for the CPD event organized by the LFB fire engineering team. Talks from Ben, Matt, Franz and Francesca covered facades, timber, and structural cables in the context of fire safety. Overall, a great event that resulted in many interesting discussions!

SFPE Greater London Student Chapter

The student chapter has kept us very busy this winter with five interesting seminars, a fire themed pub quiz and the long-awaited Christmas party. We have hosted our first seminar at Kings College where the newly appointed lecturer Francesco Restuccia gave a great presentation summarizing 8 years of research - it was impressive that he kept it to 45 minutes! We also hosted a couple of seminars at the University of Greenwich and at the Arup Headquarters. All the talks have been recorded and are available on our [website](#).

Finally, we would like to send a huge thanks all of the academics and engineers who were kind enough to visit us and share their expertise and diverse experiences with the group. Thank you to Prof. Vincent M Brannigan (University of Maryland), Dr Benjamin Ralph (Foster+Partners), Dr Francesco Restuccia (King's College), Dr John Gales (University of York), Danielle Antonellis (Arup), Dr Claire Burke (Liverpool John Moores University), Malcom Wise (University of Newcastle).

That's everything from us for now – we look forward to seeing you at IAFSS conference in Waterloo!

Signed: Francesca Lugaesi, Imperial College

News from Case Western Reserve University

Ya-Ting Liao Received NSF Early CAREER Award

Ya-Ting Liao, Assistant Professor, has recently received the NSF Faculty Early CAREER award. The grant supports her project titled "Understanding the Role of Buoyancy Flow for Accurate and Robust Scale Modeling of Upward Flame Spread". The project, funded at \$500K, is scheduled to start on July 1, 2020.

The project will study how fire behaviors change from small laboratory scale to large real-world scales, as found in structures or forest fires. This scalability problem is a long-standing challenge in fire science, one that limits generalizability of laboratory testing. Filling this knowledge gap will improve the relevance of standard safety tests and lead to safer structures and better fire mitigation techniques. The project will employ experiments, numerical simulations, and theoretical modeling to control, study, and predict fire behavior at various scales.



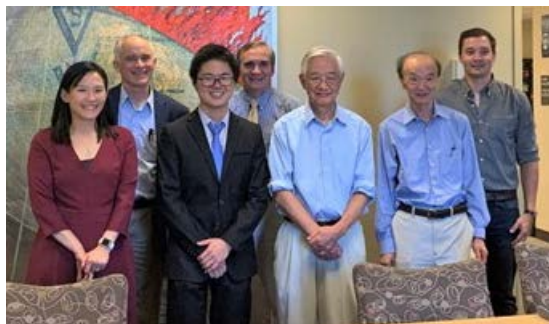
This project will also help cultivate the next generation of academic and industry leaders. This will be achieved via interactive public demonstrations of fire dynamics and via promotion of technical standards in college curricula.

Recent PhD Graduates

Dr Jiyuan Kang graduated with his PhD in May 2019. His research is entitled "Morphology and Performance Characterization of Intumescent Coatings for Fire Protection of Structural Steel". Kang is now working at UL, LLC.

Dr. Chengyao Li successfully defended his Ph.D. dissertation and graduated in August 2019. The title of his dissertation is "Material Flammability and Burning Behavior of Thin Solids in Concurrent Forced Flow in Microgravity: A Numerical Study in Support of Large Scale Microgravity Burning Experiments".

Dr. Li joined Prof. Ya-Ting Liao's lab in Fall 2015 and has been a productive member ever since. Dr. Li focused his numerical simulations on fire dynamics, and was involved in multiple projects, including NASA's Spacecraft Fire Safety (Saffire) project. During his four years in Dr. Liao's lab, Dr. Li generated four journal articles (one under review), two conference articles, and multiple conference/workshop presentations. Dr. Li received the Xiaoyang Zhao Memorial Graduate Student Research Award in 2019 at Case Western Reserve University.



After his Ph.D., Dr. Li joined Prof. James S. T'ien's research group as a Post-Doctoral researcher. He is in charge of flight sample preparation for the upcoming GEL (Growth and Extinction Limit) experiment. This investigation is part of NASA's SoFIE (Solid Fuel Ignition and Extinction) project and is scheduled to occur aboard the International Space Station in 2021-2024.

Studying Flame Spread in Space to Improve Fire Safety on Earth

Prof. Ya-Ting Liao and her co-investigator Dr. Paul Ferkul from Universities Space Research Association are setting fires on the International Space Station! Their project, Confined Combustion, is co-sponsored by the National Science Foundation (NSF) and the Center for the Advancement of Science in Space (CASIS).

Experiments of concurrent-flow flame spread over flat solid samples are performed under various confined conditions aboard the ISS. The objective is to investigate the thermal and aerodynamic interactions between a spreading flame and its nearby surrounding structures. Facilities aboard the ISS National Laboratory provide a long-duration microgravity environment. This removes the confounding effects of buoyancy and facilitates the observation of the otherwise masked underlying physics of fires. The project outcome will help enable safer structure design and improve fire safety codes both on Earth and in space.



Experiments of Combined Combustion began on Dec. 24th, 2019 with crew member Christina Koch (pictured) and is currently half way through scheduled operations with help from crew members Jessica Meir, Luca Parmitano, and Andrew Morgan.

Development of Real-Time Particulate and Toxic-Gas Sensors for Firefighter Health and Safety

Firefighters are exposed to toxic smoke and gases. A final report of the project, "Development of Real-Time Particulate and Toxic-Gas Sensors for Firefighter Health and Safety" has been disseminated through the Fire Protection Research Foundation here:

<https://www.nfpa.org/News-and-Research/Data-research-and-tools/Emergency-Responders/Development-of-real-time-particulate-and-toxic-gas-sensors-for-firefighter-health-and-safety> and accessible here: <https://engineering.case.edu/sites/default/files/Final%20report-Sensors-FY2014.pdf>.



Miniaturized particulate sensor (photo by Paul Greenberg, NASA)

Fire Blanket Protection from Wildland Fire: Revisited

Each year, fires in the wildland-urban interface cause significant damage to communities around the world. Prof. Fumiaki Takahashi has recently published an open-access journal paper entitled "Whole-House Fire Blanket Protection From Wildland-Urban Interface Fires." The article describes the work previously conducted, including videos, and is readily available here: <https://www.frontiersin.org/articles/10.3389/fmech.2019.00060/full>.

2nd Public Safety Symposium and Workshop

The Second Public Safety Symposium and Workshop, organized by Prof. Hatsuo (Ken) Ishida from the Department of Macromolecular Science and Engineering, will be held on the CWRU campus on Feb. 18th and 19th, 2020.

The symposium will focus on technology and research needs to improve public safety and resilience of infrastructure. The symposium aims to bring together and exchange cross-cutting perspectives between academia, national laboratories, and industry through keynote lectures, research presentations, and interactive forums. Panel discussions will cover various topics including battery fire safety, integration of industry needs and fundamental research, and government involvement. The symposium will be attended by 45 professors from 13 universities, along with researchers from national labs and industry. Plenary Lectures will be delivered by Dr.

Walter Copan (Under Secretary of Commerce for Standards and Technology and Director of NIST), by Dr. Marla Perez-Davis (Director of NASA Glenn Research Center), and by Terry Brady (President and CEO of UL).

Signed: Ya-Ting T. Liao, Case Western Reserve University

News from the Fire Safety Engineering Group (FSEG), University of Greenwich

Projects

FSEG are involved in a number of on-going and new research projects concerned with a variety of topics including wildfire evacuation; evacuation due to marauding armed terrorists; fires in baled waste as well as cladding fires. A brief over-view of some of these projects is highlighted below.

a) GEO-SAFE

FSEG are leading the GEO-SAFE (691161) consortium of 18 partners from 7 countries (UK, Spain, Italy, France, Switzerland, Netherlands and Australia) undertaking research into all aspects of Wildfire. GEO-SAFE is a four year (2016 – 2020) RISE project funded under Horizon2020.

One of the intended outcomes of GEO-SAFE (Geospatial based Environment for Optimisation Systems Addressing Fire Emergencies) is implementing solutions and tools for fire suppression, life- and property- protection, fire management and training. The three main fire management domains addressed in GEO-SAFE are: 'Fire Suppression and Fire propagation control', 'Life and Property Protection' and 'Implementation and Training'.

FSEG's main role in this project is in the domain of Life protection and the development of urban-scale evacuation simulation tools that can be used for both planning (urbanEXODUS) and to assist in live incident management (webEXODUS). A major development to come out of our work on both GEO-SAFE and IN-PREP (see below) is the extension of the urbanEXODUS evacuation model to include vehicle based evacuation, providing urbanEXODUS with coupled pedestrian-vehicle-wildfire simulations within a single modelling environment (see Figure 1).

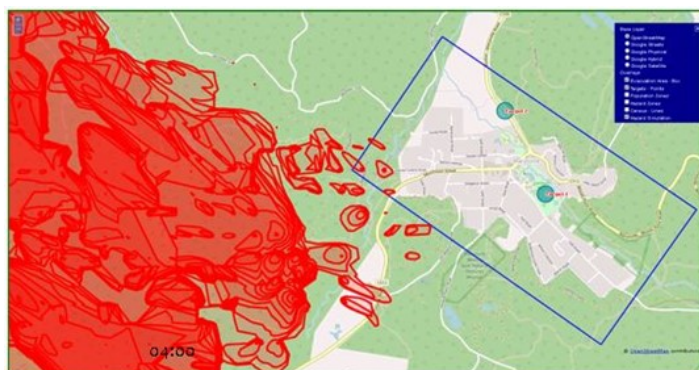


Figure 2: urbanEXODUS coupled to PHOENIX wildfire output showing predicted fire front approaching a town of 519 occupants.

small town is depicted in Figure 3.

- You can find out more about the FSEG role in GEO-SAFE from the FSEG web pages at:
 - <http://fseg.gre.ac.uk/fire/geo-safe.html>
- You can also find out more about the GEO-SAFE project from the project web pages at:
 - <http://geosafe.lessonsonfire.eu/>

b) Construction Site Evacuation

FSEG recently completed a project (May 2016 – June 2019), funded by IOSH, concerned with evacuation from construction sites. While fire may not be a major cause of death or injury on construction sites, given the high frequency of fires and the number of workers involved, there is nevertheless a significant risk to the worker safety should an evacuation caused by fire or other on-site emergency be required. It is therefore essential that large-scale construction sites have robust plans for safe and timely emergency evacuation. Evacuation during

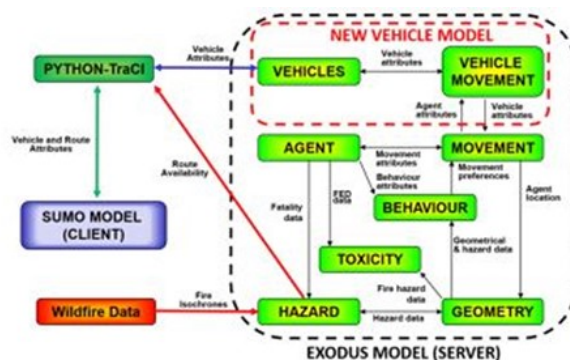


Figure 1. Coupling of urbanEXODUS with vehicle and wildfire simulation models

This has been achieved by coupling urbanEXODUS to the open source SUMO vehicle model. SUMO models the movement and routing of the vehicles in the road network, whereas urbanEXODUS controls all interactions of the pedestrians with the vehicles and vehicles with pedestrians. In addition, urbanEXODUS determines which roads have been compromised by the fire and signals to SUMO whether vehicles need to be re-routed or are assumed to be destroyed by the fire, together with which roads are blocked. urbanEXODUS is also coupled to wildfire models such as Sparks, Phoenix and Prometheus using a custom XML import format (see Figure 2). The results of simulated pedestrian/vehicle evacuation of a

construction is one of the most challenging evacuation scenarios particularly given the changing nature of the construction site. Nevertheless, over the past 50 years, very little research has focused on this topic. The overall aim of this project was to develop a unique evidence base characterising, for the first time, the actual performance and behaviour of construction workers during emergency evacuation.

To develop the evidence base, four unannounced full-scale evacuation trials and five walking speed experiments were undertaken on two high-rise construction sites in Central London. At each site, two full-scale trials were undertaken with the building at different phases of construction. The data-set generated from these nine trials involving 1,072 participants, incorporates around 2,200 data points and information from 61 worker questionnaires.

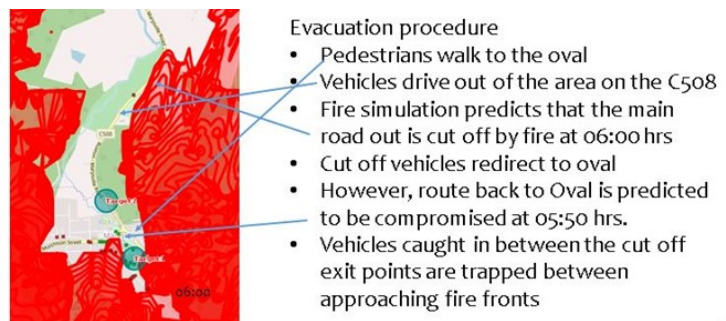


Figure 3: urbanEXODUS simulation of coupled wildfire-pedestrian-vehicle evacuation showing impact of a late vehicle-pedestrian evacuation.

The analysis of this data has produced an evidence base characterising, for the first time, the actual performance and behaviour of construction workers during emergency evacuation (see Figure 4). The evidence base addresses limitations, assumptions and omissions in safety guidelines and regulations around the world. Furthermore, it informs the development of more reliable evacuation procedures, improving the work environment, through better preparation for, and management of, on-site emergency evacuation, advancing the safety of construction workers. As part of the project, the evacuation simulation tool buildingEXODUS was modified to provide a unique capability to simulate evacuation from high-rise construction sites. Data from one of the four full-scale evacuation trials was used to define a validation data-set that could be used to assess simulation model performance in predicting the outcome of the construction site evacuation trial.



Figure 4: Cramped conditions inside the formworks.

The validated evacuation simulation software and data-sets were then used to explore potential improvements to evacuation procedures on high-rise construction sites, arising from reduced worker response times, replacing ladders with temporary stairs within the formworks and using hoists for evacuation. In each case, the target building consisted of 525 workers, including 400 workers located in the main building and 125 workers located in the formworks (see Figure 5).

FSEG will be presenting a paper on the construction site evacuation validation data-set at the 13th IAFSS Symposium Waterloo Canada.

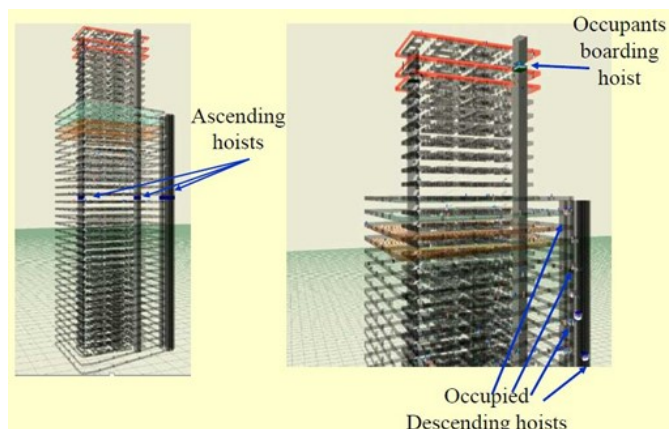


Figure 5: buildingEXODUS simulation of evacuation from high-rise construction sites using hoists.

- You can find out more about the project from the FSEG web pages at:
 - http://fseg.gre.ac.uk/fire/construction_sites123.html
- The full report can be downloaded from:
 - www.iosh.com/constructionevacuation
- Construction site evacuation simulation videos and this video can be found on the FSEG YOUTUBE Channel:
 - <https://www.youtube.com/user/FSEGresearch>
- The High-Rise Construction Site Evacuation Modelling Validation Data-Set can be downloaded from:
 - http://fseg.gre.ac.uk/validation/building_evacuation/

c) In-Prep

FSEG are part of a Horizon2020 called In-Prep (2017-2021). The project is concerned with urban scale disasters including, earthquakes, floods and terrorist situations. The FSEG role in the project is to further develop the urbanEXODUS and webEXODUS modelling environments to provide a modelling environment to enable decision support for planning and real-time applications. This includes vehicle based evacuation (see the GEO-SAFE project above).

<https://www.facebook.com/notes/fire-safety-engineering-group-fseg/fseg-in-prep-horizon2020-project-kicks-off/1856213437727221/>

d) Marauding Armed Terrorists

FSEG have funding from the UK Government to extend the buildingEXODUS evacuation simulation tool to include scenarios involving evacuation from incidents involving marauding armed terrorists. The new version of the software is called matEXODUS and has a range of new behavioural features required to simulate scenarios involving marauding armed terrorists in crowded spaces.

e) Grenfell Inquiry

FSEG director Prof Ed Galea was appointed to the Grenfell Inquiry in 2017. With the support of his FSEG colleagues, he is undertaking a forensic investigation of the evacuation of the tower. This involves an analysis of the witness statements, video footage of both the fire spread and evacuation; detailed evacuation simulation and CFD fire modelling. He has already supported the Inquiry's Phase 1 published recommendations and is due to report his Phase 2 findings later in 2020.

f) Baled Waste Fire Modelling

Work continues on an internally funded project to develop capabilities to support the modelling of the complex fuel and fire behaviours associated with fires in baled waste. Fires in baled waste are particularly frequent, costly, environmentally hazardous and difficult to tackle. The project has already developed sub-models to handle the physics of bale de-binding and toppling, as well as fuel pooling and burn-away. Once validated against WISH fire tests, these capabilities will be released within the SMARTFIRE fire modelling framework.

g) Two Way Coupled Fire and People Movement Analysis

As part of the Australian DSTG funded research to develop a Naval Platform Survivability Assessment Capability, FSEG are continuing their research into two-way coupled modelling of fire and people movement/evacuation/first responder/warden behaviour. This allows human actions, most typically on a Naval vessel, to impact the fire modelling scenario for pre-modelled scenarios that will be used for incident assessment, strategic planning and training. In the project FSEG and DSTG are developing a Naval Damage Incident Recoverability Toolset (NavDIRecT). This software will also interact with other proprietary sub-models which will, for example, predict blast damage as a precursor to fire, evacuation and survivability analysis.

PhD Students

Three FSEG PhD students recently completed their PhD's.

Dr Simo Haasnen:

FSEG PhD student and staff member Simo Haasnen defended his PhD thesis entitled, "*Immersive Real-Time Multi-User interaction with Computer Simulated Pedestrians During Emergencies*" on 13th November 2018. Both the external examiners Dr Nikolai Bode (University of Bristol) and Dr Steve Maddock (The University of Sheffield) were very impressed with the scope, complexity and novelty of his work.

His supervisors were, Dr Peter Lawrence, Prof Ed Galea and Dr Steve Gwynne.

Dr Asim Siddiqui:

FSEG PhD student and staff member Asim Siddiqui defended his PhD thesis entitled, "*An Investigation into Data Sharing Between Building Information Modelling and Fire Safety Engineering, with Potential Applications to Smart Buildings*" on 26th July 2019. Both the external examiners Dr Pete Thompson (Autodesk) and Dr Nicole Hoffmann (Fire Cubed LLP, NiHoFire Ltd) were impressed with both the quality of the research and the way Asim handled the demonstration and questioning during the viva.

His supervisors were, Dr John Ewer, Prof Ed Galea and Peter Lawrence.

Dr Owain Thompson:

FSEG part-time PhD student and member of Kent Fire and Rescue Service Owain Thompson successfully defended his PhD thesis entitled, "*Towards a Comprehensive Understanding of Human Behaviour in Dwelling Fires*" on 31st October 2019.

Both the external examiner Dr Karen Boyce (Ulster University) and the internal examiner Dr Steve Deere were very impressed with his work. Dr Karen Boyce commented, '...the thesis represents an extensive and significant contribution to research in the area. Also, it was encouraging and exciting to note that the work is already

impacting developments in fire safety messaging, fire prevention activity, incident command training and operational response.’ Owain’s achievement is all the more impressive when you consider he has a full-time and demanding job and a family with two young children.

His supervisors were Prof Ed Galea and Dr Lynn Hulse.

Honours and Awards

FSEG has recently won several awards for its research into fire and evacuation.

Royal Aeronautical Society Gold Award

On 29 November 2018, FSEG were awarded the 2018 GOLD Award from the Royal Aeronautical Society for the best paper to appear in the Royal Aeronautical Journal. Their paper concerned a detailed fire and evacuation forensic analysis of the Manchester B737 fire of 1985 which claimed the lives of 55 people. The paper concerns coupled CFD fire simulation, using the SMARTFIRE fire simulation software and agent based evacuation modelling using the airEXODUS evacuation simulation software. The authors of the paper are, Prof Ed Galea, Dr Zhaozhi Wang and Dr Fuchen Jia. An overview of the paper can be found at: <https://www.facebook.com/notes/fire-safety-engineering-group-fseg/fseg-have-published-a-new-journal-paper-concerning-the-fatal-manchester-b737-fir/1564086043606630/>

SFPE (UK Chapter) Best Research Project 2019

Best Research Project 2019 – Prof Ed Galea, Dr Hui Xie, Dr Steve Deere, Dr Lynn Hulse and Mr David Cooney: Fire Safety Engineering Group, University of Greenwich (Construction site evacuation safety: Evacuation strategies for tall construction sites)

The award was for the IOSH funded FSEG research concerning evacuation of high-rise construction sites (see project description above). The project was very much a team effort, with five members of FSEG being the core members of the research team, but with other FSEG members providing invaluable assistance when required, especially during the four challenging unannounced high-rise evacuation trials we ran. It was also a great example of what can be achieved when academics partner with industry. Jim Senior, then of MULTIPLEX, now with MACE, had the confidence and vision to allow FSEG access to two high profile construction sites in the middle of London (22 Bishopsgate and 100 Bishopsgate) to run four unannounced full-scale evacuation trials.

The SFPE citation states: “Outstanding, unique and informative research in an area seldom explored. There is great potential to make the construction environment and all those who work in it safer from fire and this research provides data and tools to achieve this objective.”

For more details about the project see the project description above.

Lifetime Achievement Award

FSEG founding director, Prof Ed Galea was awarded the inaugural University of Greenwich Lifetime Achievement Award for his pioneering work in computational fire engineering. In presenting the award, Prof Javier Bonet, Deputy Vice Chancellor of the University of Greenwich said, “... this award is in recognition of the outstanding contributions made by Prof Ed Galea to computational fire engineering over the past 30 years”. The award was announced at the University of Greenwich Annual Research Awards event on 29 November 2018 and presented to Prof Galea on the 28 January 2019.



Prof Galea (left of centre) with Prof Javier Bonet, Deputy Vice Chancellor (to his left) with FSEG and friends.

In accepting the Lifetime Achievement Award, Prof Galea said, “...I proudly accept this award not only on my behalf, but on the behalf of all of FSEG, past and present, without whose dedicated work the achievements in which we all share would not have been possible.” For details, please see: <https://www.facebook.com/notes/fire-safety-engineering-group-fseg/prof-ed-galea-awarded-lifetime-achievement-award-by-university-of-greenwich-for-/2515001221848436/>

FSEG Workshop 20 Feb 2020

FSEG, as part of the EU Horizon2020 RISE GEO-SAFE project (see above) has organised a one-day workshop to be held on 20 Feb 2020 with a focus on human behaviour associated with wildfire evacuation and predictive modelling tools that can be used to simulate wildfire evacuation.

The main workshop themes are:

- Identification and quantification of human behaviour in response to wildfire.

- Role, requirements and capabilities of evacuation modelling in the planning and management of wildfires.
- Development and application of Large Scale Wildfire - Evacuation Models.
- Future directions for wildfire evacuation modelling.

The workshop consists of:

- 7 invited lectures,
- 3 discussion panels,
- a hands on session using urbanEXODUS urban-scale evacuation simulation model,
- a demonstration session showing recent developments in coupling wildfire, pedestrian and vehicle models.

Attendance at the workshop is free and all are welcome but places are limited, so please register early.

The deadline to register is 14 Feb 2020, using the following link: <http://fseg.gre.ac.uk/hbem/>

FSEG Short Courses 2020

FSEG are again offering their well-established five day short courses in 2020:

- Principles and Practice of Evacuation Modelling: 20 - 25 April 2020,
- Principles and Practice of Fire Modelling: 8 – 12 June 2020.

The courses have been run each year since 1997 and so 2020 marks the 23rd year in which the courses have been offered, probably making them the longest running short courses in computational fire engineering, in the world. In that time we have trained around 700 delegates from 44 countries in both fire and evacuation modelling, including, fire engineers, fire scientists, architects, fire fighters and regulatory authorities.

You can register on our courses from our web pages at: <http://bit.ly/FSEG-SC>

You can keep up with the latest news from FSEG and join in topical fire research and fire engineering discussions by following us on social media:

- FSEG facebook page: <https://www.facebook.com/FSEG.UK/>
- FSEG Twitter: @evacguy
- FSEG YOUTUBE: <https://www.youtube.com/user/FSEGresearch>
- FSEG LINKEDIN: <https://www.linkedin.com/in/ed-galea-1297358/>

Signed: Ed Galea, University of Greenwich



News from Pprime Institute – Poitiers – France

LE Van Minh's PhD defense: Modeling of finite rate chemistry effects in the combustion of solid fuel relevant to fire safety problems.

Minh defended his thesis titled "*Modeling of finite rate chemistry effects in the combustion of solid fuel relevant to fire safety problems*" on December 20th 2019 in the Pprime Institute, Poitiers, France. The thesis was supervised by Prof. Thomas ROGAUME, Dr. Franck RICHARD, Dr. Jocelyn LUCHE and Prof. Arnaud TROUVÉ. The Jury was composed of: Prof Bernard PORTERIE, Prof Tarek BEJI, Prof. Benedicte CUENOT, Prof. Pascal BOULET and the supervisors. The general objective of the thesis is to evaluate the potential of



advanced combustion and radiation models for large eddy simulations (LES) of fires. We adopt here both steady and unsteady laminar flamelet model that include: detailed information on combustion chemistry through a tabulated chemistry approach; a careful description of the combustion-radiation coupling (local radiation phenomena are treated by the flamelet solver while non-local radiation phenomena are treated by the LES solver through the radiative transfer equation); a description of subgrid-scale turbulence radiation interactions; and a description of gray radiation effects. The new flamelet-based combustion/radiation model is incorporated into the LES solver FireFOAM and is evaluated by comparisons with experimental data obtained in a turbulent line burner experiment previously studied at the University of Maryland. Comparisons between simulated and measured temperatures show relatively good agreement. In addition, comparisons between simulated and measured values of the global radiant fraction show that simulated data well capture the decreasing trend of the global radiant fraction when the oxygen strength is decreased, but significantly over-predicts it, a result can be explained by the limitation of the grey radiation model, which does not account for the variation of wavelength. To improve the prediction of the global radiant fraction, a development of a better radiation model coupled with the flamelet than the grey one is in progress.

This project is financially supported at Université de Poitiers by the French Government program "Investissements d'Avenir" (LABEX INTERACTIFS, reference ANR-11-LABEX-0017-01). Special thanks the University of Poitiers for this financial support as well as the "Institut des Risques Industriels, Assurantiels et Financiers" for its technical and financial support via the platform "Incendie" Hestia.

New PhD Student: Bastien Le Ray, concerning the effects of underventilated fires on the reaction-to-fire of materials

Bastien Le Ray is keen on physics, he has obtained his License in physics in 2017, then continued in the first year of Master Degree and finished his university course in master 2 in engineering fire safety at Aix-Marseille University. After that, his diploma of Master of fire science and safety engineering enabled him to focus on a thesis fully. He will be able to put into practice his knowledge obtained thanks to internships and classes as part of his master.

Bastien Le Ray has started his PhD on January 6th of the year 2020. The subject is about the effects of underventilated fires on the reaction-to-fire of materials. All the work is divided into two parts: the first one aims at finding a model of combustion describing a chemistry non-infinitely fast and then putting it in a CFD of fluid mechanics.

Also, the goal of the second part of the thesis is to describe experimentally and at several scales effects of oxygen concentration and of air flow on the reaction-to-fire of a polymeric material, to provide some data for validation of numerical model. In parallel, It comes to develop numerical models about solid phase and exchanges between solid and gas phase; numerical predictions will be compared with experimental results.

The thesis is managed by Thomas ROGAUME (PPrime Institute) and overseen by Damien MARQUIS (LNE) and Benjamin BATIOT (PPrime Institute).

New PhD Student: Safae Kellali, concerning fire safety due to the combustion of the deposits into flue ducts

I am a new PhD student and my thesis at Pprime began on 02/11/2019 in the framework of cooperation between research departments: University of Poitiers (UP), and the French company POUJOLAT, under the supervision of Prof. Thomas Rogaume, Dr. Franck Richard, Dr. Benjamin Batiot and Dr Pierre Cremona. The present project aims to resolve the problematic of chimney fires, especially those which can be caused by the buildup of deposits within the flue. These deposits can be caused by tar and creosote from the gasses cooling within the flue.

The hazard is that those deposits are flammable and could ignite once the necessary ingredients for fire are present (fire triangle). And in order to eliminate the risk of a chimney fire, the final objective of the project is to have predictions concerning the occurrence of the buildup of deposits, the possibility of their inflammation and if it is the case, the description of inflammation and propagation of flames. This work aims also to test the different chimney fire scenarios caused by creosote in order to determine the associate conditions, for the purpose of preventing fire by avoiding those conditions.

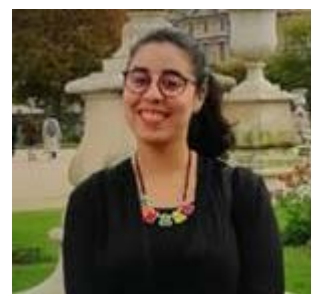
The study is numerical and experimental during all the PhD phases. The experimental study will be done both at the material scale (at PPRIME) and the real one (at CERIC laboratory). And the numerical part will focus on the simulation of the deposits burning using OpenFoam (PATO).

I've always been inquisitive about how industrial processes work in factories. After starting to know more about the processes running, I quickly realized that most industrial activities imply a potential safety risk. And being aware of the importance of safety management as it aims to ensure the safety of people and the environment. I decided to pursue a double engineering degree (Environmental, process & energy engineering and accidental and industrial risk management).

Concerning my centers of interest, I am interested in the concept of risk in general. However, I am specifically keen on fire and explosion risks. Moreover, the beauty of flames and my desire to know more about the complex phenomenology of combustion were one of the reasons that let me do a PhD.

New PhD student: Corentin Nougier on the Study of the degradation of burning solid materials subjected of controlled under-oxygenation regimes simulating real environmental conditions of a fire source in a ventilated and confined environment

In October 2019 Corentin Nougier started his thesis, under the supervision of Prof. Thomas Rogaume and Dr. Benjamin Batiot at Pprime Institute (Poitiers) and Dr Mickaël Coutin at IRSN (Cadarache). The thesis is part of the research program



FIGARO (Fires Involving Glove boxes with Aerosol Release Occurrences) between IRSN, NRA (Nuclear Regulation Authority of Japan) and JAEA (Japan Atomic Energy Agency). The goal of the thesis in this program is to bring a better understanding of the burning of two materials constituting the glove boxes, the polycarbonate, and the poly(methyl methacrylate), during a glove box fire. Therefore, these materials will be studied in conditions such as encountered during a real fire; in under-oxygenation regimes, receiving an external heat flux, and in horizontal and vertical positions. To perform this work, a multi-scale approach will be applied, with the use of small scale testing (ATG, DSG and cone calorimeter) and a medium scale calorimeter (the apparatus CADUCEE). The aim is to use the data produced during this project to verify the correlations currently used in numerical codes, for the under-oxygenation regimes, and bring corrections or build confidence in it.

New collaboration on the fire safety analysis of Cellulose in collaboration with Jean Christophe Chevallier from the Fire Rescue of "Loire Atlantique" (SDIS 44)

In order to validate his Master Degree, Jean Christophe Chevallier who is a professional Fireman, has realized an experimental study into Pprime Institute under the supervision of Dr Jocelyn LUCHE. A series of laboratory-scale



after a more or less prolonged exposition time, to these heat sources. Thus, objectives of this work were to investigate, develop and understand smouldering and fire phenomenon of cellulose wadding exposed to halogen spotlight heating by using a laboratory-scale model. This experiment device represents the installation of a rooftop house with cellulose wadding in direct contact with a 40W halogen spotlight and the electrical wire used for its power supply. After more than three hours, visible signs (smoke, crackling, heat perceived on the outside surface of the model, measured temperatures higher than ignition temperature of cellulose wadding, etc.) could be detected from the outside and the ignition of the cellulose wadding were able to be observed.

fire tests on cellulose wadding used as insulation material in residential homes to promote, among other things, energy savings in residential houses has been realized. Thus, when safety rules were not respected (*i.e.* not using a non-flammable protective cover), this cellulose wadding could be into contact with heat sources coming from lighting or electrical sources (*e.g.* halogen spotlights or electrical wires) installed in the ceilings of these houses. As a result, firefighters faced fires linked to these insulation materials that have ignited as a result of exposure,



This work was done by Jean Christophe CHEVALLIER under the supervision of Dr Jocelyn LUCHE from Pprime Institute.

New collaboration on the characterization of the smoke stopper effect in collaboration with Olivier Roy from the Fire Rescue of "Ile et Villaine" (SDIS 35)

Olivier Roy is a professional Fireman. In order to validate his Master degree, he chooses to study the operational system named "smoke stopper". This new material is recently used in France, but its scientific effects on the smoke and on the fire are unknown. To realize this study, a specific bench scale has been developed by Eider Industry. It represents at small scale a typical room in buildings. The bench



scale was equipped with multiples thermocouples, fluxmeters, mass measurement (balance), camera, gas analysis...

Different tests have been done, with an evolution of the opening surface, from completely open to completely close.

During the different tests, special attention was kept on the influence of the closure on the fire dynamics and on the smoke stratification. 5 different regimes of combustion have been identified and characterized.



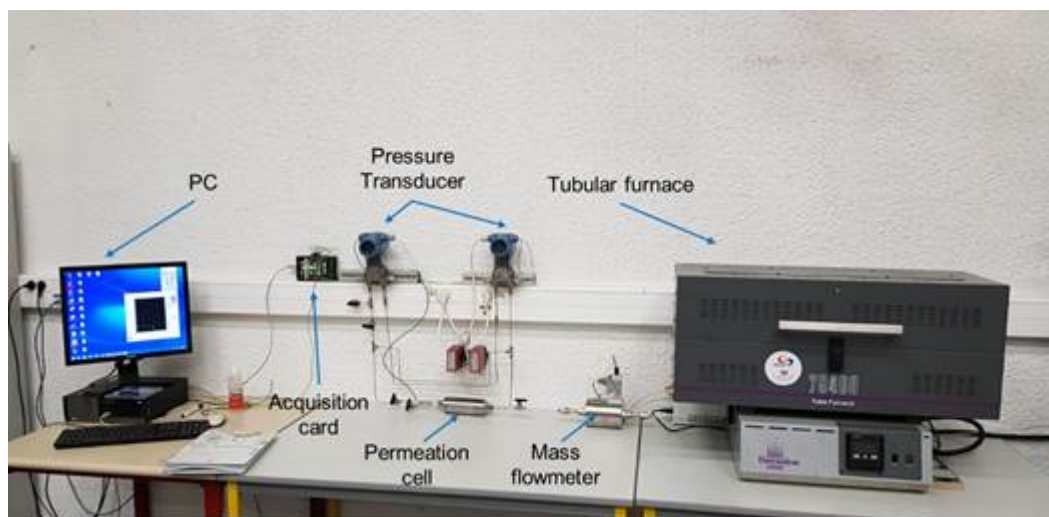
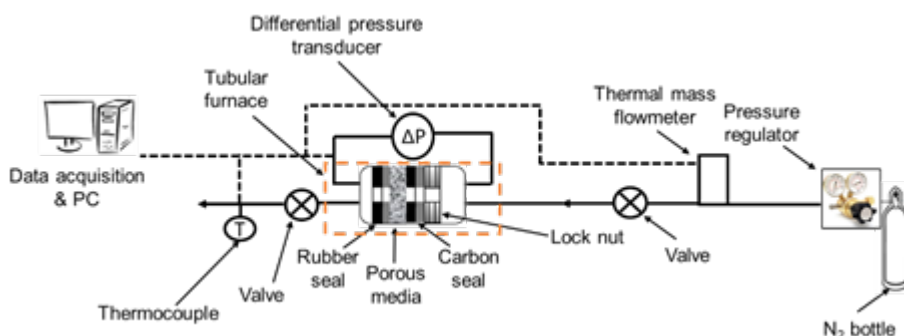
Those very interesting results have permitted to draw different perspectives.

Progress of research project “CHALEUR”

The team of Prof Thomas ROGAUME at Pprime Institut (Poitiers, France) is currently working on the project Chaleur in association with Stelia Aerospace and Rescoll which is funded by European Union. A research engineer, Hussain NAJMI, has been recruited for the ongoing project who works under the supervision of Prof Thomas ROGAUME and Dr Jocelyn LUCHE. The aim of this project is to characterize the fire behavior of multilayer composite materials used in aircraft interiors. The experiments are performed using TGA and Cone calorimeter. In addition to this classical thermal approach, a permeability analysis is also carried out on the multilayer materials defined under this project. As we know the multilayer materials are constituted of various layers of different kinds of materials, therefore in the framework of this project each material is tested individually and thereafter the same analysis is performed on the assembly too.

First TGA analysis is performed under air and Nitrogen to identify the decomposition kinetics of the materials. Then the same materials are tested under cone calorimeter at different heat fluxes (i.e. 25, 35 and 50 kW/m²). During the cone calorimeter study, tests are performed using two different types of sample holders which are ISO-5660 standard sample holder and an insulated one. The back surface temperature is also measured during the cone study in order to understand the decomposition process with respect to the surface temperature. Once the cone calorimeter tests are over, the decomposed samples are brought to the permeability bench to determine the final permeability of the material. The permeability analysis is also performed on virgin materials to know the change in permeability and understand the effect of the same on the decomposition of the materials when under a different thermal attack.

To determine the permeability, a new high temperature permeability bench has been developed at Pprime institute.



It is developed as per ISO 4022 permeability determination norms. It is equipped with permeation cell, mass flow controller, pressure transducer, thermocouples and a data acquisition system. The Bronkhorst thermal mass flow controller is capable of controlling the mass flow rate of a fluid from 0 to 10g/s. The permeation bench is equipped with two differential pressure transducers of 0–130 bar (Rosemount) and 0–2500 mbar (Rosemount). Both are placed in parallel across the permeation cell to measure the pressure drop across the porous medium. These two differential pressure transducers measure the pressure drop simultaneously to avoid any loss of data in the case of saturation of the low range transmitter or in case of low accuracy of the high range transducer. A K-type

thermocouple (Omega TJ36-CASS-18U-6) measures the temperature of the fluid exiting the permeation cell. To perform a high temperature study, the permeation cell is placed inside the tubular furnace (Thermolyne 79400). All the sensors to monitor transient variations of mass flow rate, pressure, and temperature are connected to a data acquisition system (Keithley 2400:1 Hz, 16 bits, 48 channels).

The bench is capable of determining the permeability of the material as low as 10^{-24} m^2 to as high as 10^{-11} m^2 . The developed bench also allow us to see the evolution of permeability with respect to the temperature which can be path breaking in the fire science study. To validate the bench, different grades of porous stainless steel with the known permeability ranging from 10^{-15} to 10^{-11} m^2 has already been tested. The uncertainty observed in measured and actual permeability of the materials was found to be around 7% which is very good in terms of this kind of a study. Recently an article is submitted to Fire and Materials concerning this work.

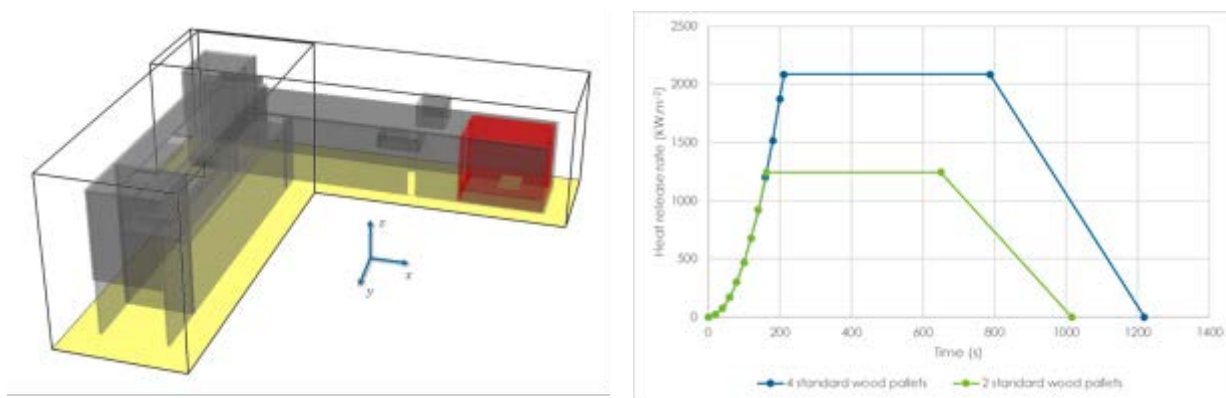
News From DuoRisk, Poitiers, France

Recently, Simon Roblin and Fabien Hermouet, PhD of Poitiers University and CEOs of DuoRisk, had the opportunity to work with the firefighting services of Vendée (France) to assess, via fire modelling, the thermal conditions that can be encountered in firefighters training facilities consisting of shipping containers. This work follows the different studies that have been led since 2012, by Poitiers and Nancy Universities, with the firefighters in order to characterise and evaluate the conditions in which the training is operated.

These kind of facilities aims to offer the opportunity for firefighters to prepare themselves in observing and experiencing the phenomena that can be encountered in real fire situations (smoke production, reached temperatures and heat flux, etc.). As the firefighters already found benefits in using such facilities in their training courses, several French fire departments decided to go further in extending the size and the geometry complexity of the facilities to offer different experiences to the trainees (e.g. observation and progression in a smoke saturated environment on different levels). Nevertheless, the increase of the compartment size and the use of more complex geometries poses several questions regarding the power of the fire source to use, the smoke repartition within the volumes, the durability of the structures and obviously the safety conditions within.

In this context, the fire department of Vendée, asked DuoRisk to lead a numerical study to ensure that the project of a new facility respond to the objectives they aim to reach in terms of safety, operability and durability.

A complete study has thus been led using FDS v6.7 where the shipping containers composing the facility have been entirely reproduced and equipped with different kind of sensors and measurement devices (thermocouples, heat flux sensors, mass flow sensors, velocity sensors, smoke opacity sensors, etc.). Figure below presents the numerical calculation domain, which totalises 680 000 meshes of 10 cm^3 and is separated in two subdomains.



Within the red area, is located the fire source composed depending on the case studied of two or four standard Europe wood pallets which heat release over time (see figure above) have been assessed using empirical formula such as the one developed by J. Quintiere and V. Babrauskas.

The results have allowed to confirm that the constructive solutions that have been proposed by the manufacturers of such facilities to the firefighters are in adequation with the formation objectives of the firefighters and besides, that the specificities in terms of thermal insulation of the inner walls of the compartments are sufficient to ensure the durability of the facilities.

Interesting information about tenability conditions for the trainees and trainers within the facility as well as thermal stress imposed to the structure have been collected and analysed in order to provide firefighters both safety measures and best practice of use.

Feel free to contact us to learn more on the subject: Fabien Hermouet and Simon Roblin, CEOs of DuoRisk

Signed: Thomas Rogaume, University of Poitiers

News from Victoria University

Victoria University's Fire Safety Group (VUFSG) has been active in fire research and education since 1991. Prof. Khalid Moinuddin, Prof Vasily Novozhilov, Assoc. Prof. Paul Joseph and Dr. Maurice Guerrieri form the core of the group. There are currently three postdoctoral fellows and six PhD students conducting research in this group. Prof Moinuddin leads wildland fire, fire suppression by water mist, tunnel fire and fire risk analysis research, Li-Ion battery fire research is led by Prof. Novozhilov, Assoc. Prof. Paul Joseph is in charge of fire safety engineering courses and fire retardance research and Dr. Guerrieri leads concrete behaviour in fire research.

Concrete Behaviour in Fire Research

Dr Maurice Guerrieri, (2019 Vice Chancellor Engagement Award Recipient) in conjunction with CYP Design & Construction Joint Venture, the consortium designing and



constructing the tunnels and stations for the \$AUD 11 billion Metro Tunnel Project in Melbourne, Australia on behalf of Rail Projects Victoria, have built a state-of-the-art full-scale structural fire testing furnace. This furnace is the first of its kind in Australia and is currently under National Accreditation

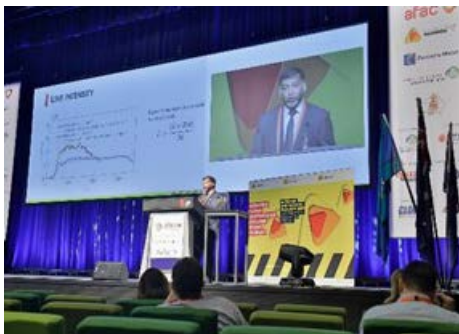
(NATA). The furnace is capable of testing full scale tunnel lining segments under combined structural and fire loading (any international fire curve).



Full scale Structural Fire Test for the Metro Tunnel Project in Melbourne, Australia.

Wildland Fire Research

Since 2014, Prof Moinuddin has been the Project Leader of the Bushfire and Natural Hazard CRC (BNHCRC) project entitled "Fire spread prediction across fuel types" which involves modifying and applying WFDS to simulate



Prof Khalid Moinuddin presenting at Australasian Fire Agencies Council (AFAC) conference, 2019.

grassfires, fire transitioning from grassfire to a forest canopy fire, sub-canopy wind flow and firebrand transport. While validation and improvement have been the main focus, parametric studies have also been carried out such as the effect of grass height, fire ignition protocol, wind speed, leaf area density of forest canopy etc. For validations, where needed benchmark laboratory experiments have been carried out and in other studies well documented published data are used. The research also provides insight into the physical processes to improve parametrisation for simpler and faster than real time empirical models. It is essential to have accurate flammability and thermo-physical properties to simulate the pyrolysis rate for physics-based fire modelling. We have been characterising these properties of common building

materials, façade materials and wildland fuels for fire modelling. Dr Nazmul Khan and Dr Mahmood Rashid are conducting our wildfire research as postdoctoral research fellows. In 2019, Dr Rahul Wadhwani received his PhD for experimental and numerical studies on short-range firebrand transport and Ms Sesa Singha Roy completed her Masters by Research on development of an interface between windninja and FDS using a penalisation method to reduce spin-up time for wildfire modelling using FDS/ WFDS. We are reinvigorating of our collaboration with Aix-Marseille University and University of Toulon in France and Lebanese University, Lebanon. Dr Sofiane Meradji at University of Toulon visited Australia in Dec, 2019 and presented seminars on FireStar3D at University of New South Wales in Canberra (where our collaborator Dr Duncan Sutherland and Prof Jason Sharples are based) and Victoria University in Melbourne. Figure 2.0 shows the photographs of presentations on wildfire modelling at conferences and seminars.



Dr Sofiane Meradji presenting a seminar at Victoria University.

Tunnel fire and water mist research

Prof Khalid continues his collaboration with Assoc Prof Futoshi Tanaka at University of Fukui, Japan in tunnel fire and fire suppression by water mist. Prof Tanaka spent a year at Victoria University in 2018-19. Our research theme for tunnel fire is related to ventilation systems that are used to control and exhaust smoke for the safety. We have been studying the efficacy of natural ventilation systems, the phenomenon of plug-holing and boundary layer separation within the shafts, longitudinal smoke-temperature distribution and critical velocity and backlayering distance using scaled tunnel experiments. We have also been investigating the fire cooling performance by water sprays in a series of medium and small-scale fire cooling experiments.

Fire Risk Analysis Research

Since the retirement of Prof Ian Thomas, research on fire risk at VUFRG has not been as prominent as before. However, there are interests among the graduate students who are practising fire engineers. Our PhD student Mr Samson Tan is developing a dynamic probabilistic fire risk model incorporating technical, human and organizational risks for high-rise residential buildings. We are also studying reliability of sprinkler and detection systems in Australian office buildings and shopping centres using physical surveys.

Li-Ion Battery Fire Research

Dr Mohammadmahdi Ghiji (VU industry postdoctoral research fellow) in collaboration with the Australian Defence Science and Technology Group established and tested a novel technique to suppress lithium-ion battery fire using the water mist system. The experimental results showed the effectiveness of the technique in immediate suppression of lithium-ion battery fire. Further computational fluid dynamic analyses are planned to shed a light on underlying phenomena aiming to improve the efficacy of the apparatus.

Fire Retardance Research

Encouraged by the results from previous research carried out in our laboratories, we are currently exploring novel ways of passively fire protecting polymeric materials, both synthetic and natural. Most of our efforts in the former category are centred on employing phosphorus-containing compounds, with the phosphorus atom in different chemical environments and having the oxidation states of III, or V. These include several phosphites, phosphates, phosphonate esters, phosphines, phosphine oxides, phosphoramino esters. Here, we have also employed different polymerization routes, such as: bulk, solution, aqueous slurry, suspension and emulsion, for making the modified polymers that are primarily based on acrylic, or styrenic, systems. The recovered products after the necessary purification are subjected to a variety of characterization techniques that include: spectroscopic, thermal and calorimetric tests. We have also endeavoured to decipher the elements of mechanism(s) operating in the condensed and vapour phases by using some standard means that also included hyphenated techniques.

In a related project, we have extended our passively fire protecting strategy to include some bio-inspired carbohydrate-based and related substrates, such as: beta-cyclodextrin, dextran, starch, tamarind kernel powder, agar agar, fish gelatine, etc. Here, we have employed both *reactive* and *additive* routes to bring about the desired modification reaction. The results obtained through thermal and calorimetric evaluations of the modified substrates indicate that they have a potential application, as passive fire protection coatings, for ligno-cellulosic materials, such as timber plaques. Given that the major fuel load in bush fires is ligno-cellulosic in nature, the tangible results from the project is bound to have far reaching implications in terms of protecting wood-based construction elements, especially, when present as external structures in buildings situated in the wildland urban interphases (WUIs).

Signed: Khalid Moinuddin, Victoria University

News from the University of Canterbury

The Fire Engineering group at the Department of Civil and Natural Resources Engineering, University of Canterbury, New Zealand, has recently expanded with three new staff members. A brief presentation of the new staff members, as well as a summary of recent events can be found below.

Dr. Dennis Pau (Lecturer, CPEng, Ph. D.)

Dr. Dennis Pau joined the Fire Engineering group at the department of Civil and Natural Resources Engineering as Lecturer in February 2020. He was previously a Postdoctoral Fellow in Fire at the same university from 2016-2019. Dennis is a Chartered Professional Engineer (CPEng) with Engineering New Zealand, and he is closely affiliated with the fire engineering consulting industry. Dennis is primarily responsible for the performance-based fire engineering course in the Masters of Engineering Studies (MEngSt) in Fire Engineering.

Dennis' area of research covers the burning behavior of fire hazardous materials and the fire safety of built environment. He has developed experimental approach to extract material properties governing heat transfer and thermal decomposition of polyurethane foams using state-of-the-art equipment, such as thermogravimetric analysis and differential scanning calorimetry. His on-going research focuses on expanding the developed knowledge, and applying these to numerical pyrolysis modelling and inputs optimization, to improve the

prediction on flame spread of combustibles. During his postdoctoral research, Dennis has expanded his research into sustainability and resiliency of the built environments, focusing on façade fires and fire safety of tall buildings.

Dr. Andres Valencia Correa (Lecturer, PhD)

Dr. Andres Valencia is a Lecturer in the Fire Engineering group. He recently joined the team after a two-year postdoctoral fellow at the University of Maryland in the Department of Fire Protection Engineering. He received a PhD in combustion and fire science at the Université de Rouen (France). He has a MS in thermal sciences from the Université de Lorraine (France) and a BS in mechanical engineering from the Ecole Nationale d'Ingénieurs de Metz (France) and the Universidad Tecnologica de Pereira (Colombia).

Andres' research interests lie in the field of fire safety. He is particularly interested in the experimental and numerical analysis of water-based fire suppression systems and fire behavior. One of his main works involves the study of fires using advanced laser diagnostics. During the last years, he participated in a project leading to an invention disclosure concerning the development of a methodology for sprinkler's spray visualization into Building Information Modelling (BIM) environments.

Prof. Daniel Nilsson (Reader, PhD, FSE, ETP)

Prof. Daniel Nilsson joined the Fire Engineering group at the department in August 2018. Daniel is teaching in the Masters of Engineering Studies (MEngSt) in Fire Engineering. He was previously Associate Professor at the Division of Fire Safety Engineering at Lund University, where he worked as a teacher for 16 years. Daniel was an exchange student at the University of Canterbury in 2000, and he now returns to teach and do research about Fire Engineering.

Daniel's main research interest is evacuation. Much of his research has focused on the interaction between people and evacuation systems, e.g., way-finding systems and fire alarms. Recent studies have involved evaluation of both visual and auditory way-finding systems in smoke filled tunnels, as well as studies on the design of fire alarms and way-finding systems in high-rise buildings. In the last couple of years, Daniel has explored the use of Virtual Reality experiments, i.e., experiments performed in virtual environments instead of built physical environments. He is currently in charge of setting up a Virtual Reality evacuation laboratory at the department.

Recent events

2018

Charley and Dennis attended the 11th Asia-Oceania Symposium on Fire Science and Technology (AOSFST) from 21-25 October 2018. The symposium was held at National Taiwan University Hospital (NTUH) Convention Centre. They presented two papers titled '*Sensitivity analysis of smoke flow in high-rise stairwells*' and '*Fire protection and fire safety design of New Zealand heritage building*' at this symposium. These presentations introduced the New Zealand Building Code and the associated engineering design practices to the participants, and generated many interesting discussions. Dennis' paper (the latter) was also one of six papers which received the Best Paper Award (see photo).



2019

Charley and Dennis attended the 9th International Seminar on Fire and Explosion Hazards (ISFEH) from 21-26 April 2019. The symposium was held at The State Hermitage Museum and Corinthia Hotel in St. Petersburg. They presented a paper titled '*Thermal decomposition of flexible polyurethane foams in air*' at this symposium. The research introduced the varying thermal decomposition behaviour of PU foams over a range of heating rates under an oxidative environment. This paper has been accepted for special publication in *Fire Safety Journal*.

Silvia Arias at Lund University and her main supervisor Daniel at the University of Canterbury received the 2019 Dr. Guylène Proulx OC Scholarship from SFPE. Many congratulations to Silvia – Very well done and you deserve it! You can read more about the scholarship here: <https://www.sfpe.org/mpage/FoundationProulx>

Signed: Daniel Nilsson, University of Canterbury

News from the National Research Council of Canada

Research on Total Cost of Fire

Researchers at NRC are launching an initiative to revisit and reassess the total cost of fire in Canada, which was last updated in 1995. Initial work has included the review of previous international studies to examine key cost components and component categorization approaches.

As part of the scoping phase of this project, various stakeholder groups (both Canadian and international) are being engaged to assist in identifying end user needs, available input data, and suitable methodologies for estimating the various cost components.

An upcoming opportunity to engage and network will be held on Friday 1 May 2020, immediately following the IAFSS 13th Symposium in Waterloo, Ontario. This planned dialogue will focus on areas for strategic alignment with current and previous efforts by other research groups and on sharing lessons learned and other considerations during the development of cost of fire estimation tools.

The outcomes of these discussions will help inform the basis for the scope and overall approach of the larger research project while supporting ongoing engagement of stakeholders and potential collaborators. If you would like to be involved, please contact Cecilia Lam for further information (Cecilia.Lam@nrc-cnrc.gc.ca).

Signed: Cecilia Lam, NRCC

News from the National Institute of Standards and Technology (NIST)

NIST Introduces Updated Standard Cigarettes to Improve Testing for Fire Safety

The National Institute of Standards and Technology (NIST) has released two improved standard reference cigarettes: one mimics commercial cigarettes for fire-safety measurements and the other is used for testing the flammability of soft furnishings, such as mattresses.

Smoking is the leading cause of fires in many countries. According to the World Health Organization (WHO), it produces an estimated 10 percent of fire-related deaths. Regulatory and testing standards have reduced fire-related deaths caused by cigarettes thanks in part by limiting how long a cigarette burns once lit and the flammability of fabrics. The improved cigarettes at NIST are known as standard reference materials (SRM), which help researchers develop test standards. NIST does not make the SRMs, but rather asks suppliers to manufacture them as part of a collaborative effort.

In 1990, as directed by the U.S. Safe Cigarette Act, NIST conducted research that laid the foundation for these cigarette SRMs. More than a decade later, NIST released the first version of SRM 1082, which mimics a commercial cigarette and led to cigarettes that burn out on their own when left unattended, also called “fire safe” cigarettes. In 2004, New York became the first state to pass legislation mandating that all cigarettes be fire safe. By 2011, all 50 states plus Canada, Europe and New Zealand passed similar mandates. The international impact from NIST’s SRMs helps ensure safety of cigarettes and soft furnishings imported into the U.S.

SRM 1082, named the “Cigarette Ignition Strength Standard,” helps manufacturers achieve accurate measurements on commercial cigarettes to help them meet state fire-safety regulations. To help states develop regulations on fire-safe cigarettes, researchers sought ways to accurately measure how often the cigarettes stop burning. NIST developed a test method, validated through collaboration with labs and manufacturers, that places a burning cigarette on top of a specific type of surface material, called a substrate, and measures how frequently the cigarette burns its full length.

Commercial cigarettes are mostly filtered and contain multiple randomly placed bands in the tobacco column. The bands act as extinguishers. Once a cigarette is lit it will burn on its own until it reaches these bands. Puffing on the cigarette is required to keep it burning through the bands. Hence it becomes a “fire safe” or self-extinguishing cigarette.

SRM 1082 is not the only standard cigarette at NIST. SRM 1196, named the “Standard Cigarette for Ignition Resistance Testing,” was introduced by NIST in 2010 for testing the fire-resistant components used in the construction of soft furnishings, such as mattresses and other soft fabrics in households. The supply of SRM 1196 was supposed to last more than a decade, but it only lasted for eight years because of increased adoption of NIST testing standards worldwide for textiles. For instance, they are used in American Society for Testing and Materials (ASTM) and National Fire Protection Association (NFPA) testing standards and in California and Consumer Product Safety Commission (CPSC) regulations.

The challenge then became finding another supplier to make SRM 1196a. Since the SRM is used to test flammability of fabrics, it is different from SRM 1082 and commercial cigarettes. For example, some of these differences include no bands, no filter, and longer tobacco-column length.

Though it has taken more time than expected, NIST finally found a supplier to produce SRM 1196a with comparable physical properties as the original SRM 1196.

This month, NIST is releasing a 15-20-year supply of SRM 1196a, which appears to be very similar to its previous iteration, SRM 1196. NIST is hopeful, because of these similarities, that the market won’t see any differences when testing using SRM 1196a.

Organizations wishing to order SRM 1082 and 1196a can visit the NIST page on [Standard Reference Materials](#).

NIST Deploys Reconnaissance Team to Camp Fire

The Camp Fire was the deadliest California fire in history, resulting in 86 civilian fatalities and three firefighter injuries with more than 52,000 residents forced to evacuate their homes. It was also the most destructive fire, destroying or damaging a total of 19,558 structures, equivalent to three times the losses of the 2017 Tubbs Fire (5,636 structures) and six times the losses of the 1991 Oakland Hills Fire (2,900 structures). The Camp Fire started on the morning of November 8, 2018, and consumed 153,336 acres and destroyed 13,696 single residences. The fire spread quickly, aided by very strong winds and very low humidity levels in the area. The fire was declared 100 percent contained after 18 days on November 25, 2018. Total personnel involved in firefighting reached 5,471 with 900 pieces of apparatus (620 engines, 101 fire crews, 102 dozers, and 77 water tenders). Preliminary estimates indicate that the Camp Fire will be the most destructive fire in California history at a cost of \$11-13 Billion [i] and \$3 Billion for cleaning up debris. [ii]

NIST sent a reconnaissance team to collect perishable data on: (1) physical damage to residential and commercial buildings; (2) the availability of hazard information, decisions made by emergency officials, and the effectiveness of emergency communications in producing protective actions by residents/tourists and explaining the variance observed; (3) first responder fire suppression tactics and operations; (4) the efficacy of recent changes to codes, standards and practices; and (5) refining scope and potential study area(s) for a possible subsequent investigation. NIST continues to study the timeline and impacts of the Camp Fire in collaboration with the U.S. Forest Service and CalFire. <https://www.nist.gov/video/camp-fire-reconnaissance-2019-disaster-resilience-symposium>

Contact: Nelson.Bryner@nist.gov

NIST Deploys New Burn Observation Bubble (BOB) in Series of Wildland Fires

Researchers at NIST have developed a fireproof, transparent enclosure to protect 360-degree cameras in extreme fires. The instrument was successfully deployed in March 2019 in prescribed forest management fires in the New Jersey Pine Barrens at the request of the U.S. Forest Service. The camera system provided unique and otherwise unobtainable video footage of conditions at the heart of a wildland fire. The camera system has also been deployed in building fire experiments in the NIST National Fire Research Laboratory. For more information visit [Virtual Reality Visualization in Fire](https://www.nist.gov/el/fire-research-division-73300/national-fire-research-laboratory-73306/virtual-reality) - <https://www.nist.gov/el/fire-research-division-73300/national-fire-research-laboratory-73306/virtual-reality>

Contact: Matthew.Hoehler@nist.gov

NIST BOB Video makes Forbes Top 25 VR Video for 2019

[The Top 25 YouTube VR Videos Of 2019](#) – Forbes -- It's not every day you get to see what the inside of a forest fire looks like—particularly in full immersion. That's exactly the experience NIST researchers wanted to provide.

NIST Receives 2018 Fire Protection Research Foundation Medal for Cross-Laminated Timber Fire Study

The cross-laminated timber (CLT) compartment fire study conducted at the NIST National Fire Research Laboratory was selected to receive the 2018 Foundation Medal by the Fire Protection Research Foundation. The medal was awarded at the National Fire Protection Association Conference & Expo in June 2018. This prestigious award recognizes the research project that best exemplifies the Fire Protection Research Foundation's (1) fire safety mission, (2) technical challenges overcome, and (3) collaborative approach to execution. These massive experiments, completed under an Interagency Agreement with the National Research Council of Canada, examined issues related to the fire behavior and structural integrity of all-wood tall buildings. Results from the experiments provided the technical basis to transform the International Building Code to allow the expanded use of cross laminated timber in North America while ensuring occupant safety.

Contact Matthew.Bundy@nist.gov

EL Hosts Workshop on Computational Models for Large Outdoor Fires

A Workshop on Computational Models for Large Outdoor Fires was held at NIST on March 18-19, 2019, to identify gaps in implementing computational tools to model large scale outdoor fires, such as those found in the Wildland-Urban Interface (WUI) communities. More than 65 experts attended, including international participants from Italy, France, the UK, Australia, Finland, Japan, Switzerland, and Nigeria, U.S. Federal agencies (USFS, NCAR, Los Alamos NL, Sandia, NOAA), academia (University of Virginia, University California Berkeley, University of Utah, University of North Carolina Charlotte, San Jose State University, University of Corsica, University of Maryland, East Carolina University, University of Edinburgh, Aalto University, Victoria University, Colorado State University, University of Tennessee, and Universitat Politècnica de Catalunya). Attendees discussed operational fire modeling, forensic reconstruction of disastrous fire events, and community planning, and produced a priority list of research topics. <https://www.nist.gov/publications/large-outdoor-fire-modeling-lofm-workshop-summary-report>

Contact Nelson.Bryner@nist.gov; Randy.McDermott@nist.gov

[i] <https://www.bizjournals.com/losangeles/news/2018/11/27/calif-wildfires-property-losses-could-reach-19b.html>

[ii] Associated Press, Correction: California Wildfires-Cleanup story, December 12, 2018, <https://www.usnews.com/news/best-states/california/articles/2018-12-11/california-wildfires-cleanup-to-cost-at-least-3-billion>

Signed: Anthony Hamins, NIST

News from Standards Norway

Passive and active fire protection of tall wooden facades

A Standards Norway committee is developing *prNS 3912 Exterior Fire Protection – method of design and verification*. Their need included large scale test evidence to fill knowledge gaps on performance of passive and active fire protection systems regarding tall wood clad facades. Independently, a testing project was initiated and funded by heritage organisations, the "KA Project". Their objectives coincided with those of the committee and was subsequently coordinated to fit needs of prNS 3912 committee as well.

On behalf of sponsors COWI designed and ran the laboratory test programme on exterior extinguishing systems and burn-through times for various typical wood panel claddings (at DFL laboratory, Denmark). The method combined testing interaction of suppression and passive fire resistiveness and is currently listed as normative by prNS 3912. We did not know of similar tests done on exterior facade fire suppression or burn-through resistance. Likewise, we did not know of any done similar on fully automatic robotic nozzles inside church wooden clad congregation rooms in full scale, reported separately.



The test results provided revelations in several aspects. The FM and NFPA sprinkler designs for combustible facades were roughly confirmed by testing at borderline minimum ratings of nozzles and pressure. When subjected to realistic arson type fuel packs those designs performed, although minor errors in K- factor or orientation of heads frequently caused failures, so less robust. The walls were 7 m high.

The test of robotic type nozzles for high rise facades performed effortlessly in comparison. They were activated by heat radiation devices. It became evident that the recorded early and superior suppression capacities with less water than sprinkler resulted from spraying from the side rather than from above. It was estimated 1/10 water consumption to extinguish compared to sprinkler. Radiation activated water mist nozzles proved equally efficient in terms of limiting damage time to extinguish and of using less water.



Most important it became clear that common rainscreen cladding in wood may complete burn-through and create hidden fires in cavities by the time bulb-activated sprinkler and water mist systems complete extinguishing. In practice, this also occurs well in advance of intervention by rescue team. Tests proved that thicker wood panels or earlier extinguishing would mitigate this, as would optimum combinations.

The results were presented first at the International Sprinkler Conference, Stockholm 2018. prNS 3912 was drafted 2019, on review 2020. [Summary report](#) available, English version: contact gjen@cowi.com.

Signed: Geir Jensen, author on behalf of Standards Norway committee.

Building Research Institute (ITB) – Poland

Last quarter of the year was a period of intense scientific work on the fire safety of facades. Our long-lasting collaboration with Imperial College London has turned into a paper "KRESNIK: A top-down, statistical approach to understand the fire performance of building facades using standard test data" authored by M. Bonner (ICL), W. Wegrzynski (ITB), B.K. Papis (ITB) and G.Rein was published in Building and Environment (10.1016/j.buildenv.2019.106540) and was mentioned on a front page of Financial Times. In this work, we have used a top-down statistical approach to understand the factors influencing the fire behaviour of facades. Furthermore, together with Imperial Hazlab and ARUP, we have performed 20 large scale tests related to the fire

behaviour of ventilated facades, and 27 large scale tests on different ETICS on the connections between walls and balconies. We have also performed two large fire tests on aluminium glazed walls on two different furnaces, to investigate the effect of scale on the fire resistance of assemblies.

Our collaboration with The Main School of Fire Science (SGSP) in Warsaw did yield a paper “Several Problems with Froude-Number Based Scale Modeling” (<https://doi.org/10.3390/en12193625>) of Fires in Small Compartments on the applicability of the Froude-number scaling. A sweet feat to the research was that the paper was chosen as the cover story.

Q4 of 2019 was also the busy period for our emerging wind tunnel – the steel structure and fans were finally delivered and assembled on the site. We are very excited to have our own, large scale wind tunnel with turbulent atmospheric boundary layer that will be focused on fire-related research. We hope this will aid us in building the bridge between wind and fire engineering. Besides the wind, a lot of work was put into preparations of full-scale fire experiment on a single-family house built with solid wood. This research task is coordinated by dr P. Sulik in close cooperation with the Polish Headquarters of Fire Brigade and the Ministry of Development, and will hopefully answer many pending questions related to the safety of use of solid wood for small housing units.

Last quarter of 2019 was also the time for IAFSS conference submissions. The competition was strong, and one of our teams succeeded – G. Kimbar and P. Roszkowski will be able to tell how they burned down a silo, and what we could learn from that. For the rest of us, crossing fingers for more luck with the posters!



We are very grateful to our visitors who held great seminars in ITB last quarter: M. Bonner (Imperial College London) who shared his experience in the use of big data in fire science, and prof. M. Skibniewski (University of Maryland) who shared his experience as an author and Editor in Chief for Automation in Construction journal. We also welcome a new PhD in construction awarded by ITB - dr Marcin Cisek, who successfully defended his work on real-time optimisation of the evacuation process by re-routing occupants, based on numerical modelling.

Signed: Wojciech Wegrzynski, Building Research Institute

News from NFPA and the Fire Protection Research Foundation

NFPA's Fire Research Network

This group was established to provide those directly involved in Fire Research a space for open discussions and exchange of information. All members of the group are encouraged to share their work, ask questions and comment on posts. NFPA will be sharing our Research and information of relevance through this channel as well.

This is a closed group and membership is by invitation only. Members include those directly involved in Fire Research at all levels from Graduate Student to Professor. If you know of someone who you believe should be a member of the group then please have them contact the group Administrator, Birgitte Messerschmidt at bcollins@nfpa.org.

Notice of new research reports

We would like to let you know about several new research reports that have been completed recently and are available on our website. A study conducted by NIST with an executive summary from the Fire Protection Research Foundation: “Economic Impact of Firefighter Injuries in the United States” highlights the total costs of firefighter injuries in the United States and can be found [here](#). A webinar presenting the results of this project is available on-line at <https://community.nfpa.org/community/xchange-exclusives/blog/2019/12/19/full-webinar-the-magnitude-and-cost-of-firefighter-injuries-in-the-united-states>. The overall size of the problem and identified causes from national data and an economic model that links injury type with cost are presented. Case studies illustrate the cost of injury at the local level.

“Digitized Fuel Load Survey Methodology Using Machine Vision” documents a new more efficient methodology using machine learning for fuel load surveys of buildings to facilitate the collection of data for performance-based design. The report can be found [here](#).

“Impact of Obstructions on Spray Sprinklers – Phase I” summarizes a literature review of the existing sprinkler obstruction criteria, gap analysis, and proposed research plan to further examine the impact of obstructions on spray sprinklers. The report can be found [here](#).

A webinar on another FPRF project is also available now. The project, WUI-NITY: a platform for the simulation of wildland-urban interface fire evacuation, aims at developing an integrated software platform for the simulation

of wildland-urban interface (WUI) evacuation scenarios that can be used both before an incident for planning and during an incident to inform decisions. The primary application of this platform is the ability to generate dynamic vulnerability maps from coupled fire, pedestrian, and traffic submodels. This webinar explains an integrated software platform for the simulation of wildland-urban interface (WUI) evacuation scenarios. It is available at <https://community.nfpa.org/community/xchange-exclusives/blog/2019/11/22/full-webinar>.

Several reports on aspects of the U.S. fire problem have been completed recently and posted on our website. The topics include home cooking fires, fire loss in the U.S. during 2018, and large-loss fires and explosions in the U.S. in 2018. They can all be found at <https://www.nfpa.org/News-and-Research/Data-research-and-tools/US-Fire-Problem>.

News from the Society of Fire Protection Engineers (SFPE)

SFPE is Seeking Comments on its Guide for Peer Review in the Fire Protection Design Process (Deadline to submit comments is 26 February 2020).

The SFPE Peer Review Task Group is accepting comments on the 1st Draft of the revised Guide for Peer Review in the Fire Protection Design Process. The purpose of this guide is to address the initiation, scope, conduct, and report of a peer review of a fire protection engineering work product. A peer review may be conducted on a fire protection engineering work product, including but not limited to, conceptual approaches, supporting analyses, calculations, application or interpretation of code requirements. Peer review is a tool that can be used to help a stakeholder make decisions regarding the suitability of a design. Typically, a peer review is sought by a reviewing authority to provide a second opinion regarding a work products' likelihood of achieving the stated objectives. However, other situations may also necessitate a peer review.

To submit a comment, please go to <https://www.sfpe.org/page/PublicCommentsPeerReviewGuide>. Comments are due before 26 February 2020. If you have any questions, please contact Engineering@sfpe.org.

SFPE Recruiting Members from All Interest categories for New Standard on Design Performance Criteria

The SFPE Subcommittee for Standards Oversight has approved starting a committee to draft a new SFPE standard on design performance criteria. The scope of this standard is the determination of design performance criteria for establishing acceptability of performance-based design for building design for fire safety, using measurable metrics and defined thresholds.

SFPE is seeking members from the following interest categories:

- Producer – an individual who represents an organization (or trade association) that manufactures or markets the products that could be affected (by the standard)
- Design engineer – an individual who uses the standard to produce drawings, diagrams, specifications or calculations for the construction of a building or system (consultants, architectural/engineering firms or contractors)
- Enforcement official – a representative of an organization responsible for enforcing the requirements of the standard (authority having jurisdiction or code official)
- Research and testing -- an individual who represents public or private sector research organizations and academics who perform research that falls within the scope of the standard
- Facilities owner — an individual having a legal interest in a property, building, or structure (facility manager, owner representative)
- Insurance interests -- a representative of an insurance company, broker, agent, bureau, or inspection agency.
- Specialist – an individual with expert knowledge within the scope of the standard who is not described by one of the categories above.

If you are interested in joining this committee, please contact engineering@sfpe.org.

Signed: Chris Jelenewicz, P.E., FSFPE, SFPE Technical Director

News from Jensen Hughes

2019 was a busy year for Jensen Hughes, as it expanded its global reach and expertise in forensics, security and emergency management to compliment the fire and life safety core discipline and better serve clients' complex challenges. With more than 1400+ employees across 70+ offices, the company now has significantly grown its footprint in the UK, Ireland and Korea.

New CEO – Raj Arora

The company also named Raj Arora as CEO in September. Arora is a fire protection engineer, well-known in the industry, and was previously overseeing the company's Strategy + Business Development group. He has

previously held positions at Johnson Controls/Tyco, running their Fire Detection and Special Hazard Product division, and with a specialty MEP firm focused on the Aviation and Transportation industries.

Growing its Geographic Footprint

At the end of 2019, Jensen Hughes made two acquisitions of leading firms in their respective markets. **IFIC Forensics** is a leading fire forensic investigation firm in the UK and Ireland, led by Prof. James Lygate, BSc(Hons) MSc PhD FRICS CEng FIFireE, that enhances the company's global fire forensics capabilities and ability to provide an immediate response to fire-related crises confronting any organization in the UK, Ireland and Europe. It also strengthens Jensen Hughes' ability to help clients in the marine market understand their fire-related risks and implement global best practices to manage these in a prevention-oriented and cost-effective manner. Jensen Hughes' focus on the UK and Ireland market includes its 2018 acquisition of the UK firm Jeremy Gardner Associates (JGA) as well as its 2017 appointment of Dr. Richard Stahl to lead the international forensics practice in the UK.

SAFire, a leading fire protection engineering firm based in Seoul, also joined Jensen Hughes at the very end of 2019. The company was founded in 2010 by CEO and President Seungmin (Simon) Park, a highly respected fire protection engineering expert in Korea.

Expanding Security and Emergency Management Capabilities

Jensen Hughes acquired **Technical Response Planning Corporation ('TRP')**, a market leader and pioneer in emergency management and business continuity planning software and consulting, in early 2019. Their cornerstone software products, SMARTPLAN and SMARTRESPONSE are used by large, blue-chip, multi-facility clients in the Oil & Gas, Manufacturing and Energy sectors to efficiently manage their emergency plans, responses, and compliance requirements. TRP was founded in 1995 by Steve Bassine.

To build on its growing security design capabilities, Jensen Hughes also acquired **Hillard Heintze**, a market leader in strategic security risk management and investigation consulting services, in April 2019. Hillard Heintze was founded in 2004 by Arnette Heintze, a former U.S. Secret Service agent and executive. The company has helped organizations worldwide more proactively identify and manage their security risks.

Signed: Dan Gottuk, Jensen Hughes

News from the International Water Mist Association

The call for papers for the 20th International Water Mist Conference (IWMC) is currently open. (See details in separate section of this newsletter). The conference will take place in Warsaw, Poland, on 7th and 8th October 2020 at the Regent Warsaw Hotel.

Since 2016, the International Water Mist Association honours young researchers who dedicate their master and Ph.D. theses to water mist technology. In 2020, the prize will go to the author of the best master thesis. The deadline to hand in submissions for the 2020 prize will be 30th April 2020. The prize includes: an invitation to the 20th International Water Mist Conference, a slot to present the thesis, travel and accommodation expenses, prize money of 1,000 Euros and one year free IWMA membership.

The IWMA Scientific Council will evaluate all entries and announce the winner on 30th June 2020. The detailed rules and regulations are available on the IWMA webpage.

REPORTS FROM PAST CONFERENCES

1st International Symposium on Lithium Battery Fire Safety (ISLBFS)

The State Key Laboratory of Fire Science (SKLFS) at University of Science and Technology of China (USTC) hosted the 1st International Symposium on Lithium Battery Fire Safety (ISLBFS) on July 18 to 20 in 2019. The Chemical Safety Committee, Chemical Industry and Engineering Society of China (CSC-CIESC), and China Energy Storage Alliance (CNESA) co-hosted this distinguished symposium. The Symposium was a success in regards to the quality of the papers and posters presented. Nearly 300 delegates from six countries and more than 80 research institutes gathered together in Hefei to discuss the fire safety and prospects of lithium battery.



Before this symposium in July 18, a workshop on publication and technology was chaired by Wei Liu, Secretary General of CNESA. In this workshop, Dr. Jiqing Sun, editor-in-chief of *Matter*, a material science with Cell Press and Vivian Wang, the Elsevier engineering solution manager, explained paper publishing and the use of Knovel references tool. Dr. Zhuang Cai from Sungrow Power Supply Co., Ltd., and Dr. Lei Ge from Anhui CAS-Zhonghuan Security Intelligence Equipment Technology Co., Ltd., shared the fire safety technology of lithium battery energy storage.

Prof. Qingsong Wang, Chairman of the Symposium, University of Science and Technology of China, chaired the opening ceremony of the symposium in the morning of the 19th. The executive vice president Zhenhua Yu, on behalf of the CNESA, Prof. Jinhua Sun, on behalf of the CSC-CIESC, and Prof. Naian Liu, on behalf of the SKLFS, USTC, delivered speeches in succession.

Prof. Jennifer Wen (Warwick University), Prof. Stanislav Stoliarov (University of Maryland), Prof. Chi-Min Shu (National Yunlin University of Science and Technology), Prof. Yan Wang (Worcester Polytechnic Institute), Prof. Ofodike Ezekoye (University of Texas - Austin), Director Ning Shi (Qingdao safety engineering research institute of China petroleum and chemical corporation), Prof. Shaoyu Zhang (Tianjin Fire Research Institute), and Dr. Jian Lin, CTO of Jiangxi YOTTEO Auto technology Co., Ltd., and others were invited to attend this symposium.

Prof. Stoliarov, Assoc. Prof. Li Wang from Tsinghua University, Prof. Wen, and Prof. Wang were invited to give a plenary speech on the



thermal runaway mechanism and mitigation, understanding insight of thermal runaway, predicting Li-ion battery thermal runaway, and Lithium ion battery failure mechanisms, were fully explained.

There were 26 oral presentations, and 20 posters were presented in the following six sessions in the field of lithium battery safety: Thermal runaway and propagation, Heat generation, Abuse condition and venting, Capacity fading and life prediction, Thermal management, Fire extinguishing and safer materials

The selected papers will be recommended to the LiB Fire Special Issue of *Fire Technology* for peer review.

Signed:: Prof. Naian Liu and Prof. Qingsong Wang, State Key Laboratory of Fire Science, University of Science and Technology of China

1st China International Symposium on Forest Fire

The Academy of Inventory and Planning, National Forestry and Grassland Administration (AIP-NFGA), and Forestry and Grassland Fire Prevention Committee, China Forest Society (FGFPC-CFS) co-hosted the 1st China International Symposium on Forest Fire, guided by Forestry and Grassland Fire Prevention Department, NFGA. The Symposium, held in Beijing during December 16-17 in 2019, was a big success in regards to international academic exchange and cooperation on forest fire research. Nearly 120 delegates from more than 50 institutes worldwide gathered together to discuss current situation of China forest fire control and prevention and future challenges under the background of climate change.

Gaochao Wang, vice president and secretary-general of FGFPC-CFS, chaired the opening ceremony of the symposium on the morning of the 16th. Director Haizhong Wang, on behalf of Bureau of Forest Security, NFGA, Vice president and secretary-general Xingliang Chen, on behalf of CFS, Director Guoqiang Liu, on behalf of AIP-NFGA, respectively delivered speeches.

Prof. Naian Liu (State Key Laboratory of Fire Science (SKLFS) at the University of Science and Technology of China), Prof. Lifu Shu (Chinese Academy of Forestry), Prof. Long Sun (Northeast Forestry University) were invited to give plenary speeches. The topics cover many aspects such as fundamental problems in forest fire prevention, forest fire ecology, and overview of China forest fire research status, problems and challenges.

Prof. Donald Falk (University of Arizona), Director Peter Brown (Rocky Mountain Tree-Ring Research), Prof. Youmin Zhang (Concordia University), Prof. Weiguo Song (SKLFS), Prof. Keyan Fang (Fujian Normal University), and others were invited to present topic reviews.



30 theme presentations were presented in the following 6 sessions in the field of forest fire: North American fire research progress, Consultancy service, Features of forest fire ecology, Fire research in high-risk areas, Fire detection and warning technology, and Forest fire forum.

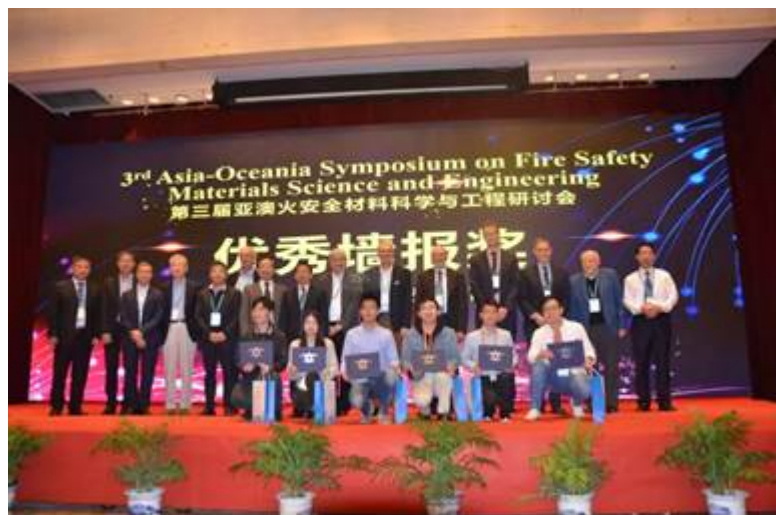
Signed by: Prof. Naian Liu, State Key Laboratory of Fire Science, University of Science and Technology of China, and Dr. Qichao Yao, National Forestry and Grassland Administration

3rd Asia-Oceania Symposium on Fire Safety Materials Science and Engineering (AOFSM'3)

The 3rd Asia-Oceania Symposium on Fire Safety Materials Science and Engineering (AOFSM'3) (<http://www.aofsm2019.cn/>) was held successfully on October 24-27, 2019 in Shanghai, China, hosted by Shanghai Research Institute of Chemical Industry Co., LTD, Shanghai Jiao Tong University, and the Asia-Oceania Association for Fire Safety Materials Science and Engineering (AOFSM). This symposium is organized every two years with the support of the AOFSM.



The AOFSM'3 was a successful event which gathered over 250 participants from USA, Russia, Germany, Japan, Italy, Switzerland, France, UK, South Korea, New Zealand, India, Spain, Australia, Egypt, Finland, China, etc. These participants included experts and scholars in both scientific and industrial communities.



Totally, there were 91 speeches (6 Plenary speeches, 40 Keynote speeches and 45 oral presentations), 107 paper and 44 posters. The symposium strengthens exchanges in the field of fire safety materials research, promotes application technology innovation of fire safety materials, and boosts development of the relating industry. During the symposium, the organization committee selected 6 Excellent Poster Awards.

The Asia-Oceania Association for Fire Safety Materials Science and Engineering (AOFSM) is a non-profit organization founded by the outstanding academic institutions from China, Korea, Japan, Australia, India, Russia, China Hong Kong, Taiwan and other countries and regions. The primary objectives for AOFSM include improving world-wide academic communication, establishing the production-study-research cooperation, and promoting the development of the flame retardant industry. Academic conferences and scientific journals will be organized and published regularly by AOFSM, thus advancing the flame retardant research and fostering the economic blooming for the Asia-Oceania region.

The AOFSM'1 was successfully held in 2015 by the University of Science and Technology of China at Suzhou, China, and The AOFSM'2 was held in 2017 by the Beijing Institute of Technology of China at Shenzhen, China. These three organized Symposiums have provided an excellent forum for the introduction of new ideas, materials and technologies in flame retardancy for participants and a communication bridge between academia and industry. The AOFSM'4 will be held in 2021 at the University of New South Wales (UNSW), Sydney, Australia.

Signed: Prof. Naian Liu and Prof. Yuan Hu, State Key Laboratory of Fire Science, University of Science and Technology of China

2019 International Forum on the Frontier of Safety Engineering Materials and Technology

On the purpose of enhancing international academic communication and promoting innovations for fire safety materials, the 2019 International Forum on the Frontier of Safety Engineering Materials and Technology was held in Hefei, China on October 22-24, 2019 by the State Key Laboratory of Fire Science (SKLFS), the University of Science and Technology of China (USTC). Prof. Yuan Hu (SKLFS of USTC), organized this forum and chaired the opening ceremony of the forum on the afternoon of the October 22th, 2019. Prof. Naian Liu, the director of SKLFS, briefly introduced the history, research area and recent progress of the SKLFS. Prof. Serge Bourbigot (Unité Matériaux et Transformations, France), Prof. Jaime Christopher Grunlan (Texas A&M University, USA), Prof. Jurgen Horst Troitzsch (Fire & Environment Protection Service, Hessen, Germany), Prof. Manfred Doring (Fraunhofer Institute for Structural Durability and System Reliability LBF, Germany), Prof. Oleg Korobeinichev (Institute of Chemical Kinetics and Combustion, Russia), Prof. Yongchang Wang (University of Manchester, UK), Dr. Kelvin Kei-wei Shen (Rio Tinto Minerals, USA), Prof. Gaelle Fontaine (Ecole Nationale Supérieure de Chimie de Lille, France), Prof. Hao Wang (University of Southern Queensland, Australia) were invited to give plenary speeches. Their topics included synergy in fire retardant systems, flame retardant thermal nano-coatings, flame retardant polystyrene foam, flame retardancy rigid polyurethane foam, fire retardants evaluation, commercial flame retardants in E/E sector, flame retardancy acrylonitrile butadiene styrene, and Composites Part B: Advances on flame retardants.

At the end of the forum, Prof. Yuan Hu introduced the research progress of safety engineering materials in the SKLFS. This forum was considered a big success for promoting the international cooperation by a diverse group of researches for the fundamental and applied researches of safety engineering materials.

Signed by: Prof. Naian Liu and Prof. Yuan Hu, State Key Laboratory of Fire Science, University of Science and Technology of China

UPCOMING CONFERENCES

9th International Symposium on Tunnel Safety and Security – 11-13 March 2020, Munich (Germany)

Registration for ISTSS 2020 is now open. ISTSS 2020 has a packed two-and-a-half-day program that experienced ISTSS visitors will recognize. Each day will start with Keynote sessions followed by paper presentations in various themes such as:

- | | | |
|------------------------------|------------------------|----------------------|
| • Active protection and FFFS | • Safety concepts | • Explosion hazards |
| • Fire dynamics | • Emergency management | • Ventilation |
| • Evacuation | • Risk analysis | • Passive protection |

Each day includes plenty of time for networking during coffee-breaks and the lunch break. The first day (Wednesday 11th) will end with a Poster Session and Cocktail Reception and the second day (Thursday 12th) will finish with the notorious ISTSS Banquet Dinner. On Friday we plan to have our traditional technical visit in the afternoon.

You can find the preliminary programme, information on accommodations, and register on the symposium website at <https://istss.se/>.



Society of Fire Protection Engineers, 13th International Conference on Performance-Based Codes and Fire Safety Design Methods – 11-13 March 2020, Auckland (New Zealand)

This marks the 25th anniversary of the SFPE 'PBD' conference. It will provide an excellent opportunity to address current and future trends in building and fire regulatory systems, the contribution of fire protection engineers to innovative design solutions, and the latest developments in fire modeling, risk assessment and analysis in support of those solutions



and their approvals. The conference will provide a forum for discussion of the issues of fire protection engineering education, professional competence, product certification and inspection, fire safety maintenance and management, verification methods and all the regulatory and administrative provisions needed to ensure that effective fire safety outcomes result from performance-based design solutions. This year will feature looks back over 25 years as well as looks to the future. As always, the conference will feature case studies from a variety of countries illustrating performance-based design approaches.

The conference agenda can be found at <https://www.sfpe.org/mpage/SchedulePBD20> and you can register at <https://www.sfpe.org/mpage/RegisterPBD20>.

Wood & Fire Safety 2020 – 9th International Scientific Conference - May 3-6, 2020 in Strbske Pleso, The High Tatras (Slovakia)

The aim of the conference is to bring new insights to this multi-disciplinary business field and increase the focus on forest fires, wood fires and new regulations, especially Eurocodes - Eurocode 5 - which deals with wooden construction and new wood in historic buildings. We believe that your participation will contribute to the quality of this ninth follow-up of the Wood & Fire Safety Conference (Wood and Fire Safety).

Keynote speakers include Eva Haviarova (Purdue University, USA), speaking on “The Society of Wood Science and Technology and their Support of Global Wood Science Programs; Overview of Wood and Fire Safety Research in the USA”, Boris Iskra (Forest and Wood Products Australia), speaking on “Australian Building Code Change – Eight-Storey Timber Buildings” and Rodolphe Sonnier (IMT Mines Alès, France), speaking on “Flame retardancy of wood-plastic composite by radiation-curing phosphorus-containing resins.”

The conference will take place May 3-6, 2020 in Strbske Pleso, The High Tatras, Slovakia. The topics covered at the conference include:

- Structure and properties of wood and its changes at high temperatures
- Burning of solid materials
- Stage study of wood burning process
- Wood burning retardation and wood-based materials
- Fire safety in wooden objects
- Fire modeling, testing, certification
- Fire Behaviour Modelling
- Fire Dynamics
- Fire Investigation
- Smoke Control and Combustion Toxicity
- Fires in wooden buildings
- Forest fires
- Fires in historic buildings
- Others topics focus on wood and fire safety

Early registration opened 14 February. For conference details, information on accommodations and to register, see the conference website at www.wfs2020.sk.

11th International Conference on Structures in Fire (SiF 2020)

This conference will take place Early Bird registration is open until 15 April 2020. Registration information and details on the venue and availability of accommodations can be found on the website: <https://sif2020.com>. Registration includes attendance at all technical sessions, all social events and a printed copy of the proceedings.

The 11th International Conference on Structures in Fire (SiF 2020) will be hosted by UQ Fire, the Fire Safety Engineering Research Group, at the University of Queensland. The conference is organised in collaboration with Queensland University of Technology, the University of Canterbury, the University of Melbourne and the Royal Melbourne Institute of Technology June 24-26, 2020, in Brisbane, Australia.. The main focus of the conference is to provide an opportunity for researchers, practitioners and engineers to share and discuss their research related to structures in fire with their peers in an open, international forum. Research should include fundamental work that progresses the understanding and application of performance based structural fire engineering as well as technological developments and case studies.

One of the principles of the conference series is that it should be a forum where the latest research is presented. Keynote and invited speakers are therefore not a feature of the SiF series of conferences. Papers are submitted only a few months before the conference, which ensures that only the most current research work is presented. In addition to the plenary and parallel sessions of the conference, SiF 2020 will provide an opportunity for further discussions both formally following presentations and informally through the planned receptions, meals and other breaks.

Selected papers will be invited to submit an extended version to the published in a special issue of *Fire Technology*.

AUBE '20 / SUPDET® 2020 – 15-17 September 2020, Mülheim an der Ruhr (Germany)

AUBE '20/SUPDET 2020, a joint conference of the 17th International Conference on Automatic Fire Detection (AUBE '20) and the Suppression, Detection and Signaling Research and Applications Symposium (SUPDET 2020) will be jointly hosted by the Department of Communication Systems NTS at the University of Duisburg-Essen,

Germany and the Fire Protection Research Foundation. The combination of these two international conferences continues the tradition of presenting the latest developments in research, technology and applications for the fire protection community. The joint conference will be held September 15-17, 2020 in Mülheim an der Ruhr, Germany.

Registration information will be available soon on the conference website: <http://nts.uni-duisburg-essen.de/aube/aube20/aube20.html>.

20th International Water Mist Conference (IWMC) – 7-8 October 2020, Warsaw (Poland)

IWMC 2020 will take place in Warsaw, Poland, on 7th and 8th October 2020. The conference hotel will be the Regent Warsaw. The conference webpage and the registration platform will be activated on 15th May 2020. IWMA will offer reduced prices up to 15th July 2020. The program will be published on 1st July 2020. Day one of the conference will be Applications Day and can be booked separately. Day two will primarily focus on the scientific side of the technology.

Deadline for submissions for the IWMA Young Talent Award is 30th April 2020. In 2020 this award will go to the author of the best master thesis dealing with water mist.

See details on the website at www.iwma.net.

6th International Conference on Fires in Vehicles (FIVE 2020) – 8-9 October 2020, Amsterdam (The Netherlands)

FIVE 2020 will take place in Amsterdam 8-9 October and will bring together expertise in the field of Fires in Vehicles for two days of presentations and exhibits. Each day will be opened by invited Keynote Speakers, leaders in their field, providing an overview of their topic of expertise as an introduction to the themes of the day. The objective of this conference is to exchange knowledge concerning fires in vehicles, including road, off-road and rail vehicles. The event will include both oral presentations and a poster session. Conference topics will include, but are not limited to:

- Regulations and standards
- Fire statistics
- Insurance issues
- Fire development in vehicles
- Fire detection in vehicles
- Fire suppression in vehicles
- Fire mitigation strategies in vehicles
- Case studies
- First responder strategies
- Fire risks in vehicles with alternative fuels or alternative drives
- New materials in vehicles

RESEARCH ROADMAP FOR EVALUATING THE ENVIRONMENTAL IMPACT OF FIRE

The environmental impact of fires is difficult to estimate. Significant research is needed to quantify impacts and estimate costs in a reliable manner. Lund University (Sweden) in collaboration with INERIS (France) and Meacham Associates (North America) have developed a Research Roadmap based on a literature study of existing research and extensive gap analysis. The work was funded by the Fire Protection Research Foundation and will be publicly available through their website by the end of February 2020 (<https://www.nfpa.org/-/media/Files/News-and-Research/Resources/Research-Foundation/Current-projects/ProjectSummaryEnvironmentalImpactOfFire.ashx?la=en>).

ENCYCLOPEDIA OF WILDLAND FIRES AND WILDLAND-URBAN INTERFACE FIRES

Wildland fires that spread into communities, known as Wildland-Urban Interface (WUI) fires constantly make headlines in the USA and around the world. The recent Northern California WUI fires in 2018 destroyed more than 18,800 structures and impacted thousands of lives. At the invitation of Springer Nature, I was asked about developing an encyclopedia on this topic and serve as the Editor in Chief (EiC).

As part of the encyclopedia process, I reached out to colleagues from around the world to help me to be part of our editorial board to develop an outline of what we felt was absolutely essential for the readers of general interest to know about wildland fires and WUI fires. The encyclopedia is geared towards a general purpose audience where anyone may learn about the accepted knowledge in this field. In the end, six section editors (SEs) from Australia, China, France, and the USA worked tirelessly to complete this massive task. They are Dr. Raphaelae Bianchi (CSIRO, Australia), Dr. Anne Ganteaume (IRSTEA, France), Dr. Michael Gollner (University of California, Berkeley, USA), Dr. Sara McAllister (USDA Forest Service, USA), Dr. Sayaka Suzuki (NRIFD, Japan), and Dr. Kuibin Zhou (Nanjing Tech University, China).

Our first edition of the encyclopedia contains 171 contributions, written by nearly 200 authors from all over the globe. Now anyone from around the world may access important topics of key significance to wildland fires and WUI fires. Each contribution follows a clear simple definition and provides an overview of the topic. Readers can learn about many interesting and exciting topics, from combustion, to fire whirls, to wildland fire fighting positions and tactics, all the way to the importance of fire ecology in wildland fires. A major challenge for all our authors was how to best prepare simple, succinct, contributions on the topics we invited them to write about. The writing style for an encyclopedia is much simpler than scientific journals and trade publications. The encyclopedia presents clear definitions of important terms in this field.

Currently, 159 of our author contributions are published on-line (remaining are in press and more appear on-line everyday) and Springer Nature is working hard to print the first edition, as it will be more than 1200 pages in length. Our editorial board also runs what we call 'Editor in Chief Featured Contributions'. These are voted on by our SEs to select what we feel are really special contributions that would be of the most interest to general audience and these are free to download for fixed period and are also tweeted by Springer Nature.

Please see the following link to see the exciting work of all of authors:
<https://link.springer.com/referencework/10.1007/978-3-319-51727-8>

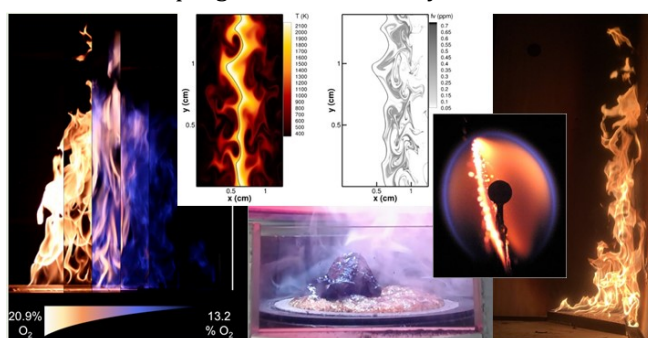
Please see link for current EiC features:
<https://meteor.springer.com/wildfire/?id=561&tab=About&mode=ReadPage&entity=7303>

Signed: Samuel L. Manzello, Editor in Chief, NIST

COMBUSTION INSTITUTE SUMMER SCHOOL ON FIRE SAFETY SCIENCE

The **Combustion Institute Summer School on Fire Safety Science** will bring together graduate students, post-doctoral fellows and early-career researchers and engineers engaged in fire science as well as distinguished instructors from leading higher-education institutions and research programs in fire safety around the world.

The summer school will take place on June 8-12 2020 on the campus of the University of Maryland in College Park. The objectives of the summer school are to expose participants to a broad range of advanced topics with a mix between fundamental courses that emphasize the theoretical foundations of the engineering problem and application courses that describe the engineering configurations and emphasize current challenges in the engineering practice. The objectives are also to build a strong international network of graduate students, post-doctoral fellows, early-career researchers, instructors and leading researchers.



The list of courses is organized into two main categories: (1) Fundamental courses that emphasize the theoretical foundations of the engineering problem (combustion science, material science, structural mechanics); and (2) Application courses that describe the engineering configurations and emphasize current challenges in the engineering practice (wildland fires, façade fires, performance-based design, suppression systems).

Registration

Thanks to the financial support by the Combustion Institute and by the Burgers Program at the University of Maryland, the **Combustion Institute Summer School on Fire Safety Science** is offered without any registration fee for students from academia and public organizations; students from private organizations are also welcome but depending on final budget numbers, a small fee - approximately \$500 - may be requested for their registration. The available budget will cover costs for lodging (shared double rooms), breaks and lunches, and handout material. Participating students are expected to cover the cost of travelling to the University of Maryland; depending on final budget numbers, partial support for travel of participating students from academia may also become available.

Application and important date

Application material: the application package should be a single file (Microsoft® Word or PDF) that contains:

- A cover letter (up to 2 pages) explaining the applicant's interest in fire research and his/her motivation for the Combustion Institute Summer School on Fire Safety Science;
- A curriculum vitae (up to 2 pages);
- And for students enrolled in a graduate academic program, a letter of recommendation from the applicant's academic advisor (up to 2 pages).

Applicants should submit their application package to Prof. Arnaud Trouvé: atrouve@umd.edu, with the subject line "Application to the Combustion Institute Summer School on Fire Safety Science". Note that for logistic reasons, student participation will be restricted to a maximum group size of 50 students.

Application deadline: **February 28, 2020** Final decision: **March 7, 2020**

Point of contact: Prof. Arnaud Trouvé, Department of Fire Protection Engineering, University of Maryland, Phone: 1 (301) 405-8209 or Email: atrouve@umd.edu

For more details, see the website at: <https://www.combustioninstitute.org/ci-event/combustion-institute-summer-school-on-fire-safety-science/>

CALLS FOR PAPERS/ABSTRACTS

20th International Water Mist Conference (IWMC)

Those wishing to give a presentation, may submit an abstract no later than 15th May 2020. Please send all abstracts to mcdowell@iwma.net. Abstracts should not exceed 2 pages and should include the title of the paper, the name(s) of the author(s), the person(s) presenting and the affiliation, including the address, telephone, fax number and e-mail address. The topics covered at the conference include:

- System applications
- Research & Testing
- Detection, innovation technologies
- Regulations, Standards and Codes
- Environmental and health/safety issues

The conference will be held in Warsaw, October 7-8, 2020. For details on submission, see the brochure at https://iwma.net/fileadmin/user_upload/IWMC_2020/2020_callforpapers.pdf.

Fire and Materials 2021 - 16th International Conference and Exhibition

This major international forum focuses on the fire performance of materials and the products into which they are made. Papers on fire chemistry flame retardants, FR applications and modelling are welcome, along with those on fire performance in construction, electro technical and transport applications. The conference also addresses specific topical issues and, over the last decade, introduced parallel sessions on fire investigation, large outdoor fires including wildland urban interface fire studies and facade fires.

The Programme Committee has targeted specific areas for presentation and invites papers on the following:

- Chemistry in Fire
- Electrical Fires including Cables and Li-ion Battery Fires
- Fire Dynamics
- Combustion Toxicity
- Fire Resistance
- Fire Hazard and Risk Assessment
- Large Outdoor Fires
- Fire Safety Codes and Regulations
- Fire Safety of Building Contents
- Environmental Concerns
- Facade Fires
- Fire and Building Products
- Fire retardants, including Nanocomposites
- Materials Behavior in Fire
- Test Methods and Measurement Challenges
- Modelling including Pyrolysis Modelling
- Wildland Urban Interface Fire Studies
- Fire Investigation
- Fires in Tunnels, Vehicles and Transportation
- Fire Safety Engineering

To offer a paper, send a maximum 2-page abstract, including tables and images, for review before **June 1, 2020**. (Format: A4 paper, 1-inch margins, 11pt Arial font, max 2 pages) to: Stephen Grayson, Fire and Materials 2021. Email: conference@intersciencecomms.co.uk

Authors will be advised of acceptance by **September 1, 2020**. Final version of the full paper is required by **November 1, 2020**. Papers will be eligible for publication in *Fire and Materials Journal*. One speaker per technical paper will be entitled to register for the conference at a discounted rate.

The conference will be held February 1-3, 2021, in San Francisco CA (USA) For more information and the abstract template, see: <https://www.intersciencecomms.co.uk/html/conferences/fm/fm21/fm2021home.htm>

UPCOMING EVENTS –2020-2021

2020

- Mar 11-13 9th International Symposium on Tunnel Safety and Security (ISTSS 2020) – Munich (Germany) - <https://istss.se/>
- Mar 11-13 SFPE 13th International Conference on Performance-Based Codes and Fire Safety Design Methods – Auckland (New Zealand) - <https://www.sfpe.org/page/UpcomingConferences>
- Apr 27-May 1 13th IAFSS Symposium on Fire Safety Science – Waterloo, ON (Canada) – www.iafss2020.ca
- May 3-6 9th Conference Wood & Fire Safety 2020 - Štrbské Pleso (Slovakia) - <http://wfs2020.sk/en/>
- June 8-12 Combustion Institute Summer School on Fire Safety Science – College Park, MD (USA) - <https://www.combustioninstitute.org/ci-event/combustion-institute-summer-school-on-fire-safety-science/>
- June 24-26 11th International Conference on Structures in Fire (SiF 2020) – Brisbane (Australia) – <http://sif2020.com>
- Jul 12-17 38th International Symposium on Combustion – Adelaide (Australia) - <http://www.combustionsymposia.org/2020/home>
- Aug 24-26 World Conference on Timber Engineering 2020 (WCTE 2020) – Santiago (Chile) - <http://wcte2020.com/>
- Sep 15-17 17th International Conference on Automatic Fire Detection (AUBE '20) and the Suppression, Detection and Signaling Research and Applications Symposium (SUPDET 2020) – Mülheim an der Ruhr (Germany) - <http://nts.uni-duisburg-essen.de/aube/aube20/aube20.html>
- Oct 7-8 20th International Water Mist Conference (IWMC) – Warsaw (Poland) - www.iwma.net
- Oct 8-9 6th International Conference on Fires in Vehicles (FIVE 2020) – Amsterdam (The Netherlands) – <https://firesinvehicles.com/>

2021

- Feb 1-3 16th Fire and Materials conference – San Francisco CA (USA) - <https://www.intersciencecomms.co.uk/html/conferences/fm/fm21/fm2021home.htm>

Job postings on the IAFSS Website

King's College London – Department of Engineering is seeking applications for professor in thermofluids. Candidates must have a PhD in Engineering or related field and show a commitment to helping shape the future of the Department of Engineering at King's. This full-time post will be offered on an indefinite contract. The salary will be paid at the Professor salary scale, £72,119-£89,515 per annum, inclusive of £3,500 per annum London Allowance. The selection process will include a panel interview, a presentation. Interviews are scheduled for early April 2020. To Apply, please register with the King's College London application portal and complete your application online.

FM Global, Norwood MA (USA) is seeking a senior research scientist. The purpose of this position is to develop new scientific knowledge, engineering technologies, and engineering solutions to problems in fire protection, which can be used and applied by FM Global for mitigating commercial property loss. The position requires, among other things, an M.S. or PhD in Mechanical, Chemical, Aerospace Engineering or related fields and a strong background in combustion, fluid mechanics, heat transfer and applied mathematics. Title and salary are commensurate with qualifications and experience. Direct application link: <https://jobs-fmglobal.icims.com/jobs/9363/senior-research-scientist-fire/job?mode=view&mobile=false&width=626&height=500&bga=true&needsRedirect=false&jan1offset=-300&jun1offset=-240>

Worcester Polytechnic Institute (USA)'s Fire Protection Engineering Program invites applications for a tenure-track position at the Assistant Professor level. The successful candidate is expected to have a PhD or equivalent degree in fire protection engineering or a closely-related engineering discipline. For complete job posting and to apply, see: https://wpi.wd5.myworkdayjobs.com/WPI_External_Career_Site/job/Worcester/Assistant-Professor_R0000814

The Department of Fire Protection Engineering at the University of Maryland is seeking applicants for a tenure-track faculty position at the Assistant/Associate professor level. The applicant should have a doctorate in a relevant discipline. Teaching expertise and a background in fire protection are desirable. See the complete job posting and apply at <https://ejobs.umd.edu/postings/74942>.

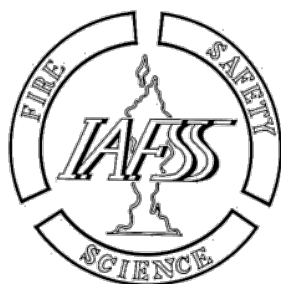
Remember, you can always check the website for current job postings at the bottom of the front page.

CALL FOR CONTRIBUTIONS

To continue succeeding with this newsletter, it is important that we receive contributions from the IAFSS membership at large. Please consider submitting articles, letters to the editor, images, news, announcements or job openings related to fire safety science of IAFSS members. These could be collected from your department, institution, country or region. Please send your contributions to the Editor (Rita Fahy, rfahy@nfpa.org).

Letters to the Editor are most welcome, anytime, in response to newsletter content or any other topic related to the IAFSS.

**For the next issue (No. 45), the
deadline for submissions is
June 30, 2020.**



<http://www.iafss.org>

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