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Fire Safety Science News

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Rita Fahy, Editor

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Jackson Pollock Paints with Fire Sriram Bharath Hariharan Winner of the Award for Artistic Merit at the 2019 US National Combustion Meeting



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 <u>online</u>.

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 <u>webmaster@iafss.org</u> and they'll help you out.

MEMBERSHIP REGISTRATION

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

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*
- Discounted Annual Print Subscription Fees to *Fire Safety Journal*
- Fire Safety Science News (Official Newsletter of the IAFSS)
- Membership list with contact details
- 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.

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

LETTER FROM THE CHAIR



The preparations for our 13th symposium to be held in Waterloo, Canada are at full speed. As I write these notes, the deadline for submission of papers has passed and the papers are in the reviewing process. I hope you all will help the organisation committee to perform the reviews of the papers within the scheduled time period and with a high quality. It is extremely appreciated.

Similar to the previous symposium, our papers will be published in a special issue of *Fire Safety Journal* and will get full exposure in the scientific community. You will also have the possibility to publish your paper as open access at a considerably-reduced price. This will be taken up at a later stage by the symposium committee. Thanks to Elsevier.

Apart from presentations, there will be also a myriad of other activities such as meetings of our two working groups, workshops, excursion events and an official dinner with the announcement of both the IAFSS and FORUM awards. Most of the IAFSS awards have now been announced and you can find the list on our website and later in this newsletter. We also appreciate that FORUM gives a number of awards for different type of researchers and would like to thank FORUM for this effort and for their continuous support of our symposium.

A special word of attention is given to organisers and leaders of both our working groups. Both the working group on the Measurement and Computation of Fire Phenomena (MACFP) and on Large Outdoor Fires and the Built Environment (LOF&BE) will hold meetings during the symposium. The LOF&BE group even had a successful meeting during the Interflam conference and it seems many people are interested in participating in that initiative too. Apart from the working groups, there will also be a number of workshops and on top of that, initiatives for young researchers and diversity issues. Keep tuned on our website. Soon even the registration website will be opened. Further information about the symposium can be found elsewhere in this newsletter and on the website from the organisation committee. A big thanks to all involved.

In order to have a good overview on our member status, we decided to close our 2019 membership at the end of October. If you have colleagues who want to join IAFSS, they can do so after this date, but this will be under membership for 2020. Membership numbers are still constant but we have seen a decrease in student membership although the fee is very low for them. But it seems to hinder them. Therefore, we decided to create contact points at the universities who can provide us with names of the students at their university who want to become members. If the contact point delivers us a list with the students who want to become a student member, we will register them for free. So, if you want to become one of the contact points 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!

Another idea from the strategy discussion was the establishment of a white paper on fire safety science. The paper, which is an agenda 2030 for fire safety, is now published in *Fire Safety Journal* as open access (<u>https://doi.org/10.1016/j.firesaf.2019.102889</u>). Please read the paper and refer to it so that we get maximum exposure of the thoughts in the paper. I do hope we will have more such initiatives in the future. Thanks to all the people who helped in writing this paper, all the way from participants at our workshops to the authors and the leading people. This is a joint effort!

Last but not least, I would like to remind you again that we also are standing for the challenge of bringing our organisation in a new structure with a new secretariat. A first hurdle has been taken and that was the change to a new bank. We now open up for tenders to run our secretariat as a second hurdle. If you are aware of a person or an organisation who could act as our secretariat, contact me, provide the data of the interested party and I will send the tender to them. We hope to close down this effort by the end of October and decide on the route to follow before the end of the year. In the meantime, Sue Owen will continue providing us with an interim solution and we thank her for her efforts. The last hurdle will be an adaption of 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 hopefully will be as successful as the Lund symposium.

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

13TH INTERNATIONAL SYMPOSIUM ON FIRE SAFETY SCIENCE

The International Association for Fire Safety Science (IAFSS)'s 13th International Symposium on Fire Safety Science will be held from April 27 to May 1, 2020 at the University of Waterloo, Canada. The symposium website is now available: http://www.iafss2020.ca/).

The IAFSS Symposium, organized triennially



since 1985, is the premier fire safety science meeting, attracting researchers, students and fire protection engineers from across the globe. The five-day symposium will feature invited lectures from world-leading fire researchers, parallel presentations of peer reviewed papers, and poster sessions for recent work. Symposium activities will be preceded by a series of weekend workshops. In addition to the technical sessions, numerous social activities are planned to provide informal meeting and networking opportunities for colleagues and friends.

The topic areas of the papers presented at the symposium include:

- Material Behaviour in Fires (ignition, pyrolysis, flame spread, and smouldering)
- Fire Dynamics (pool fires, fire plumes, compartment fires, and tunnel fires)
- Fire Chemistry (chemical kinetics, material toxicity, and flame retardants)
- Structures in Fire
- Fire Suppression
- Wildland and WUI Fires
- Evacuation and Human Behaviour
- Fire Risk Analysis and Fire Safety Design
- Other Topics (fire detection and smoke control, explosions and industrial fires, fire codes and standards, and fire safety management)

Host Venue

The 13th International Symposium on Fire Safety Science will be held on the University of Waterloo's main campus. 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.

13th IAFSS Symposium Timeline

Full Papers

6 September 2019 – Submission deadline for full papers

13 November 2019 – Authors notified of preliminary accept/reject decision

13 December 2019 – Deadline for submission of revised accepted papers

23 December 2019 – Authors notified of final accept/reject decision

Posters and Images

30 January 2020 – Submission deadline for poster abstracts and images

10 February 2020 – Authors notified of accept/reject decision for poster abstracts

17 February 2020 – Authors notified of accept/reject decision for images

Symposium

27 April to 1 May 2020 - 13th IAFSS Symposium

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 also offers 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 city centre is located within walking distance of the University of Waterloo. The Grand River Transit system, which serves Waterloo and the surrounding areas, is extensive and fully-accessible. The city is easily accessible from major Canadian cities by train, bus or airplane.

Locally, there is the Region of Waterloo Airport which is continuously expanding its services. The closest major airport is Toronto's Lester B. Pearson International Airport which is about 1.5 hours away with frequent shuttle service to and from the Waterloo campus.

Registration and Accommodation

Symposium registration for participants and their companions will be available via links from the Symposium website at <u>http://www.iafss2020.ca</u> in the near future. Links to accommodations are available on the website now. Blocks of rooms have been arranged at three area hotels. 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.

Registration will include online access to full papers and posters. 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.

13th Symposium Committees

IAFSS Chair Prof P van Hees, Lund University, Sweden

Symposium Host Committee 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 Co-Chairs

Prof N Liu, U of Science and Technology of China Dr S McAllister, USDA Forest Service, USA

Program Communication Co-Chairs

Dr K Boyce, Ulster University, UK Dr Y Wang, FM Global, USA

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 Co-Chairs

Prof C Fleischmann, U of Canterbury, New Zealand Prof M Gollner, U of Maryland, 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

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

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).

FINAL NEWS ON AWARDS PRESENTED AT THE 12TH IAFSS SYMPOSIUM

The names of the winners of the FORUM Student Awards in the Memory of Sheldon Tieszen were not included in the last newsletter. The awards went to:

Rahul Wadhwani Mohamad Ludfi Ramadhan Obinna Akaa

Cong Zhang Joshua Swann James White

Maria Thomsen Rémi Stroh Franz Richter

UPDATES FROM IAFSS WORKING GROUPS

Measurement and Computation of Fire Phenomena (MaCFP) Working Group

The second MaCFP workshop is currently being scheduled for April 25-26 2020, as a pre-event to the 13th IAFSS Symposium in Waterloo, Canada. The organizing committee of the Gas Phase Phenomena Subgroup for the second MaCFP workshop is composed of:

Alexander Brown (Sandia National Laboratories, USA) Andres Fuentes (Universidad Técnica Federico Santa María, Chile)

Michael Gollner (University of Maryland, USA)

Anthony Hamins (National Institute of Standards and Technology, USA)

John Hewson (Sandia National Laboratories, USA)

Naian Liu (University of Science and Technology of Beth Weckman (University of Waterloo, Canada) China, China)

Andre Marshall (University of Maryland, USA)

Randy McDermott (National Institute of Standards and Technology, USA)

Bart Merci (Co-Chair) (Ghent University, Belgium)

- Arnaud Trouvé (Co-Chair) (University of Maryland, USA)
- Yi Wang (FM Global, USA)

The organizing committee of the Condensed Phase Phenomena subgroup is composed of:

Benjamin Batiot (University of Poitiers, France)	Yuji Nakamura (Toyohashi University of Technology
Morgan Bruns (Virginia Military Institute, USA)	Japan)
Simo Hostikka (Aalto University, Finland)	Pedro Reszka (Universidad Adolfo Ibáñez, Chile)
Isaac Leventon (National Institute of Standards and	Thomas Rogaume (University of Poitiers, France)
Technology, USA)	Stanislav Stoliarov (University of Maryland, USA)

The target audience is the experimental and computational fire research community. The MaCFP Working Group invites 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 will be fully open.

Members of the fire research community can participate 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 25-26, 2020: attend and participate in the discussions at the workshop.

Important issues like membership to the organizing committee of the MaCFP Working Group and the selection of new target experiments for the third MaCFP workshop will also be discussed at the second workshop. Suggestions on these topics are also welcome anytime.

Contact Information: For more information and/or to take a first step to get involved, please contact one of the organizing committee Co-Chairs: Bart Merci (<u>bart.merci@ugent.be</u>) and Arnaud Trouvé (<u>atrouve@umd.edu</u>).

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

The kickoff workshop of the new permanent working group, sponsored by the International Association for Fire Safety Science (IAFSS), entitled Large Outdoor Fires and the Built Environment (LOF&BE) was held from 3:00 pm to 4:30 pm on October 21, 2018. (Please download the report here: https://doi.org/10.6028/NIST.SP.1236). The workshop was held as a part of the 11th Asia-Oceania Symposium on Fire Science and Technology (AOSFST) in Taipei, Taiwan. A total of 32 global experts participated, representing Australia, China, Indonesia, Japan, New Zealand, Singapore, South Africa, Taiwan, United Kingdom, and USA. The workshop began with an introductory presentation on how this topic became a permanent working group with IAFSS sponsorship. After this, the large outdoor fire and built environment problem was placed in the context on why it is important to the Asia and Oceania regions. Further presentations went into detail to highlight what each of the three subgroups will undertake and their specific plans as part of the IAFSS 2020 symposium that will be held in Waterloo, Canada. It was noted that the Ignition Resistant Communities (IRC) subgroup has the largest number of registered participants, as this topic most closely aligns with the majority of the expertise within the current IAFSS community. As a result, it was stressed that more participation would be helpful in the Emergency Management and Evacuation (EME) and Large Outdoor Firefighting (LOFF) subgroups. Participants suggested it would be good to have another workshop prior to IAFSS 2020 Symposium with Interflam 2019 suggested as a possible venue. As a result, a partnership was forged with IAFSS and Interflam to have a LOF&BE workshop at Interflam 2019! A report will be issued after the workshop: (https://www.intersciencecomms.co.uk/html/ conferences/Interflam/if19/workshopsif19.htm)

If you are interested in this working group, please sign up: (https://goo.gl/forms/0TMW2SbWi7mmHYIv1).

PROF. AI SEKIZAWA TO BE AWARDED THE KUNIO KAWAGOE GOLD MEDAL AT 13TH IAFSS SYMPOSIUM IN WATERLOO

The 2020 <u>Kunio Kawagoe Gold Medal</u> will be presented at the <u>13th IAFSS</u> <u>Symposium in Waterloo, Canada</u> to Professor Ai Sekizawa of the Tokyo University of Science, Japan. The Kunio Kawagoe Gold Medal is awarded by the IAFSS as a prestigious recognition of life-long contributions to and career achievements in fire science and engineering.

For more than 40 years, Prof. Sekizawa has dedicated himself to fire science and engineering while working at both government research institutes and prestigious universities in Japan, including the Fire Research Institute (now the National Research Institute of Fire and Disaster) and as a Professor at the University of Tokyo and Tokyo University of Science. During his career, he has made significant contributions in different areas of fire science, such as fire risk analysis of residential fires, urban fires following an earthquake, and



evacuation. His achievements in research are not only of great importance for the promotion of fire safety science and engineering, but also of great contribution to the actual measures used to mitigate the fire risk of both residential and post-earthquake fires.

Prof. Sekizawa has also been active in the promotion of fire science and its translation to practice. He established the Japan Chapter of the Society of Fire Protection Engineers (SFPE) and has made a significant contribution promoting exchange among local chapters and fire experts in Asia Oceania as a Chairman of the co-ordination group. At the Graduate School of Global Fire Science and Technology at Tokyo University of Science, he has educated many students and young fire officials from Asian countries. He was President of the Japan Association for Fire Science and Engineering (JAFSE), the representative academic society on fire safety science in Japan (2008 and 2009). He also served on the management committee of the IAFSS from 2005 to 2017, including as Vice-Chair (2011 to 2017) and Secretary (2008 to 2011).

Prof. Sekizawa has previously been recognized with the Award of the Japan Association for Fire Science and Engineering in 1992, the Peter Lund Award in 2011, and the prestigious Arthur B. Guise Medal in 2014 from the Society of Fire Protection Engineers (SFPE). He is a Fellow of the SFPE and received the Lifetime Contribution Award at the 11th Asia-Oceania Symposium on Fire Science and Technology in 2018.

Professor Kunio Kawagoe

Professor Kunio Kawagoe pioneered the development and use of scientifically based fire analysis, developing the relationship between the compartment burning rate and the size of an opening ($Rb = 5.5 \cdot A \cdot h0.5$), in a seminal paper on compartment fire modelling published in 1958. His contributions, especially on fuel-controlled compartment fires and the structural analysis of the fire induced effects in columns and beams, laid foundation to modern fire science and engineering, and underpinned the early development of performance-based fire safety design, especially in Japan. Professor Kawagoe was the Director of the Building Research Institute between 1969 and 1973, when he was appointed Professor in the Faculty of Science and Engineering at the Science University of Tokyo. His career included appointments of the Deanship of the Faculty at the Science University of Tokyo in 1980 and, in 1986, the Directorship of the Centre for Fire Science and Technology. He served as an IAFSS Vice-Chairman from its founding in 1985 until 1991. Professor Kawagoe was a role model and dedicated teacher of young fire safety engineers. He passed away in 1994. (Extracted from T Ishii, Fire Science and Technology 14, 1994, pp i-ii, and from In Memoriam, Proceedings 5th Fire Safety Symposium, 1997, p vii.)

PROFESSOR DLUGOGORSKI TO GIVE EMMONS INVITED PLENARY LECTURE AT THE 13TH IAFSS SYMPOSIUM

The 2020 <u>Howard Emmons Invited Plenary Lectureship</u> at the <u>13th IAFSS</u> <u>Symposium in Waterloo, Canada</u> will be delivered by Professor Bogdan Z. Dlugogorski of Charles Darwin University, Australia. The Emmons Lectureship is a prestigious recognition of distinguished career achievement in fire science and engineering awarded by the IAFSS once every three years at its International Symposium on Fire Safety Science.

Professor Dlugogorski is distinguished for his contributions to the field of industrial fire safety and environment protection, especially through innovative development of safe industrial processes. Professor Dlugogorski founded and leads a large research group, with a strong focus on fire safety, and engaged in collaborative research and technology transfer. His



achievements are recognized both within Australia and internationally, by a series of awards and fellowships. Professor Dlugogorski's personal contributions to the field of fire and process safety and environment protection are in four areas: (i) formation of toxic compounds in uncontrolled combustion (with focus on emissions of dioxins/furans, PCB and PAH in chemical fires, and from treated and contaminated wood); (ii) conversion of chlorinated and brominated wastes to useful material (including banned chlorofluorocarbons and halons, and byproduct hydrofluorocarbons); (iii) fire and explosion chemistry (including fundamental studies on chemical mechanisms of self-heating and ignition of coal, sensitization of emulsion explosives and mitigation of NOx formation in blasting); and (iv) mitigation of industrial fires (firefighting foams, gaseous agents and chemical fires).

Prof. Dlugogorski is a Fellow of the Australian Academy of Technology and Engineering, Society of Fire Protection Engineers, the Combustion Institute, Engineers Australia and Royal Australian Chemical Institute. Professor Dlugogorski has been awarded the IAFSS's Philip Thomas Medal of Excellence, NFPA's Harry C. Bigglestone Award for Excellence and the Lifetime Contribution Award from the Asia-Oceania Association for Fire Science and Technology. Professor Dlugogorski is currently Deputy Vice-Chancellor and Vice-President, Research and Innovation at Charles Darwin University, having previously held the positions of Dean of School of Engineering and Information Technology at Murdoch University in Perth and Director of Priority Research Centre for Energy at the University of Newcastle, Australia. He holds a DSc in Fire Safety Science and Engineering (Newcastle), PhD and MEng in Chemical Engineering (Montreal, McGill), and undergraduate degrees in Chemical Engineering and Geophysics (Calgary). He is immediate past chairman of the International Association for Fire Safety Science.

Professor Howard W. Emmons

Professor Howard Emmons is considered by many to be "the father of modern fire science" for his contributions to the understanding of fire dynamics. While teaching at Harvard University from the 1940s until his death in 1998 at the age of 86, Emmons conducted pioneering studies of fire safety in buildings and documented how combustible materials interact and how fires spread and grow in phases. His measurements pushed the prediction of fire behavior into the world of precise mathematical modeling. Emmons pressed for reform of U.S. building and fire codes based on scientific and engineering insight. His efforts led to early computer models of fire spread in buildings and U.S. congressional passage of the 1968 Fire Research and Safety Act. Emmons held honors from the Stevens Institute of Technology (100th Anniversary Medal, 1970), the American Society of Mechanical Engineers (Timoshenko Medal, 1971), the American Physical Society (Fluid Dynamics Prize, 1982), and the Combustion Institute (Egerton Gold Medal, 1968). He was inducted into the U.S. National Academies of Engineering (1965) and Science (1966). His legacy includes 50 doctoral students and more than 130 landmark research papers.

13TH IAFSS SYMPOSIUM INVITED SPEAKERS ANNOUNCED

We are pleased to announce the five invited speakers for the 13th IAFSS Symposium. The Symposium will be held from April 27 to May 1, 2020 at the University of Waterloo, Canada. Organized triennially since 1985, the IAFSS Symposium is the premier fire safety science meeting attracting researchers, students, and fire protection engineers from across the globe. The invited speakers were nominated and voted on by the entire IAFSS Committee. The final selection takes into consideration proposed topics, geographical region, and gender and is made by the Symposium Program Scientific Co-Chairs. One speaker is chosen by the local host. Our five speakers, experts representing a wide range of fire safety topics, are:

Mark Finney:"The Wildland Fire System and Challenges for Engineering"

Mark A. Finney is a Research Forester with the US Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory. He has worked at the Fire Laboratory since 1993 on fire behavior, fire growth modeling and risk analysis, and landscape fuel management. He leads a fire behavior research team to discover fundamental physical explanations for wildland fire behavior using laboratory and field-scale experiments. He was responsible for development fire models for the national Wildland Fire Decision Support System. He holds a Ph.D. in wildland fire science from Univ. California at Berkeley (1991), an M.S. in Fire Ecology from University of Washington (1986), and a B.S. in Forestry from Colorado State University (1984).



Anne Steen-Hansen: "Learning from fire investigations and research – from reactive to proactive fire safety management"

Anne Steen-Hansen has been professor in Fire Safety Engineering at the Norwegian University of Science and Technology (NTNU) since August 2019, and has also a part-time engagement as a Chief Scientist at RISE Fire Research in Trondheim. She received her PhD on the topic smoke production in 2002. Her field of interests includes materials' reaction to fire, fire investigation, fire statistics, domestic fire safety, industrial fire safety and fire terminology. Anne is the director of the newly established Fire Research and Innovation Centre (FRIC) in Norway, and is President of EGOLF (European Group of Organisations for Fire Testing, Inspection and Certification) since 2016.

Erica Kuligowski: "Evacuation Decision-making and Behavior in Wildfires: Past Research, Current Challenges, and a Future Research Agenda"

Dr. Erica D. Kuligowski is a research social scientist in the Wildland-Urban Interface (WUI) Fire Group of the Fire Research Division of the Engineering Laboratory at the National Institute of Standards and Technology (NIST). Dr. Kuligowski holds a Ph.D. in Sociology from the University of Colorado at Boulder, as well as a B.S. and M.S. in Fire Protection Engineering from the University of Maryland, College Park. Her research interests are human behavior in emergencies, focusing on decision-making





and response of people under imminent threat, and the role that emergency communication plays in this process.

Tara McGee: "Evacuating First Nations during wildfires in Canada"

Tara McGee is a professor at the University of Alberta in Edmonton, Canada. She grew up in Ontario and completed her undergraduate degree at the University of Waterloo. Her PhD is from the Australian National University. Dr. McGee's research program focuses on the human dimensions of wildfire, including wildfire risk perceptions, evacuation, mitigation and preparedness, and recovery. Most of her research is based in Canada, including the First Nations Wildfire Evacuation Partnership, and research in the Regional Municipality of Wood Buffalo. She is also engaged in international research.

Jinhua Sun: "Progress on research of fire behavior and fire protection of lithium ion battery"

Professor Jinhua Sun received his Ph.D. from University of Tokyo in 1999. Now he is the Vice Director of SKLFS and the Director of Energy Fire safety Institute. He has made substantial accomplishments in fire safety in new energies, building and industrial fire safety, fire risk assessment and so on. He has published over 260 SCI journal articles and 11 academic books or book chapters in these research areas. He chaired more than 20 important National and International research programs. He was elected to the "Hundred-Talent Program" of Chinese Academy of Sciences in 2002, and he has won the First Prize (1993) and Second Prize (2006) of National Award for Science and Technology Progress.

INTERNATIONAL FORUM OF FIRE RESEARCH DIRECTORS AWARDS

The International FORUM of Fire Research Directors has selected the recipients for the 2019–2020 Sjölin and mid-career researcher awards. The prizes consist of a plaque and an honorarium. Recipients of the awards are selected annually and the awards are delivered at the triennial symposia of the International Association for Fire Safety Science, IAFSS. These awards will be handed out at the 13th IAFSS Symposium in Waterloo, Canada, next April.

The FORUM Sjölin Award

The FORUM 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. It is presented to the individual or group whose efforts are primarily responsible for or traceable to the specified advance.

The FORUM selected **Prof. Brian Y. Lattimer**, Virginia Polytechnic Institute and State University (Virginia Tech), as the recipient of the 2019 Sjölin Award in recognition of his research in a wide range of fire science areas, including advanced modeling and simulation techniques, robotic systems for emergency response, material response in fires, heat transfer, and combustion product transport. He has pursued the use of new, advanced technology and approaches to provide innovative solutions in the area of fire. For example, he has adapted machine learning techniques to create new methods for generating real-time solutions for computationally expensive problems, and led the development of advanced robotic systems to assist in fire emergency response. The FORUM especially acknowledges Prof. Lattimer's contributions in the area of material pyrolysis and structural

response due to fire including building materials, composites, and metals. His research efforts on the heat transfer from fires and in providing new techniques to separate radiative and convective heat transfer are greatly appreciated.

The FORUM selected *Prof. Haukur Ingason*, RISE Research Institutes of Sweden and Lund University, as the recipient of the 2020 Sjölin Award. With this award the FORUM is recognizing more than twenty-five years of international contributions to fire safety science. Prof. Ingason has performed outstanding experimental fire research both at large and small scale, for example tunnel and rack-storage fires as well as evaluation of heat flux in various configurations. His main impact can be seen in the areas of design fires, smoke movement, visibility in smoke, sprinkler/water mist systems, the influence of ventilation on fire development, and improving fire services operations. The FORUM especially acknowledges Prof. Ingason's pioneering research in tunnel fire science. His work on tunnel fires has contributed to making this field a major research area, and his findings are now used for defining design

fires for underground construction worldwide.







The FORUM Mid-Career Researcher Award

The FORUM Mid-Career Researcher Award recognizes exceptional achievement and demonstrated leadership in the fields of fire safety science or fire protection engineering made by those in mid-career. It is intended to honor an individual, who is between the ages of 35 and 50 at the time of nomination.



The FORUM selected **Prof. Guillermo Rein**, Imperial College London, as the recipient of the 2019 Mid-Career Researcher Award. With this award, the FORUM is recognizing his outstanding achievements in several fields of fire safety science, centering on heat transfer, combustion and fire fundamentals. His work has been instrumental in reducing the worldwide burden of accidental fires and protecting people, their property, and the environment. The FORUM especially acknowledges Prof. Rein's contributions in three subjects: how polymers and wood ignite so that we can prevent fires from starting, how engineers can design better structures that resist fire, and how wildfires spread and can be fought.

The FORUM selected **Prof. Thomas Rogaume**, Institut Pprime (UPR 3346 CNRS, Université de Poitiers, ISAE-ENSMA), Institut des Risques Industriels, Assurantiels et Financiers (IRIAF), University of Poitiers, as the recipient of the 2020 Mid-Career Researcher Award. With this award, the FORUM is recognizing his outstanding research activities in fire safety, conducted in the area of multiscale and pyrolysis modelling. His research team on experimental and numerical pyrolysis phenomena during fires has produced a large number of publications and several PhD theses since 2005. The FORUM especially acknowledges Prof. Rogaume's versatile teaching achievements in the fields of combustion and fire safety, as well as waste management, air pollution, air treatment, and environmental management.



The International Forum of Fire Research Directors (FORUM) is a group of directors or technical leaders of comparable stature of fire research organizations throughout the world. Its aim is to reduce the burden of fire (including the loss of life and property, and effects of fire on the environment and heritage) through international cooperation on fire research.

Signed: Dr. David Sheppard, Chair of the FORUM Award Committee Dr. Tuula Hakkarainen, Chair of the International FORUM of Fire Research Directors

PROFS. HUANG AND RONCHI TO BE AWARDED PROULX AND MAGNUSSON EARLY CAREER AWARDS AT 13TH IAFSS SYMPOSIUM IN WATERLOO, CANADA

In 2017 the International Association of Fire Safety Science (IAFSS) created two new early-career awards to recognize meritorious achievement by members of the IAFSS who are early in their careers and have contributed a body of work that is of significance to any area of fire safety science. The two awards are distinguished by the period of time from completion of the candidates' most recent educational degree.

The recipient of the 2020 Proulx Award is Dr. Xinyan Huang, Assistant Professor at the Hong Kong Polytechnic University. He is recognized for his research contributions that have impacted fire safety science and technology through: (1) pioneering understanding of smoldering wildfires by innovative experiments, developing the first-ever numerical model, and performing multidisciplinary research with the ecology and geoscience community, (2) improving our understanding of the flammability of materials and fire dynamics in the microgravity space environment, and (3) developing theories and techniques to understand the wire and cable fire and associated dripping phenomena. His work has been presented in over 40 peer-reviewed publications in journals such as *Combustion and Flame, Fire Safety Journal*, and *International Journal of Wildland Fire*. Dr. Huang has been very active in the fire science community, serving on



multiple editorial boards and conference organizing committees. He has previously been recognized with multiple awards, including the Bernard Lewis Fellowship and the Sugden Best Paper Awards by the Combustion Institute and several best poster awards from the IAFSS and AOAFST.

For the Proulx Award, candidates must be within five years from completion of their most recent degree at the time of nomination. The award commemorates Dr. Guylène Proulx (1960-2009), an expert in human behavior in fire at the National Research Council Canada and IAFSS Board member at the time she passed away.

The recipient of the 2020 Magnusson Award is Dr. Enrico Ronchi, Associate Professor at Lund University, Sweden. He is recognized for his numerous research contributions that have covered a wide range of areas



concerning human behavior in fire and fire evacuation. Dr. Ronchi's research includes work on different fire-related domains such as the verification and validation of evacuation models, pedestrian/crowd evacuation dynamics, emergency signage design, virtual reality and wildland-urban interface fires. He is also actively involved in teaching activities in the fire safety domain (being responsible for three courses in human behavior in fire and evacuation areas) and being the responsible at Lund University for the International Master of Fire Safety Engineering (IMFSE) Program arranged with Ghent University and The University of Edinburgh. His work has been published in over 50 peer-reviewed publications, and he commented in prestigious journals such as *Nature* and *the Physics of Life Reviews*. He is currently Associate Editor for the journals *Fire Technology* and *Safety*

Science. He has also worked to translate his work into practice through his involvement with multiple committees and publications with the ISO, SFPE and Italian and Swedish Governments.

For the Magnusson Award, candidates must be within five to ten years from completion of their most recent degree at the time of nomination. The award commemorates Prof. Sven Erik Magnusson (1938-2014), pioneer of parametric fires and risk management at Lund University, Sweden, and a driving force in creating the first education curriculum for fire safety engineering.

The IAFSS Proulx and Magnusson Early Career Awards will be presented at the 13thIAFSS Symposium in Waterloo, Canada in April, 2020. Each recipient will deliver at the Symposium a review paper drawn from their body of work.

2020 BEST THESIS AWARDS TO BE PRESENTED AT THE 13TH IAFSS SYMPOSIUM IN WATERLOO, CANADA

The IAFSS Best Thesis Award "Excellence in Research" recognizes the best research theses at either the PhD or master's level, in all the fields related to fire safety science and engineering. Three awardees were selected from the three IAFSS regions: Europe and Africa, the Americas, and Asia and Oceania. The awardees will have the opportunity to present their research at the 13th IAFSS Symposium in Waterloo, Canada. The awards committee also noted two honorable mentions. The awardees are:

<u>Americas:</u> Joshua D. Swann for the thesis, "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" conferred by the University of Maryland, College Park, USA, advised by Prof. Stanislav Stoliarov.

<u>Europe and Africa</u>: Eric V. Mueller for the thesis, "Examination of the underlying physics in a detailed wildland fire behavior model through field-scale experimentation" conferred by the University of Edinburgh, UK, advised by Dr. Rory Hadden and Prof. Albert Simeoni.

<u>Asia and Oceania:</u> Yongzheng Yao for the thesis *"Fire Behaviors and smoke transportation law of tunnel fires under confined portal boundaries"* conferred by the University of Science and Technology of China, in collaboration with RISE Research Institutes of Sweden (RISE), advised by Prof. Heping Zhang and A/Prof. Xudong Cheng at USTC and Prof. Haukur Ingason and Dr. Ying Zhen Li at RISE.

Honorable mentions:

James L. Urban for the thesis "Spot ignition of natural fuels by hot metal particles" conferred by the University of California, Berkeley, USA, advised by Prof. Carlos Fernandez-Pello.

Francesco Restuccia for the thesis "Self-heating ignition of natural reactive porous media" conferred by Imperial College, London, UK, advised by Prof. Guillermo Rein.

11TH ASIA-OCEANIA SYMPOSIUM ON FIRE SCIENCE AND TECHNOLOGY (11TH AOSFST)

The 11th Asia-Oceania Symposium on Fire Science and Technology (11th AOSFST) was held successfully on October 21-25, 2018 in Taipei, Taiwan, hosted by the Central Police University and Society of Fire Protection Engineers (SFPE) Taiwan Chapter. This symposium is organized in the Asia-Oceania region every two or three years, with the support of the Asia-Oceania Association for Fire Science and Technology (AOAFST) under the International Association for Fire Safety Science (IAFSS).



It was a successful event which gathered over 250 participants not just within the Asia-Oceania region including Taiwan, Hong Kong, China, Japan, Singapore, Australia, Indonesia and Korea, but also from the USA, Sweden and UK, etc. A workshop on "Large Outdoor Fires and the Built Environment" and another workshop on "Diversity"

were held on 21 October 2018; and a technical tour to the training center of the National Fire Agency (NFA), and Emergency and Rescue Command Center, Fire Department, New Taipei City Government (NTCG) was held on 25 October 2018.

As a whole, there were 12 keynote speeches, 100 paper presentations and 43 posters. The 14 tracks included topics such as fire safety design and codes, fire protection of high-rise buildings, tunnel fires, etc.

Thanks are due to the academic staff, research personnel and research students of the Central Police University, National Kaohsiung University of Science and Technology, and Chang Jung Christian University in operating the symposium successfully.

Congratulations to Professor A. Sekizawa and Professor B. Dlugogorski who were the two recipients of the Lifetime Contribution Award. There were also five Excellent Paper Awards and four Excellent Poster Awards.

The next AOSFST is expected around 2021 at the University of Queensland, Brisbane, Queensland, Australia!

IAFSS AGENDA 2030 FOR A FIRE SAFE WORLD – PUBLISHED IN *FIRE SAFETY JOURNAL*

The IAFSS white paper on fire safety science has been published in *Fire Safety Journal* and is now available online (https://doi.org/10.1016/j.firesaf.2019.102889). The paper presents the Association's thinking, developed by the Management Committee, concerning pressing research needs for the coming 10 years. The research needs are couched in terms of two broad Societal Grand Challenges: (1) climate change, resiliency and sustainability and (2) population growth, urbanization and globalization. These challenges include significant fire safety components that lead both individually and collectively to the need for a number of fire safety and engineering research activities and actions. The IAFSS has identified a list of areas of research and actions in response to these challenges. The list is not exhaustive, and actions within actions could be defined, but this paper does not attempt to cover all future needs.

NEWS FROM MEMBERS

News from the University of Edinburgh

For all the latest news from the Centre for Fire Safety Engineering at the University of Edinburgh follow us on Twitter @edinburghfire or on facebook.com/EdinburghFire.

Education

In July, students on the Structural and Fire Safety Engineering degree graduated. This year's cohort was comprised of seven students. Congratulations also to three PhD students who also graduated in July. Marion Bourebrab graduated with her thesis entitled "Hydrophobic and fire retardant treatment with functionalised silica particles applied on hemp shiv", Jamie McLean's thesis was entitled "Structural response of reinforced concrete columns during and after exposure to non-uniform heating and cooling regimes" and Farian Wu graduated with his thesis "An Experimental Study of Backdraught using Solid Fuels".

Congratulations to the cohort of students that started the International Master of Science in Fire Safety Engineering (IMFSE) in 2017. They had their

Some of the graduating students from our undergraduate and PhD programmes with some of the academics from the group

graduating ceremony in Ghent, Belgium on June 24. The graduation day programme included several speeches by professors and alumni, as well as the commencement ceremony conducted by Dean Patrick De Baets from Ghent University. Luke Bisby gave a lecture on "Sociological Issues in Fire Safety Engineering" and Grunde Jomaas gave the commencement speech. The formal day programme was followed by a river cruise with a threecourse dinner in the evening.



mposiu



More pictures can be found on the <u>Facebook Page</u> of the IMFSE programme. For more information about the IMFSE programme, please visit the webpage on <u>http://www.imfse.ugent.be/index.asp</u>.



Luke Bisby during his lecture

The graduating class with academics, administrators and representatives from the sponsorship consortium

New group members

Simone Zen has joined the research group as a Postdoctoral Research Associate working on the dynamics of wildfires, including firebrand characterisation and rate of spread modelling. The research combines the development of mathematical models, image analysis and physical experiments at both the field and laboratory scale. Simone has a PhD jointly from the Universities of Trento and Queen Mary University of London on the development of physically-based morphodynamic models for river evolution.

Awards/Prizes

Nikolai Gerasimov wins WCSIM grant for innovation in fire testing.

Nikolai Gerasimov, a postgraduate researcher in the School's BRE Centre for Fire Safety Engineering, has won a Worshipful Company of Scientific Instrument Makers (WCSIM) research grant for an innovative advance in fire performance testing. The awards, which are worth \pounds 2,000 each, are given in recognition of projects which involve innovative scientific development and enable recipients to become Society of Instrument Maker (SIM) Scholars.

Many materials either expand or contract when exposed to fire. For example, wood forms a char and the surface recedes away from the fire, while intumescent fire protection coatings, which are routinely used to protect steel and other materials from fire, expand to form a thick protective layer and move closer to the source of the fire.

This differing behaviour of materials exposed to fire in the real world has important implications for the accuracy of fire performance testing under lab conditions.

During testing, the distance between the material sample and the fire itself helps to determine the intensity of the fire acting on the sample: a key variable which should remain constant for an accurate understanding of fire performance.

The method developed by Nikolai allows for the surface of any sample to be monitored continuously during a test, and the distance between the sample and the fire source to be adjusted in real time to remain consistent.

This has created the twin benefits of allowing more accurate control of the experimental conditions and enabling researchers to record a new variable – the size of the sample – continuously during the test.

The development equips our researchers with an even greater understanding of the performance of materials when exposed to a fire, and has been of great interest to industrial partners of the BRE Centre for Fire Safety Engineering. Find out more: <u>https://www.wcsim.co.uk</u>

New projects

Disaster risk reduction

Dr David Rush is part of the **Global Challengers Research Fund's Urban Disaster Risk Hub** - £19.6M over 5 years. The Hub officially started in March 2019 and aims to reduce disaster risk for the poor in tomorrow's cities. The failure to integrate disaster risk resilience into urban planning and decision-making is a persistent intractable challenge that condemns hundreds of millions of the World's poor to continued cyclical destruction of their lives and livelihoods. It presents a major barrier to the delivery of the Sustainable Development Goals in expanding urban systems. Science and technology can help, but only against complex multi-hazard context of urban life and the social and cultural background to decision-making in developing countries.

The Hub, co-designed with local and international stakeholders from the start, will deliver this agenda through integrated research across four urban systems - Istanbul, Kathmandu, Nairobi and Quito - chosen for their multi-

hazard exposure, and variety of urban form, development status and governance. In each urban system, the Hub will reduce risk for 1-4 million people.

The hub will assess and understand (1) urban transitions from crisis to risk management, based on assessments of organisational, economic and risk dynamics; (2) urban vulnerability and risk production processes including analysis of decision-making culture; (3) how to deal with the uncertainties in hazard estimates, and across a range of hazards from earthquakes, volcanoes, landslides, flood, drought, and fire; (4) the statistics of risk; (5) the application of modern informatics tools to rapid calculation of hazard; and (6) knowledge of appropriate engineering, community and financial responses to risk and hazard mitigation. A significant aim of the Hub is the translation of knowledge into decision-support tools and communication strategies for visualising and managing risk within development planning.

Scottish Fire Danger Rating System

Dr Rory Hadden is part of a project lead by the James Hutton Institute to develop a Fire Danger Rating System for Scotland. The system will focus on evaluating the flammability of natural fuels specific to Scotland and understanding the moisture dynamics of upland ecosystems specific to Scotland. The team recently joined in some prescribed burning lead by Michael Bruce (Firebreak Services) at the Glen Tanar Estate and will be undertaking a programme of flammability assessments to derive relationships between fuel flammability and fire danger.

News and activities

Dr Angus Law delivered a lecture as part of the UK's Institution of Structural Engineers Technical Lecture Series. The lecture, entitled 'We need to talk about timber" focussed on the legal duties of designers in the design of tall timber structures, and the solutions available to allow designers to meet these duties. The whole talk is available on the IStructE YouTube channel:

https://www.youtube.com/watch?v=rND9M-kmVX8

Members of the research group contributed to a UK Government Parliamentary Office of Science and Technology note on Climate Change and UK Wildfire. These Notes are used to inform policy makers of current scientific topics. The Note is available <u>here</u>.



Members of the group enjoying some typically Scottish weather at the weekend away in Glencoe

We recently hosted Ashlynne Orcurto as a visiting student from the University of Maryland. Ashlynne spent six weeks working in the lab on the flammability of Scottish fuels. She will return to the USA to pursue a Masters' with Dr Gollner.

In summer 2019, the fire group ventured out to Glencoe in the Scottish Highlands for a weekend of hillwalking and adventures.

Project updates

Improving the Resilience of Informal Settlements to Fire

The IRIS-Fire Project (Rush, Bisby, Cooper-Knock, Hadden, Spinardi, Walls [Stellenbosch], Wang, Gibson, Beshir, Cicione) has been continuing well over the past six months with experimental campaigns, developing models, refining change detection techniques and starting to develop risk mapping data.

In November 2018, the IRIS-Fire team conducted 20-dwelling experiment led by Walls et al at Stellenbosch University in South Africa. The second (of three) large outdoor experiments took 3.5 days to set up and contained a mixture of steel and wooden clad mock informal settlement dwellings. With hundreds of channels ready to record and a steady 15kph South Easterly wind the first four dwellings were simultaneously lit (to represent a large fire that has already progressed to a linear burn line). Twelve minutes later – all the dwellings were alight and a further 10 minutes the fire was essentially burnt out. More details and the analysis of the recorded data will be presented soon.

In January and March 2019, the IRIS-Fire team led by Rush, went to Underwriters Laboratories in Chicago to conduct 12 single and one double dwelling experiment to understand more about the fire development within leaky and thermally thin bounded compartments. Publications and details to follow soon.

Modelling of our experimental work continues across both Edinburgh and Stellenbosch institutions, as does the methods being developed by Gibson to look at how we can use Sentinel II satellite data to detect historic urban fire spread events. The analysis of the fire spread risks within the settlements is also a topic for one of our undergraduate thesis students and is one of the starting points of our final year's efforts looking at developing risk mapping frameworks for the Western Cape of South Africa.

Other activities over the past six months include; home surveys to understand the perceptions of fire and the in home risks of over 500 informal settlement households across six different settlements in Cape Town, SA; a student engagement event held at the University of Edinburgh (<u>https://www.iris-fire.com/2019/02/22/reporting-on-fcl19/</u>); and Rush presenting a Plenary at the IFE's Centenary Conference on Fires in Informal Settlements.

Wildfires

The team returned to New Jersey for two fieldwork campaigns in early 2019. The first was to perform the final large-scale experiment for the JFSP-funded project "Measurement of firebrands generated during fires in pine-dominated ecosystems in relation to fire behavior and intensity". This involved a highlyinstrumented head fire and deployment a series of firebrand measurement techniques. This also led to collaboration with NIST to deploy a 360° camera in the burn unit. The resulting videos are available on the <u>NIST website</u> and were featured in the popular scientific press.

The second campaign involved a series of 20 low intensity fires as part of the SERDP-funded project "Multi-scale Analyses of Wildland Fire Combustion Processes in Open-canopied Forests using Coupled and Iteratively Informed Laboratory-, Field-, and Model-based Approaches". This series of highly instrumented



Low intensity fire spread during an experimental fire

experiments seeks to determine the influence of fuel loading, structure and ambient conditions on the spread of low intensity fires typically used by land managers.

We are very grateful to a large number of partners to make this work possible: the US Forest Service Northern Research Station, the New Jersey Conservation Foundation, and the New Jersey Forest Fire Service.

Signed: Rory Hadden, University of Edinburgh

News from Ghent University

PhD defense Florian Vandecasteele

On 18 January 2019, Florian Vandecasteele successfully defended his PhD, entitled 'Multimodal Data Fusion for Spatio-Temporal Fire Behavior Analysis'. The academic supervisors are Prof Bart Merci and dr. Steven Verstockt. The full text is available on <u>https://biblio.ugent.be/publication/8589307</u>.

Best Student Presentation Award

Junyi Li, PhD student under supervision of Prof Bart Merci and dr. Tarek Beji, won the Best Student Presentation Award at the 9th International Seminar on Fire and Explosion Hazards (Saint-Petersburg), for his presentation entitled 'CFD Study of Fire-Induced Pressure Variation in a Mechanically-Ventilated Air-Tight Compartment'.

Fellow of The Combustion Institute

Prof Bart Merci has been elected Fellow of The Combustion Institute, for 'outstanding contributions to the understanding of fires and fire safety including the advancement of predictive capabilities.'

Accreditation Master of Science in Fire Safety Engineering

The Master of Science in Fire Safety Engineering has received a very positive evaluation, and hence accreditation, by VLUHR. The entire report is published on <u>http://www.vluhr.be/default.aspx?PageId=848</u>

1st Asia Pacific Combustion Institute Summer School

Prof Bart Merci is one of the lecturers at the 1st Asia Pacific Combustion Institute Summer School (APCISS-1), held in Chile in November 2019. Together with Prof Arnaud Trouvé (UMD) he will cover the lectures on compartment fire modeling.

Submitted: Prof Bart Merci, Ghent University



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

IMFSE Sponsorship Consortium

The IMFSE Sponsorship Consortium is still going strong, with several new sponsors on board! OFR Consultants, Basler & Hofmann, Jensen Hughes, Rockwool and DBI have confirmed their support and are joining the IMFSE Sponsorship Consortium. Many thanks to them as well as the other members for their continued support, which contributes a lot to the success of the program!

The 5th IMFSE FSE Day – 15 October 2018, London

The 5th IMFSE Fire Safety Day at the BRE Centre in London on Monday 15 October 2018 was a big success! The central theme of the day was 'Postconstruction Fire Safety'. Many interesting presentations were given by our sponsors, followed by a fascinating panel debate. The next edition will take place in Sweden at the start of 2020.





Erasmus Mundus Association 12th General Assembly – 23-24 February 2019, Vienna

IMFSE was well-represented at the EMA 12th General Assembly in Vienna with 2 student representatives and 2 alumni present, as well as the IMFSE administrator. It was a very interesting and successful event. IMFSE is looking forward to a fruitful cooperation with EMA in the future!

IMFSE Graduation Ceremony – 24 June 2019, Ghent

On 24 June 2019, the IMFSE class of 2019 graduated in Ghent during the IMFSE

Graduation Ceremony. This was a very exciting event where all graduating students gave a thesis presentation and presented their thesis poster. Moreover, there were several interesting speeches and lectures throughout the day. In the evening a relaxing and unique activity was scheduled.

Signed: Lies Decroos, IMFSE, Ghent University

News from the University of Ulster (UK)

Education

The MSc Fire Safety Engineering programme, now in its 29th year, welcomed 25 new students on its full time and part time programmes. The course, which is accredited as Further Learning for CEng by the IFE, EI and CIBSE, continues to thrive and in academic year 2019-20 will offer an extended Masters (2-year programme) with a more substantial research element. Students once again have benefitted from workshops with fire engineering consultants from, among others, Omega Fire, Bureau Veritas, Arup Fire, BB7, Jeremy Gardner Associates and worked on real design projects provided by RPS Consulting Engineers. Great fun was had yet again at the Northern Ireland Fire and Rescue Service Compartment Fire Fighting Training days where students came face to face with backdraught and got



a taster of the challenges faced by the fire and rescue services whilst fighting fires in buildings. Adeline Le Douarin (pictured here at winter graduation, December 2018) with Pierre Thomas, also graduating) received the Jeremy Gardner Associate's award for the Best Student MSc Fire Safety Engineering 2017-18.

Recent projects:

1. <u>TRAFIR: Characterization of TRAvelling FIRes in large compartments</u> Partners: Arcelor Mittal, Ulster University, Edinburgh University, RISE, Liege University.

FireSERT is testing three large compartments at a specially designed rig (15mx9mx3m) in Enniskillen, Northern Ireland. The tests are designed to characterise the travelling fire in three situations: 1. Load control compartment fire (21st May) 2. Between load control and ventilated control fire (4 June) 3. ventilated controlled fire (13th June).

2. <u>EENSULATE</u>

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



Test Rig, Enniskillen, Northern Ireland

efficient components as well as associated enabling materials for cost-effective retrofitting and new construction of curtain wall facades. FireSERT is continuing working on experimental characterisation and numerical analysis of flammability and burning behaviour both single-component and multi-component insulation foams based on PIR. Furnace tests are currently being prepared for examining the fire performance of the complete system consisting of insulation foams, spandrel and vacuum insulation glazing (VIG). The research findings were presented at the 3rd European Symposium on Fire Safety Science, Nancy, France, September 2019 and the 9th International Seminar on Fire and Explosion Hazards, St Petersburg, Russian, April 2019 and are also under preparation for journal publication.

Events:

1. An Integrated Approach to Fire Safety Engineering, Engineers Ireland, 23rd November 2018

In November 2018 FireSERT, in collaboration with Engineers Ireland, held a workshop entitled '*An Integrated Approach to Fire Safety Engineering*' to disseminate findings from FireSERT's recent project 'LOCAFI+ Temperature Assessment of a Vertical Member subjected to LOCAlised Fire'. The purpose of the workshop was to give consultants the tools to provide clients with the most cost-effective design solutions and present this information in a manner that would highlight the benefits that can be gained from utilizing the methodology for the fire design of columns under localised fire. The presentations, from both UK and other European partners highlighted the legal context and reference documents in the UK and Luxembourg, the purpose of the project, outcomes of experimental tests and CFD calibration, analytical methods and worked examples.

2. The Fire Investigators Association of Ireland (FIAI) Annual Training Conference, Ulster University, 12th April, 2019

In April, FireSERT, in collaboration with FIAI hosted the FIAI annual training day at Ulster. Presentations reflected on legal issues, issues related to fires in saunas, difficulties related to fire investigation on trains and the importance of toxicology in forensic cases. Geoff Sommerville, Group Commander in the Northern Ireland

fire and rescue service spoke about the challenges of fighting fires in high rise buildings. More information can be found at https://lnkd.in/d4iPZZg

Phd Students

Since the last update, Dr Kontantinos Chotzoglou graduated with his Phd in December 2018 (photo here). His research is entitled "Burning Behaviour of Liquid Pool Fires in Corridors and Thermal Characteristics of Resulting Externally Venting Flames". Konstantinos is now working as Project Leader at Efectis UK/Ireland.

Peter Cassidy, part time student and full-time firefighter with NIFRS, works on development of intervention strategies for the older adult, continuing with interviews and focus groups. He has recently been invited to present his work to the National Fire Chief's Council, Home Fire Safety Committee, Cambridgeshire England (December 2019) and the Home Accident Prevention Strategy Implementation group NI (March 2019), both of which were well received. He presented his latest findings at Interflam, July 2019.



News from the Hong Kong Polytechnic University

Fire engineering education and research will be developed at Anhui University of Science and Technology, China. Professor W.K. Chow gave a lecture there on 12 November 2018.

Subsequent to the address made by the Chief Executive of Hong Kong in March 2018 on developing green projects, the fire hazards behind vertical greenery systems were pointed out in *SFPE FPE Extra*, Issue 31, July 2018, in an article co-authored by Professor Chow.

The SFPE Asia-Oceania Chapter Coordinating Group (AOCCG) was renamed 'SFPE Asia and Oceania Chapters' in January 2019. Management details will be determined later.

The Central-Wan Chai Bypass was opened on 20 January 2019, after 10 years of construction. In addition to the performance of the ventilation system in keeping indoor air quality at an acceptable level, the fire hazard associated with long vehicle queues is the key. Burning heavy goods vehicles can give up to 200 MW, while a design fire might be only 35 MW, or even down to 5 MW. There is also the explosion risk of Liquefied Petroleum Gas taxis to consider.

A big forest fire occurred at Liangshan Yi, Sichuan, China on 30 March 2019, killing 30 firefighters. This might be an erupted fire due to Canyon feature and wind action. However, deflagration with explosion noise was suspected to occur as reported in the news. The fire is under investigation with details to be reported later.

A double-deck bus burnt by itself near a footbridge in the central business district on 11 May, 2019 night. Explosions were heard. There were seven passengers on the bus with few pedestrians walking on the footbridge. The structure of the footbridge might be affected and was closed for inspection, though a burning double-deck bus emitted about 10 MW. The heat release rate is much lower than 200 MW from a heavy goods vehicle. But more importantly, a large volume of smoke was generated, blowing towards the footbridge. The consequence can be very hazardous if the fire occurred during normal weekday working hours with the bus crowded with passengers, many pedestrians walking on the footbridge and heavy traffic. Those crowded footbridges in heavy traffic areas must have adequate fire safety provisions against heat and smoke. Video is available at the following website : https://yns.page.link/JYUgb?soc_src=unv-sh&soc_trk=wa

Signed: WK Chow, The Hong Kong Polytechnic University, Hong Kong, China

News from Lund University

Education

Last autumn the division launched a new course in fire investigation. The students performed labs and learned to apply their knowledge in fire dynamics and fire simulation to investigate fires. They also learned generic skills of accident investigation. The course has a broad spectrum of lecturers from both within and outside Lund University (e.g. Police, fire departments, Swedish Civil Contingencies agency). For further information, contact marcus.runefors@brand.lth.se

In autumn 2019, the division will start a PhD course on tunnel fire dynamics led by Adj. Prof. Haukur Ingason whose Adj. Professorship was extended earlier this year. For more information, contact him at <u>haukur.ingason@brand.lth.se</u> or visit our website. The course can be attended by both PhD students and by personnel from individual companies.

Research

The division of Fire Safety Engineering has recently been granted a new major project by the Swedish Civil Contingencies Agency. The project aims to develop a multi-hazard risk index to assist prediction of emerging risks on a local, regional and national level to support various stakeholders for strategic training and resource planning. Partners in the project are Swedish Meteorological and Hydrological Institute and the National Research Council of Canada.

The division of Fire Safety Engineering and the <u>Centre for Ageing and Supportive Environments (CASE)</u> at Lund University got granted a joint 3-year project in the research area of egress (that is, exiting a building in case of emergency) and ageing. The goal of the project is to develop the concept of egressibility for all to ensure that egress planning and procedures are designed to equally consider all members of an ageing society. The principal investigator of the project is <u>Dr Enrico Ronchi</u>.

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

Dr. Jonathan Wahlqvist has received a two-year post doc grant from the Swedish Civil Contingencies Agency. In his project Dr. Wahlqvist will develop a simulation platform for large-scale evacuation caused by forest fires.

There are several more 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

Margaret McNamee was appointed professor in Fire Safety Engineering with a focus on fire and the environment and fire chemistry. Professor McNamee comes most recently from RISE, where she worked as Chief Technology Office/Technical Director, and she has been active in many research projects related to fire chemistry and the environment. Professor McNamee will help the division to be active in linking fire safety with sustainable development. We wish her welcome to our division.

Dr. Enrico Ronchi has been appointed as reader (Docent). This is proof of his excellence and great knowledge in evacuation modelling and human behaviour in fires. This also means that Dr. Ronchi can act as main supervisor for PhD students at Lund University. There are currently four people at the division who act as main supervisors, Patrick van Hees, Margaret McNamee, Håkan Frantzich and Dr. Ronchi.

Silvia Arias was awarded the 2019 Proulx Scholarship. Her research includes how Virtual Reality (VR) can be used to study human behaviour in fire. The award is one of the prestigious SFPE Educational and Scientific Foundation awards.

The Interflam Trophy which is awarded for a single outstanding contribution to fire science, or for a sustained series of significant contributions was awarded to Prof. <u>Patrick Van Hees</u>. The Award was presented by Marc Janssens, who said "Patrick had won it on both judgement criteria".

Dr. Bjarne Husted is currently on an 80% leave from the division for work at The Danish Institute of Fire and Security Technology.

From September 1st, Erik Smedberg will start as PhD student within the above-mentioned project on aging and egress. Erik graduated earlier this year from Lund University.

Upcoming events

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

Signed: Nils Johansson, Lund University

News from Worcester Polytechnic Institute (WPI)

Johnson Controls International is lending a Particle Image Velocimetry (PIV) measurement apparatus to WPI's Department of Fire Protection engineering. The apparatus will be used for many ongoing and new research projects, including the study of wildland fires.

The accuracy of the PIV technique will provide more insight on the dynamics of fresh air and hot smoke, as well as the different interactions between fire-fighting agent discharge and the fire.

New Recruitments

Dr. Benjamin Betting joined our Department in February 2019. He was recruited as a post-doctoral fellow. A professional firefighter in France, Benjamin obtained his PhD at the University of Rouen. His dissertation focused on the study of smoke dynamics in fire enclosures for ventilated and under-ventilated conditions using a large-scale PIV.

At WPI, Benjamin's research will focus on many large-scale experiments involving wildland fire phenomena as well as projects with the fire service. His field of research covers smoke dynamics, enclosure fires, and fire behavior.

Leo Schneider, an exchange student from the University of Aix-Marseille in France, will be conducting a 6-month research project. He will be using the Fire Propagation Apparatus (FPA) to investigate the influence of soot on the radiation emitted by the





flame for differing oxygen concentrations and flame heights. He is also helping to implement PIV measurements in our 6 meter-long wind tunnel.

Giovanni Di Cristina, a PhD student, has been conducting experiments using the fire research wind tunnel. The wind tunnel features a portable design and is a collaboration between WPI, the University of Notre Dame,

and USDA Forest Service. The current study focuses on characterizing the wind-fire interactions in wind-

backed fire spread through pine needle fuel beds. Ultimately, the wind tunnel will facilitate the link between laboratory and field experiments, with the capability to perform large scale testing in the laboratory.

Delaney Seeburger, a second-year Master's student at California Polytechnic State University, has joined the wildfire research group for five-months as a visiting scholar to obtain fire testing and laboratory experience. Delaney is working on the characterization of



soot from wildland fuel combustion.

Nadia Mofidi is pursuing her Ph.D. in fire protection engineering and will focus on the topic of soot production in wildfires. She has over seven years of experience in industrial fire protection systems including design, installation, commissioning and maintenance of systems ranging from fire and gas detection to fire suppression systems. She graduated with a Master's degree in Fire Protection Engineering from WPI in 2018 and a Bachelor's degree in Mechanical Engineering from Shahid Rajaee University in 2007.

Veronica Kimmerly, a PhD student, is studying the changes to fire behavior when the fire is located in a pit. The end goal of this work is to improve the combustion efficiency in burn pits that are used in many parts of the



world for waste disposal and processing. She presented her work at the US National Combustion Institute meeting in March. She has also obtained the WPI Presidential Fellowship (2017-2018) and an NFPA Grant award for this work (2018).

Javad Hashempour, a post-doctoral fellow and assistant teaching professor, left WPI in June to start as an assistant professor in the fire safety engineering technology program at the University of North Carolina in Charlotte. He joined WPI in October 2016 and conducted research projects on fire oxygen calorimetry, porous material ignition and fire dynamics of merging fires. We will miss Javad and wish him well.

News from the University of Maryland

Arnaud Trouvé Named Fellow of The Combustion Institute

Arnaud Trouvé, Professor, was recently elected Fellow of The Combustion Institute for his outstanding contributions in the application of direct numerical simulation (DNS) and large eddy simulation (LES) to the study of turbulent flames in combustion engines and in fires. This Fellowship recognizes outstanding contributors to the international combustion community - in research or in applications - and supports advancement to leadership positions within the Fellow's home institution.

"I'm honored to have been elected Fellow of The Combustion Institute," Professor Trouvé said. "And to be recognized for research that has essentially been my life's work."

Trouvé will be recognized at the 38th International Symposium on Combustion in July, 2020, in Adelaide, Australia.

PhD Student Sriram Bharath Wins Combustion Art Competition

Sriram "Ram" Bharath Hariharan – a Ph.D. Candidate – won the Award for Artistic Merit at the 2019 US National Combustion Meeting.

Ram's submission - Jackson Pollock Paints with Fire (pictured here) – was inspired by the "boil-over" phenomenon, typically observed when oil fires extinguished using water. Water tends to sink to the bottom of the oil layer and vaporizes rapidly upon boiling, expelling droplets from the oil layer; thus, significantly enhancing the burning rate and size of the flame.

Experiments conducted by the Gollner Research Group to simulate in-situ burning of oil spill, crude oil was burned over a water layer 20 cm in diameter, resulting in boil-over.

UMD Fire Researchers Ignite the First of Two Space Station Experiments

After several years of research and planning, scientists in the Department of Fire Protection Engineering (FPE) at the University of Maryland (UMD) ignited their first flames on the International Space Station (ISS) on February 8, 2019.



The experiment, called the Burning Rate Emulator (BRE), focuses on spacecraft fire behavior. BRE uses gaseous fuels to determine the flammability of solids in microgravity. The BRE burners — flat, round and porous with embedded heat-flux sensors — will allow measurements of burning rate, extinction characteristics, and radiative environments for a broad range of solids. The tests are expected to reveal valuable information about how materials such as paper and plastic in microgravity. Fire is a big unknown under space conditions of microgravity.

"Researchers demonstrated that a small fire could be sustained in microgravity at 40% oxygen," said James Quintiere, BRE Principal Investigator. "At lower oxygen levels the flame eventually went out. These experiments and their analysis will help make space flight safe from fire."

Additional team members include Parham Dehghani (Ph.D. student), Eric Auth (M.S. student), James Muessig (B.S. student), Peter Sunderland, John deRis, and Howard Baum,

Christmas Trees Are Festive, and Potentially Hazardous

On December 12, 2018, UMD's Department of Fire Protection Engineering hosted its 5th annual Christmas Tree Fire Safety demonstration as a means of educating the public about the potential hazards of neglected trees.

UMD Alumni Isaac Leventon ('16), a Fire Research Scientist with the National Institute of Standards and Technology (NIST), and Fernando Montoya ('16), FPE's Lab Coordinator and FireTEC Test Engineer, offered insight into the speed with which dry trees can burn - less than a minute.

Christmas tree fires are four times deadlier than the average house fire due to the speed with which they catch fire and burn. According to the National Fire Protection Association (NFPA), U.S. fire departments respond to an annual average of 210 home structure fires that begin with Christmas trees. These fires cause on average six civilian deaths and roughly \$16 million in property damages each year. One out of every 34 reported home Christmas tree fires result in a death, compared to an average of one death per 142 total reported home fires.

Ashlynne Orcurto Wins 2019 John L. Bryan GRA Award

FPE Undergraduate Student Ashlynne Orcurto - who completed the first leg of the B.S./M.S. program in May - has won the John L. Bryan Graduate Research Assistantship (GRA) Award for 2019.

The John L. Bryan Chair endowment provides support for a single GRA each year. The funding is offered to outstanding, incoming Master of Science (M.S.) students, domestic or international, in the UMD Department of Fire Protection Engineering (FPE) and is awarded on a competitive basis. The award includes up to 25 standard tuition credits, health benefits and a \$30K stipend.

Orcurto is set to begin her master's program in the fall, during which she will conduct wildland fire research in the Gollner Fire Research Group.

Jose Torero Accepts Position at UCL

Prof. Jose Torero has accepted a position as Head of the Department of Civil, Environmental and Geomatic Engineering at University College London. We certainly enjoyed having him with us as the John L. Bryan Chair, and we wish him every success at UCL.

Signed: Prof Peter Sunderland, University of Maryland

News from the University of Cantabria

Adhesion of the UC to the fire cluster of Cantabria

According to the strategies from the Government of Cantabria to enhance synergies among industry and science,

in last April, a new cluster on fire safety was created in our region. This initiative is based on the participation of a first group of companies, the Technological Centre CTC and University of Cantabria.

The cluster aims to act as a meeting point between all the agents of the sectors that are involved in Fire Safety sector to offer support to the technological capabilities of the companies in the region and increase their innovation and improve the capacities for transferring knowledge of the research institutions.

One of the pillars on which this initiative is based is the human and equipment resources of the GIDAI group at University of Cantabria. The cluster will enable us to improve our visibility in the Fire Safety sector, allowing the generation of new collaborative actions.

New H2020 Project ASSISTANCE

GIDAI participated in the new project "ASSISTANCE: Adapted situation awareness tools and tailored training scenarios for increasing capabilities and enhancing the protection of First Responders" granted with more than 6 million Euros by the European Union's Horizon 2020 Research and Innovation program (GA 832576). The project, with 19 entities of 9 nationalities represented by companies, universities,



research centers, first responder agencies, public administrations, etc., will be coordinated by the Polytechnic University of Valencia.

The aim of the project is to enhance the capabilities and protection of first responders in response to severe disasters and our R&D group GIDAI will work on modelling evacuation routes and lead the societal impacts Work Package.

New Projects CAFESTO and FLASH

We have just started two research projects related to thermal degradation of plastic materials, both of which are granted by Spanish Science Agency and FEDER founds. On the one hand, the project "CAFESTO: New fire resistant construction cables designed by simulation" (RTC-2017-6066-8), leaded by General Cable company of the Prysmian Group, aims to develop new high-performance cables with the support of experimental and computational approaches for the prediction of fire performance of fireproof electric cables.

On the other hand, "FLASH: Development of halogen-free flame-retardant ABS" (Project RTC-2017-6414-5), leaded by ELIX POLYMERS intends to create a new flame retardant ABS formulation based on the correct combination of intumescent systems and nanoparticles.

Teaching collaboration with THM Giessen

During the month of September, Prof. Daniel Alvear gave a teaching module on Fire Safety for the Master's students in Civil Engineering at the THM University of Applied Sciences Mittelhessen in Giessen. The classes focused on the opportunities of Fire Safety Engineering and on the knowledge and handling of different fire and evacuation simulation tools. It is a teaching exchange experience that we hope will be consolidated in the future, and even increase from the initiatives that are underway for the creation of new European Master programs among our universities.



News from York University, Toronto Canada

York University's fire safety program, led by Dr. John Gales, P.Eng, is growing in scope and in number. We are studying a range of topics from; novel instrumentation, pedestrian evacuation, engineered timber, heritage masonry, concrete, and bridge fires. Working closely with our collaborators we are offering the Human Behaviour in Fire course for its 6th time. New and exciting fire safety projects and collaborations are just around the corner!

Graduating students

Lauren Folk and Danielle Aucoin both successfully finished and defended their Masters theses with no corrections necessary. Lauren who was funded via IAWF and the SFPE Guylène Proulx scholarship with support from collaborators at Arup and NIST, focused her thesis on "The use of human behaviour in fire to inform Canadian wildland urban interface evacuations". Danielle, who was funded via an NSERC Collaborative Research and Development Grant with Arup

focused her thesis on "The Use of Human Behaviour to Inform Egress Modeling in Stadiums". Both students had published their work in a range of conferences including Interflam and IAFSS



Team members Tim Young and Seth Gatien worked closely with NIST colleagues to perfect Narrow Spectrum Illumination technologies for digital image correlation. The results appear in a recent *Fire and Materials* journal article.

Current students

The York University fire team stands at 10 students strong, with six of these being graduate students. Our team closely collaborates with the University of Waterloo. Our more recent research focus has been on the heritage structure stock of timber and masonry buildings in Toronto. More recently we are working toward the establishment of a living lab centre to highlight this initiative at the York Campus. In addition, our Human Behaviour in Fire research is receiving sustained collaborative support from Arup Toronto. Our current focus is to expand our endeavours with WUI investigations. Team members Ben, Georgette and Bronwyn were recipients of the Ontario Graduate scholarship, a prestigious provincial scholarship program Summer 2019. Our team was recipient of the 2019 Lassonde Research Innovation Award for early career research at York University this summer. We are very proud of

our research team's efforts this past year, equally grateful of the companies and collaborators that support our projects in Canada to make this happen. Lastly, the federal and provincial government have allocated funding in establishing a fire resiliency research centre through the foundation of innovation at York University. With this





Stadium Pedestrian series, to date we have analyzed four Canadian stadiums in an effort to continue Massmotion software advancements

funding specific tech upgrades of York University's high bay lab are being performed with anticipated completion in 2020-21.

Signed: John Gales, York University

News from Linnaeus University, Växjö, Sweden

CONFERENCE REPORT - COST Action FP1404 - Fire Safe Use of Bio-Based Building Products – Final conference

The four-year COST Action on Fire Safe Use of Bio-Based Building Products was ended by a final conference in Zürich Switzerland on 1-2 October 2018. About 100 persons attended. The program included presentations from the working groups on Contribution to the fire development, Structural fire design and Regulations in relation to bio-based building products. The program also included presentations from overseas representatives.



The Action has created a platform for networking,

exchange and collection of performance data, experiences, authority and climate requirements which affect the design with respect to the Fire Safe Use of Bio-based Building Products. It has organised exchange of knowledge and researchers, workshops and created comprehensive dissemination material. The Action has had partners from 30 European countries and New Zealand and Japan.

The Action has been chaired by Joachim Schmid ETH Zürich, Switzerland (previously at SP Wood Technology). Further info on the action and its outcome is available at <u>http://www.costfp1404.com</u>

The earlier network FSUW Fire Safe Use of Wood, see IAFSS Newsletter no 34, has been dormant during the COST Action, and will now be reactivated as a global network. The group will be co-chaired by <u>Michael Klippel</u> ETH Zürich, <u>Alar Just</u> Tallinn University of Technology, Estonia and Andrew Dunn Australia.

Upcoming event

Wood & Fire Safety 2020 Conference. 9th International Scientific Conference, 3rd – 6th May 2020 Hotel Patria, Strbske Pleso, The High Tatras, Slovakia. Info at <u>www.wfs2020.sk</u>

Signed: Birgit Östman (Birgit.Ostman@lnu.se), Linnaeus University (previously at SP/RISE)

News from the University of Queensland

Material Library of cladding materials

In the previous IAFSS newsletter we wrote about a fire testing framework developed by UQ fire at the request of the Non-Conforming Building Products (NCBP) Audit Taskforce in Queensland, Australia. This work was intended to generate a publically available database of cladding materials including characterisations of the fire performance. This database has been released and is available at <u>www.claddingmaterialslibrary.com</u>. According to our framework, the flammability of cladding materials (aluminium composite panels, insulation, and any other materials such as sarking) is defined based on well-established testing frameworks widely accepted in the fire safety engineering community. These frameworks have been applied and peer reviewed within the scope of fire research studies on the fire performance of aluminium composite panels and insulation materials at The University of Queensland and the University of Edinburgh.

The Library comprises an extensive database of cladding materials based on their composition and flammability as individual components. The database is a tool for qualified engineers to enable an adequate fire hazard identification and quantification of the potential fire spread of cladding materials.

The library is complemented by other activities here at UQ, including ongoing research activities and our CPD courses.

Structures in Fire 2020

We are very excited to announce that the first call for papers for the 11th International Conference on Structures in Fire, SiF2020, has been published. SiF2020 is hosted by UQFire, the fire engineering research group at The University of Queensland.

The conference will be held from the 24th to the 26th of June 2020 in the city of Brisbane and is being organised in collaboration with Queensland University of Technology, The University of Canterbury, The University of Melbourne and The Royal Melbourne Institute of Technology.

For more information, the website is available at https://sif2020.com. This will be updated over the course of the next few months and as the conference draws closer.

You can also download the call for papers from the website.

We are also hosting the 12th Asia-Oceania Symposium on Fire Science and Technology (12th AOSFST) in 2021. After you've visited us for SiF in 2020, we're sure you won't be able to resist coming back in 2021!

Warren Centre project on Fire Safety Engineering

The Warren Centre (<u>https://thewarrencentre.org.au/</u>) for advanced engineering at the University of Sydney has made a significant contribution to fire safety engineering in Australia. The first fire safety engineering project carried out by the centre was a part of the chain of events that led to the introduction of the performance based building regulations for fire in Australia in the late 1990's.

Over the past year, in response to a growing need for professionalization of fire safety engineering, the Warren Centre has been leading a new project in fire safety. This project has to date produced three reports: the Education report; the Regulation, Control and Accreditation report; and the Methods report. UQ Fire has been very privileged in making a major contribution to this research, having co-authored both the Education and the Methods report.

The education report discusses the current educational systems and the process for accreditation of fire safety engineers both here in Australia and abroad. The report makes a case for reviewing the skills and competencies expected of a fire safety engineer for today's market, as well as for consistent and stronger accreditation of practitioners.

The Methods report discusses the utility and benefit of the International Fire Engineering Guidelines, verification methods for fire safety, and practice notes issued by professional societies. In order to do this, the report revisits the design process from a fundamental perspective, discussing the current regulatory framework and how these different documents fit into this.



All three of the published reports, as well as future reports from this project, can be downloaded from the Warren Centre's website, <u>https://thewarrencentre.org.au/activities/past-projects/fire-safety-and-engineering/</u>.

International Bamboo Construction Competition

The International Bamboo Construction Competition (IBCC 2019) was aimed at university students of architecture, civil engineering, other construction-related courses to explore the potential construction applications for both bamboo poles and engineered bamboo products. The prototype should be designed to be a multi-functional building with a construction area of 9 m2, to operate as an office, warehouse, educational space or relaxation suite such as drink corner. The building should be easily demountable, transportable and reusable.



UQ Fire PhD Candidate Mateo Gutierrez, joined Architect and PhD

candidate, Harry Mills, from the School of Civil engineering, and Mr Hamish Buchhorn, Master Student from The School of Architecture, to represent UQ in this competition. Mr Kim Baber was the project's supervisor. Their proposal called "The Ternary Shed" was selected as one of the 15 finalists out of 70 designs from 12 countries submitted online in the mid of May.

On the 19th July, they presented their design to a jury of 23 experts, including representatives from INBAR, industry and academia. After they gave an oral presentation and presented a physical model of The Pavilion, they were awarded the **third prize**.



To view their submission and the submission of the other 15 finalists, please visit the IBCC 2019 website (<u>https://www.ibcc2019.org/results/</u>).

Candidate Development Award

As part of an industry-academia engagement initiative and funded by the "Candidate Development Award" UQ competitive scholarship, PhD Candidate Andrea Lucherini spent 2 weeks in Arup's London offices. Andrea participated in various meetings and discussions, working closely to Dr Panos Kotsovinos and Dr Egle Rackauskaite; and also took the chance to present on his PhD studies on intumescent coatings.

Recently graduated

We would like to congratulate our July 2019 graduates! We are very proud to have graduated the following students:

Carlo Paneni graduated with an MPhil. His thesis was titled "Development of Fire Engineering Solutions for Modular Construction". Carlo is the Technical Engineering Services Lead at Ausco Modular (Brisbane)

Andy Wong graduated with a BE-ME Civil and Fire Safety Engineering. His thesis was titled "Biomimetic Approach to Timber and Treatments for Fire Performance". Andy is a Graduate Fire Engineer at Arup (Sydney)

Thomas Thorne graduated with a BE-ME Civil and Fire Safety Engineering. His thesis was titled "Mechanisms of Fire-Induced Concrete Spalling". Thomas is a Fire Consultant at Omnii (Brisbane).

New PhD students

We would like to welcome Mr Julian Mendez to the UQ Fire group. He will be starting a PhD on "External Fire Spread Risk in Tall Building Design" in October, supervised by Dr Juan Hidalgo and Dr Martyn McLaggan.

We recently announced two new scholarships for joint PhDs between The University of Queensland and IIT Delhi as part of the UQ IIT Delhi Academy of Research. This opportunity offers a joint PhD degree between two universities with a combined high strength in Fire Safety Engineering and Structural Engineering.

We are delighted to welcome Akshay Satishkumar Baheti and Yazan Abutahnat to the group.

Akshay will work on Life-Cycle Risk Assessment of RC Structures under Earthquake and Fire; supervised by Dr David Lange at UQ and Professor Vasant Matsagar at IIT Delhi.

Yazan will work on Novel hybrid testing for studying seismic and fire behaviour of beam-column joints in

reinforced concrete structures, supervised by Dr Cristian Maluk at UQ and Prof. Dipti Ranjan Sahoo at IIT Delhi.

UQ Fire Newsletter and Blog

We publish a regular newsletter summarising all of our activities, as well as maintain a regularly updated blog. You can find both of them at https://uqfire-news.org/.

Signed: The entire UQ Fire team

News from the University of Central Lancashire

The fire group at the University of Central Lancashire (UCLan) is going from strength to strength. We have recently recruited additional members to our team, increasing the breadth and depth of our work. Some recent highlights are detailed below.

Lack of UK firefighting regulation causing "alarmingly high" exposure to cancerous chemicals

Research at University of Central Lancashire (UCLan) has given rise to fresh calls for the government to regulate firefighters' exposure to toxic gases in order to protect them from developing cancer as a result of their occupation.

Prof Anna Stec's team have identified that firefighters' risk of developing cancer is increased by high levels of polycyclic aromatic hydrocarbons (PAHs), that remain on their protective gear following exposure to smoke. The study, published in Nature's Scientific Reports, indicated that skin absorption, rather than inhalation, is firefighters' leading cause of exposure to carcinogens created during a fire, known as UCLan researchers also discovered that the methods used to clean firefighters' protective clothing and equipment are not effective. This causes the protective gear to be contaminated for its next use, and means the length of time that skin is exposed to carcinogens is increased.



This was the first UK study to identify the occupational exposure of firefighters to PAHs, and to establish whether particular practices may adversely affect their health. Wipe samples collected from firefighters' skin, personal protective equipment, and work environment at two UK fire and rescue service stations were examined for the presence of cancerous PAHs.

The research concluded that the risk of developing cancer in UK firefighters caused by dermal absorption of toxic chemicals is as high as 350 times above the level. At present, neither exposure to toxic gases nor their long-term effects on the health of firefighters are officially monitored in the UK, despite cancer deaths in firefighters growing steadily since the 1970s.

The full research paper can be downloaded here: https://www.nature.com/articles/s41598-018-20616-6

Flame retardants contribute to fire deaths



Breakthrough research has revealed that flame retardants used in domestic furniture increase the amount of toxic chemicals produced when it burns, increasing the likelihood of death following the outbreak of a fire.

The research assessed the flammability of furniture manufactured with and without chemical flame retardants. It discovered that chemicals, added during the manufacturing process in order to comply with strict UK fire safety regulations, cause smoke to become up to three times more poisonous.

Inhalation of toxic gases in smoke is the primary cause of death from fire in the UK. Bromine, a chemical element often used in flame retardants by furniture manufacturers, increases the amount of the two key toxicants, carbon monoxide and hydrogen cyanide, when furniture burns.

Researchers also discovered that flame retardants resulted in only a slight delay to the ignition of furniture, with UK standard furniture blazing within just 5-8 minutes. Furniture made specifically to pass UK flammability tests using higher quality materials but without flame retardants took 15-20 minutes before the first flames appeared, a noticeably longer delay than when using the chemical retardant.

The study was carried out by Prof Richard Hull's team at UCLan in collaboration with Greater Manchester Fire and Rescue Service, West Midlands Fire Service, and The University of Canterbury in New Zealand. It can be downloaded here: <u>https://www.sciencedirect.com/science/article/pii/S0045653517319781</u>

UCLan's research uncovered significant environmental contamination surrounding Grenfell Tower

New analysis of soil, debris and char samples following the Grenfell Tower fire has uncovered significant environmental contamination in the surrounding area. This includes known cancer-causing chemicals and respiratory sensitisers, highlighting the need for a detailed investigation and long-term health screening to fully establish potential health risks to those in the local area.



One month after the fire, Prof Anna Stec's team at UCLan discovered that char samples from balconies 50 to 100 m from the Tower were contaminated with cancer-causing polycyclic aromatic hydrocarbons (PAHs). This led to further analysis, six months after the fire, of soil, fire debris and char samples, taken from six locations up to 1.2 km from the Tower. Based on the level of chemicals discovered, researchers have concluded that there is an increased risk of a number of health problems to those in the local area, from asthma to cancer. The research, published in Chemosphere, revealed that soil samples within 140m of the Tower contained six key PAHs at levels of

around 160 times higher than those found in reference soil taken from other urban areas.

Soil samples collected within 50 m of the Tower also contained phosphorus flame retardants, materials commonly used in insulation foams and upholstered furniture that are potentially toxic to the nervous system. In this soil, as well as in fallen debris and char samples, researchers identified synthetic vitreous fibres matching those present in products used in the Grenfell Tower refurbishment.

Elevated concentrations of benzene, a proven carcinogen, were discovered up to 140 m away from the Tower in quantities 25-40 times higher than those typically found in urban soils.

Dust and a yellow oily deposit from a window blind inside a flat 160m from the Tower, collected 17 months after the fire, were found to contain isocyanates – potent respiratory sensitisers that can lead to asthma after a single exposure. These substances were discovered in quantities that could indicate that they resulted from the burning of specific materials which were used in the 2016 refurbishment of Grenfell Tower.

Publication can be downloaded here: <u>https://www.sciencedirect.com/science/article/pii/S0045653519305995</u>

Grenfell Tower panels had 55 times greater heat release than least combustible products tested

This is the first in-depth study of the cladding and insulation used on Grenfell Tower. It has uncovered significant differences in flammability and smoke toxicity between the products used and least combustible products available, helping to explain the rapid spread of flames within the tower's façade.

Prof Hull's team at UCLan showed that the polyethylene-filled aluminium composite material (ACM) panels used on the Tower had 55 times greater peak of heat release rate than the least flammable panels tested. Smoke released when burning polyisocyanurate (PIR) insulation was also found to be 15 times more toxic than current fire-safe insulation products, with just 1 kg of burning PIR insulation being sufficient to fill a 50 m³ room with an incapacitating and ultimately lethal mix of carbon monoxide and hydrogen cyanide gas.

Published in the Journal for Hazardous Materials, the research found that the combination of ACM panels and PIR insulation resulted in the highest flammability and smoke toxicity of products currently available. Used together, the ACM forced rapid ignition of the toxic foam. Just a few burning drips of polyethylene from the ACM panelling would be enough to ignite the foam insulation, which could provide a new explanation for the very rapid spread of flames within the tower's façade.

These new findings also highlight the dangers with High-Pressure Laminate (HPL) materials – a popular alternative to the cladding used on Grenfell Tower, and the material which contributed to the death of six people during the 2009 Lakanal House fire. Test results revealed that when set alight, it had 25 times greater heat release rate, and 115 times more heat was released, compared to the least flammable panel products available.

Despite reports such as these, and new data being released regularly around cladding systems and building materials used across the UK, investigations into these high-risk materials are only starting to be addressed by

regulators. This study was published in

published in the Journal for Hazardous



Materials and can be

Ignition of PIR by burning PE droplets from ACM after ignition; 3 s; 6 s and 40 s.

downloaded here: https://www.sciencedirect.com/science/article/pii/S0304389418312275?via%3Dihub

Firefighter's health and the best practice in minimising risks from fire effluent contamination



There have been concerns, particularly in the US and Canada, that fire effluents may have some adverse health effects. Working with the UK's Fire Brigades Union, the University of Central Lancashire initiated a 3-year research project to develop the best practice in minimising risks from fire effluent contamination. The project is divided into three main areas.

1. A national survey to establish firefighter's culture, health problems, and common practices used for clothing and fire station cleaning.

2. Evaluation of decontamination methods and damage to personal protective equipment (PPE) - influence of different cleaning processes, effect of PPE equipment age on permeability and retention of contaminants.

3. Evaluation of the different potential exposure routes - inhalation, ingestion and dermal absorption. Biological samples from saliva, blood and urine to estimate the absorption and release of key contaminants from the body, with and without decontamination, such as showering etc.

Combustible Façades in the UK before and after the Grenfell Tower fire

In 2006, the regulations in the UK changed to allow combustible products on the external walls of tall buildings, provided thev met certain criteria. 18 months after the fire, the government banned the use of all combustible material on the exterior



Phenolic foam faced with non-combustible A2 ACM, before, during and after the test.

face of tall residential buildings. They defined "combustible" as below Euroclass "A2". A series of large-scale tests were carried out before this announcement on rainscreen façades, using non-combustible (A2) aluminium composite panels (ACP) in front of 3 insulation products: mineral wool (MW); polyisocyanurate (PIR); and phenolic foam (PhF). The results showed that even the non-combustible A2 ACP was unable to withstand the thermal attack from the façade fire scenario, exposing the underlying insulation. Where combustible insulation was used (PIR and PhF), this burnt rapidly, contributing to the fire spread and most significantly increased the smoke toxicity within the cavity.

Signed: Prof Anna Stec, University of Central Lancashire

News from Luleå University of Technology

Example of interesting master thesis

All reports can be found on the website http://pure.ltu.se/portal/en/studentthesis/search.html.

Temperature distribution in air tight cavities of steel framed modular buildings when exposed to fire

Elin Bergroth and Greta Torstensson, both students at the fire protection engineering bachelor program at Luleå University of Technology, have completed their bachelor thesis together on behalf of the construction company Isolamin Sweden AB, Part Group, who works with wall structures for modular houses.

Elin and Greta investigated how the supporting steel structure between two modules in a modular building is affected when a fire occurs in one module. In modular construction, modules can be assembled side-by-side creating



Greta preparing the test specimen.

small gaps between them. However, if a fire occurs, these buildings can be subject to a rapid fire spread due to its cellular nature. These cavities must remain devoid of combustible material and remain air tight, even during fire. This to avoid that the air flow causes the cavities to work as "highways" for the fire spread which can lead to devastating damages.

To examine a steel structure in a modular building when exposed to fire, a fire test and temperature calculations have been performed and are presented in this thesis. The thesis consists of a fire test, theoretical calculations and a computer simulation using the finite element method. The aim of the thesis is to examine to what extent a steel column in a modular building is affected by a fire and to investigate the temperature distribution in the steel.

Furthermore, temperature calculations for the steel beam were made and five different models in the finite element code TASEF was created and simulated. The temperature curves used were the fire test time-temperature curve, the ISO 834-curve which represents a simplified fire, and the parametric fire curve with gamma value of 20. Three models were created where the steel beam was placed in contact to the mineral wool. Two models were created where a material with the properties of air was placed between the steel beam and the mineral wool.

The conclusions are that the steel column reaches a highest temperature of 41°C after one hour in the fire test.

Since this is not close to the critical temperature of the steel (506°C), the EI60 requirements from BBR (Swedish regulation) are considered to be fulfilled. Further, the steel column of this modular building does not need to be fire protected based upon the results of this thesis. The temperature distribution throughout the specimen depends on several parameters, for example the properties of the materials such as conductivity and specific volumetric enthalpy. Further, the air flow inside the cavity, the time exposed to fire, and the surrounding fire temperatures affect the temperature distribution.



Pedro, Greta, and Elin in front of the fire furnace.

The report is available at http://ltu.diva-portal.org/smash/get/diva2:1296917/FULLTEXT01.pdf

Elin and Greta are now continuing their studies on advanced level within the master program in fire engineering, where they specialize in fire engineering related to constructions, BIM (building information modeling), and computer simulations.

Examiner: Alexandra Byström, Supervisor: Pedro Andrade

Signed: Prof Michael Försth, Luleå University of Technology

News from Imperial College London

Hello! It's good to see you. Welcome to another update from Imperial College London. Our group's been busy over the last few months, and we can't wait to share what's been going on.

Graduating Students

Yuqi successfully passed his VIVA in July, congrats!!! He will stay with us for a post-doc, good luck with that. Sadly, one of our post-docs, Dr Guoxiang Zhao, left us in May to start a career as a fire safety engineer at The Fire Surgery in London. We wish you all the best.

New Arrivals

In October we will be officially welcoming Harry Mitchell from Imperial College to Hazelab. His research, funded by Arup, will focus on computational modelling of fire in wooden buildings. We look forward to having him.

We will also be hiring a PhD student to work on wildland fires under the project PyroLife, a 4milion euro grant assigned by the European Union to consortium of 10 leading European universities, of which Imperial College is part.

Conferences



On the 9th November last year, three members of Hazelab travelled to Coimbra for the 9th International Conference of Forest Fire Research. Eirik, Agung, and Yuqi gave presentations on the rate of spread of smouldering, the transition from smouldering to flaming, and the emissions given off during peat fires, respectively.

On the 7th April, three different members of Hazelab travelled to Vienna for the European Geoscience Union (EGU) annual general assembly.

Wuquan, Dwi, and Han were only a small part of this huge event with 5,531 oral presentations and 9,432 posters.

On the 23rd May Francesca presented her work on bridge cable fires at the 3rd SFPE Europe Conference on Fire Safety Engineering in Malaga. Our supervisor Professor Guillermo



Rein will also be giving a keynote speech at the conference titled "Forecasting Fire Dynamics: When Smart Buildings help Fire Commanders".

In June, Han, Yuqi and Franz presented their recent work at the 11th Mediterranean Combustion Symposium in Tenerife, Canary Island. Yuqi also travelled to Cambridge for the Combustion Aerosol Conference and to University of Michigan for the 16th International Congress on Combustion By-Products and Their Health Effects.

In July, Xuanze and Zhenwhen presented their experimental and modelling work on self-ignition of ion battery at the first ever International Symposium on Lithium Battery Fire Safety in Hafei China. In September Matt, Ben and Francesca will be attending the Fire Safety of Façade conference in Paris.

Awards

Guillermo Rein has won two awards since the last newsletter. The first was the 2018 Guise Medal for eminent achievement in the advancement of the science and technology of fire protection engineering, awarded by SFPE. He also won the 2018 Research Foundation medal for the research project "e-Sanctuary: Open Multi-Physics Framework for Modelling Wildfire Urban Evaluation" that best exemplifies the NFPA's fire safety mission and collaborative approach.

Franz Richter also won two awards recently. His project on modelling the charring of wood won the Ben Ashraf El-Shanawany Memorial Prize for the best PhD project in Imperial College's Department of Mechanical Engineering. He also won first prize for communicating his research in the regional level of the Speak Out for Engineering competition, hosted annually by the Institution of Mechanical Engineers. He will now go on to compete at the national level. We wish him the best of luck.

Other

Hazelab created a short promotional video showing some of the work done in our group. You can watch the video on the <u>Imperial Mechanical</u> <u>Engineering YouTube channel</u>.

Guillermo was invited to give a talk about polymer flammability at an Antimony day conference in Brussels, focused on flame retardants. A cartoonist y Floris Oudshoorn @MySwampThing (Comic House, 2018). happened to be present and made some comic drawings of his talk.

Guillermo also gave talks to the London Fire Brigade; Friends of Imperial; Arup London; AECOM London; University of Maryland;

University of California; NFPA Massachusetts; NFPA via webinar; and SFPE via webinar. It's been a busy few months.

Hazelab were invited as special guests to the Royal Geographic Society's, Monday Night Lecture series. Presenting was Dr Thomas Smith from LSE, an expert in wildfires and a good friend and collaborator of Hazelab. He presented our latest collaboration – the GAMBUT field scale peat fire experiment.

In March, Dr Barbara Lane, a senior fire engineer at Arup, visited Imperial College to give a keynote talk at the Department of Mechanical Engineering Research Showcase. Her fascinating talk discussed the current challenges facing fire safety, and the need for communication between the different sectors dealing with fire safety.



Some of Hazelab's peat fire researchers attended a two-week course on the fundamentals of



landscape at the University of Wageningen in the Netherlands. Through talks and excursions around the city, they discovered the relation between geology, topography, soils, and land use.

Dr Jiaje Zhu, Dr Wolfram Jahn, and Prof Guillermo Rein published a paper

calculating the intensity of radiation produced by the "Walkie Talkie" building on 20 Fenchurch Street during an

incident in 2013 when it melted a car parked nearby. The paper inspired an article in <u>The</u> <u>Londonist</u>.

On February 4th, Hazelab welcomed in the Chinese New Year in style with some friends from Arup.

In April, Hazelab were invited to visit the labs of both Bureau Veritas and BRE. We got to learn about fire forensics, small scale fire tests and large-scale facade tests. Thank you to both teams for being so welcoming.





Also, in April, four members of Hazelab teamed up with a student from the University of Coventry and another Imperial student to take part in "FireHack 2019" - a hackathon with the goal of using drones to track wildfires. While the team unfortunately didn't win, it was a great learning experience. We look forward to the next one.

In May, Imperial College hosted Fired-up following the event's success last year at the University of Edinburgh. The event is a chance for young, UK based fire researches to meet up and discuss their work in a more informal setting than a traditional conference. A total of 40 students from 4 different UK universities attended the conference. We are looking forward to the 2020 edition!

That's all from Imperial Hazelab this issue, but before we go we would like to thank all of the academics and engineers who were kind enough to visit us and share their expertise with the group. Thank you to Prof George Boustras, Dr Wojciech Wegrzynski, Dr Cathelinje Stoof, Dr Michael Spearpoint, Dr Roger Harrison, Dr Sara McAllister, Dr Martyn Mclaggan, Dr Danny Hopkins, Marc Castellnou, Sandra Vaiciulyte, Mr. Charles S. Bushey,



Dr. Sarah Scott, Dr. Maria Thomsen, Dr. Octavian Lalu, Tom Lennon, Dr. Cristian Maluk, Dr Eric Guillaume, Tarek Rashwan, Pieter Maes and Anne Ganteaume. Apologies to anyone we've forgotten.

Signed: Matthew Bonner, Imperial College

News from Pprime Institute - Poitiers - France

New PhD student: Tarik Ben Hassi

On October 1st 2018, Tarik BEN HASSI started his PhD at Pprime Institute (UPR 3346 CNRS), University of Poitiers, attached to the doctoral school SIMME. His subject concerns the study of the transfer of masses and heat to the interfaces during the combustion of solid materials.

His work is led by Prof Thomas ROGAUME, Dr Franck RICHARD and Dr Jocelyn LUCHE. Tarik BEN HASSI is working on the phenomenology at the interfaces and the flame-wall interaction in a vertical configuration, where not much research has been done, even if it's necessary in developing mathematical models used in numerical simulation of fire scenarios in order to decrease risks.

In order to validate his Masters in Civil Engineering from the Faculty of Sciences and Techniques at the ABDELMALEK ESSAÂDI University in Tangier-Morocco, Tarik BEN HASSI came to France in 2016 as part of an exchange program to carry out his internship at the University of Aix-Marseille.

His research internship took place within the laboratory IUSTI. His work was concentrated on the reliability of the CCV technique to be adapted during the fire



tests in situ; he participated in the parallel project with the PhD student. The majority of the period was occupied by programming on the Matlab software in order to reliable the post-processing code of temperature records to deduce the velocity of the fluid. In addition, he actively participated in the analysis and interpretation of the tests.

Tarik BEN HASSI, after some experience in the field of fire safety, decided to join the community of fire by pursuing a Master 2 in engineering fire safety at Aix-Marseille University. And because he is attracted by research, his end-of-studies training was carried out within the Pprime Institute in Poitiers. He worked on developing a new approach to evaluating thermal properties of materials which are in the thermal decomposition phase. This work gave him the chance to carry out tests in ATG/DSC and calorimeter cone in order to optimize and identify the kinetic parameters and to develop a small-scale 1D pyrolysis model.

Until now he has successfully developed during his PhD a very sophisticated experimental bench, where he puts very fine thermocouples in order to characterize the reactive boundary layer. The obtained results are so encouraging.

Van Minh Le PhD on the Modeling of finite rate chemistry effects in the combustion of solid fuels relevant to fire safety problems – New stay in the University of Maryland with Prof A. Trouvé

The thesis of Van Minh LE began 01/10/2016 in the framework of cooperation between research departments: University of Maryland (UM), USA; University of Poitiers (UP), France under the supervision of Prof. Thomas Rogaume, Dr. Franck Richard, Dr. Jocelyn Luche at UP and Prof. Arnaud Trouvé at UM. In detail, the project is to develop accurate combustion and radiation models for large eddy simulations (LES) of well-controlled laboratory-scale turbulent fires. The combustion model features a library of flamelet solutions corresponding to steady, laminar, strained diffusion flames. The radiation model features a classical description of non-local radiation phenomena through the Radiative Transfer Equation (RTE). This modeling framework is incorporated into the LES solver FireFOAM, developed by FM Global. This project is financially supported by the French Government program "Investissements d'Avenir" (LABEX INTERACTIFS, reference ANR-11-LABX-0017-01).



In the last months of his thesis, he will go to the University of Maryland to improve and validate his results obtained and also develop some new better models and to write his thesis manuscript. His PhD defense is planned for October 2019.

PhD of Jérémy Colombiano, on the experimental and numerical fire spread on solid fuels relevant to fire safety problems

The thesis of Jeremy began on October 2017 in cooperation with Pprime Institute (Poitiers, France), Efectis France (Saint Aubin, France), and the FireSERT (Belfast, Northern Ireland) supervised by Prof. Thomas

Rogaume, Dr. Franck Richard, and Dr Benjamin Batiot from the Pprime Institute, Dr Virginie Dréan from Efectis France, Dr Talal Fateh and Dr Ali Nadjai from the FireSERT.

The project deals with the prediction of fire propagation over fir wood in vertical configuration and on PVC in horizontal configuration by the description of the mass loss rate of the solid phase, which is a critical value we must accurately predict, as it feeds flames. Therefore, a fully description of the solid phase must be done and thermokinetic parameters are determined, as well as phenomena occurring at the interface solid-gas for the prediction of fire spread.

The methodology followed for this project is multi scale. Small scale tests (TGA, DSC, cone calorimeter, etc.) have allowed the identification of a pyrolysis model, the thermal parameters and the development of a method leading to the prediction of the pyrolysis temperature and local mass loss rate. This one is relevant data for scale with fire propagation, as the community uses to measure global mass loss rate. This first part of work was presented during the 9th ISFEH at Saint Petersburg. Next scales deal with fire propagation, and well-instrumented benches have been developed in order to understand phenomena occurring at the interface solid-gas, leading to the identification of what is driving fire spread.

At the end of the thesis, a first step for the definition of a methodology for engineering studies for fire spread prediction will be defined. Information about relevant input parameters, as well as numerical model, mesh recommendation, tests to perform at least to get parameters, etc. will be pointed out.

Internship of Soufiane Morsaly concerning the thermomechanical behavior of wood



Soufiane Morsaly starts an internship on the thermomechanical behavior of wood in case of a fire. The course will be separated in two distinct parts, a first step which consists in thermally hitting our wood samples and a second part where we will use these samples for a bending study.

Soufiane is 23 years old. He started his studies with a License done in Aix-en-Provence, where he had his first contact with the field of mechanical engineering. By integrating License 3, he has the opportunity to deepen his technical and theoretical background in the fields of mechanics, fluid mechanics and also to introduce himself to CAD and structural calculation. He was also able to put into

practice his knowledge with university projects during his two years of Master.

After graduation and several searches, his view turned to the third cycle where the fire safety topics were the most interesting. So, he had to expand his knowledge by preparing a Double Master in Fire Safety Engineering. And that bring us to his actual situation where he is doing his internship in Pprime Institute to succeed the Master.

The first part of this internship will take place in department 2 of the Pprime Institute. Wood samples will be exposed at different heat flux and times of exposure during cone calorimeter (Fire) experiments to



obtain samples with different properties. Those different thermal energy aggressions generate different levels of thermal decomposition of the samples (thickness of char generated, thickness of residual virgin material).

A second part of the internship in department 1 of Pprime Institute consists of cutting the samples and subjecting them to 3 points bending tests. With these tests, we will be able to measure the residual mechanical

properties of the wood samples depending of the previous thermal aggression. This study should then permit to determine which parameters of the combustion part influence the mechanical behavior of the wood we are working on (Douglass).

Work stay of Dr Tarek Beji from Ghent University

From the 8th to the 12th of April 2019, the Pprime Institute welcomed Dr Tarek Beji from Ghent University as part of a research program on the evaporation and combustion of liquid fuels in a controlled atmosphere.

During his stay, Dr Beji conducted several experiments with Dr Olivier Helson (post-doctoral researcher from the Pprime Institute) using the controlled atmosphere cone calorimeter to study the evaporation and combustion of different liquids. A specific

scientific instrumentation is used to characterize both the liquid phase and the gaseous and particle emissions during the experiments.

The results obtained, thanks to the cooperation between the two teams of Ghent and Poitiers, will be used to develop and assess an evaporation modelling approach already implemented in an in-house code and to be coupled in the near future with the Fire Dynamics Simulator (FDS).

DuoRisk: A short story of two PhDs that decided to become CEOs

Fabien Hermouet and Simon Roblin have respectively obtained their PhDs in 2015 and 2016 in Pprime Institute (UPR CNRS 3346) and started their own company, DuoRisk, in 2017.

This company is located in Poitiers, near the former laboratory where Fabien and Simon conducted their research.

After several years thinking about their project, Fabien and Simon whose expertise in fire safety science completes their initial curriculum within the fields of risk analysis, health and safety, quality and environment management, have thus decided to provide services to public and private structures by means of a large panel of missions such as fire safety engineering, vulnerability analysis, risk assessment, crisis management, standards conformity evaluation, environmental evaluation, *etc.*



As a complement of these activities, DuoRisk has inscribed within its values to share knowledge and has expanded its professional network far beyond its clients, to its social, economic, academic and regulatory stakeholders. In this sense, Fabien and Simon have decided to pursue the sharing of knowledge by continuing to conduct courses at the University of Poitiers and also to promote and participate in conferences and events within their field of expertise.

This willingness carried by the two leaders allows a convergence between socio-professional circles whose expectations are sometimes different, although seeking the same objectives. In this sense, DuoRisk wishes to make possible at the level of a territory the federation of the human, material and technological means by ensuring the link between private companies, research laboratories and institutional partners in order to conduct high value projects.

Feel free to visit DuoRisk's website, to follow our activity on LinkedIn, to recommend our skills and obviously to contact Fabien and Simon!

See you soon!

Signed: Thomas Rogaume, University of Poitiers

News from RISE Safety/Fire Research

FRIC – Fire Research and Innovation Centre established in Norway

RISE Fire research in Norway has, together with The Norwegian University of Science (NTNU) and the research organization SINTEF, received funding from the Research Council of Norway for the establishment of FRIC - the Fire Research and Innovation Centre. FRIC was officially opened 1st of March 2019 and is funded for five years. It will probably be possible to apply for three more years of funding after the mid-term evaluation of FRIC. The 20 partners in FRIC also contribute with funding. both in cash and in form of in-kind contributions.

Multidisciplinary cooperation is a prerequisite for FRIC's development of good solutions. FRIC is led by RISE Fire Research in Trondheim, with NTNU and SINTEF as research partners, and Anne Steen-Hansen



The FRIC management team: (from the left) Christian Sesseng (RISE), Kathinka L. Friquin (SINTEF), Ivar S. Ertesvåg (NTNU), Karolina Storesund (RISE) and Anne Steen-Hansen (RISE). The photo is from the opening of FRIC 1st of March 2019 where the FRIC fire was ignited. Photo: RISE Fire Research.

from RISE Fire Research is Centre Director. FRIC has partners from the public sector, authorities, consultancy

engineers, manufacturers of building materials and building installations, as well as within real estate development and management. An important partner is the local fire and rescue service (TBRT), which represents a central target group for the research.

The main objective is to increase knowledge within the field of fire science in order to support decisions and develop better solutions providing increased fire safety in buildings. FRIC shall strengthen cooperation and lead to a long-term increase of competence and dissemination of knowledge within the fire safety field. The research is organized into four work packages:

- 1) Evidence-based decision-making within fire safety
- 2) Fire dynamics and modeling
- 3) Building Technology and design
- 4) Fire safety measures and new technology.

FRIC will develop knowledge for improved mathematical modelling of fire development, and study fire safe use of new technology in buildings (e.g. solar cells, batteries/energy storage, innovative building materials and construction solutions). Fire safe dwellings, fire safety for vulnerable groups and safety for the fire brigades are other topics to be studied, as well as new extinguishing systems and the efficiency of different fire safety measures. Various research methods will be applied, e.g. investigation of fires, experimental activities and theoretical analyses. The research results will provide the basis for further development of products, services and regulations that can increase fire safety in our society.

International collaboration is important in the research centre. We have received letters of intent from a number of organizations throughout the world, and there is room for more collaborators to come. Some ways of international collaboration can be through joint projects, through exchange of researchers and PhD candidates, and through participation in FRIC workshops and seminars.

RISE Fire Research is very proud and happy to have received this funding and we are looking forward to many exciting projects in the FRIC in the years to come.

For more information about FRIC, please contact Centre Director Anne Steen-Hansen at <u>anne.steen.hansen@risefr.no</u>

Energy efficient buildings and fire safety

RISE Fire Research has during recent years had a focus on energy efficient buildings and fire safety. Our focus is how the development of new technologies, materials and construction methods affect fire safety. In recent surveys made for Norwegian authorities, we have had a focus on fire safety of photovoltaic installations (solar cells), batteries, airtight buildings and cross laminated timber (CLT). You may find full reports from these surveys at our webpage (reports in Norwegian, with English summaries): https://risefr.com/publications

The focus on fire safety of green technologies for buildings continues as part of FRIC - Fire Research and Innovation Centre (see above).

BattMarine - Safety and modelling of new and aged Li-ion Batteries

The largest battery system for a ship currently built, stores several MWh of electric energy. The consequences of fire in such a system can be catastrophic. The Norwegian Maritime Authority recently published its Circular on "Guidelines for chemical energy storage – maritime battery systems" ensuring that "...battery systems maintain the same level of safety as ships with conventional operation". Knowledge about the safety performance, gas emissions and fire behaviour is hence strongly needed for large Li-ion battery systems.

These are key topics in the BattMarine project, which in the next 3.5 years will contribute to ensure reliable, safe and economic use of batteries for maritime applications. The research partners in BattMarine are Institute for Energy Technology (IFE) (coordinator), RISE Fire Research in Trondheim, Norwegian Defence Research Establishment (FFI) and Norwegian University of Science and Technology (NTNU). Industry partners play key roles, for instance by ensuring that the project investigates battery cells which are relevant to the industry.

BattMarine will conduct fire testing and testing of thermal stability of selected Li-ion cells. Fire propagation and fire properties of battery cells and modules will be studied during thermal runaway, by using a cone calorimeter and large-scale experimental setups. Based on the experimental results, a computational fluid dynamics (CFD) model for fire propagation will be developed. Life cycle testing and comparison of new and aged batteries will also be in focus.

BattMarine is funded by the Research Council of Norway, through the research program ENERGIX.

For more information, please contact Ragni Fjellgaard Mikalsen at ragni.mikalsen@risefr.no.

FIRENWOOD - Improved fire design of engineered wood systems in buildings

There is a high focus on development and use of innovative wood systems in constructions, commonly used as loadbearing elements and, in some cases, as fire separating walls and ceilings, as substitutes for traditionally used incombustible products. There is also an increasing motivation to extend the application areas of such products to taller and larger buildings. To support this development, new fire risks must be sufficiently addressed.

FIRENWOOD will fill knowledge gaps regarding fire safe use of engineered wood systems, with focus on structural joints and adhesives in cross-laminated timber (CLT), glued-laminated timber (GLT) and woodbased I-joists, and develop validated and relevant fire design models for these systems as well as classification methods for adhesives. A key point is to investigate the behaviour of



The FIRENWOOD team gathered in Trondheim for the kick-off $12^{\rm th}$ of April 2019. Photo: RISE Fire Research.

adhesives used in structural applications, as many of these innovative systems utilise different adhesives.

The main goal in FIRENWOOD is to ensure fire safe use of innovative, engineered wood systems in taller and larger buildings, by providing

- Improved fire design models, validated by small- and full-scale fire tests, and
- Classification and test methods for adhesives with regard to elevated temperatures and fire. The main focus will be the effect of structural joints and adhesives in cross-laminated timber (CLT), glue-laminated timber (GLT) and I-joists.

FIRENWOOD is supported under the umbrella of ERA-NET Cofund 'ForestValue – Innovating forest-based bioeconomy' by national funding organizations in Germany, Sweden and Norway. ForestValue has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773324. The project is coordinated by RISE Fire Research in Trondheim, Norway.

For more information, please contact the project manager Karolina Storesund at karolina.storesund@risefr.no

Publications and updates from the project may be found at ResearchGate: <u>https://www.researchgate.net/</u><u>project/FIRENWOOD-Improved-fire-design-of-engineered-wood-systems-in-buildings</u>

SH₂IFT - Safe H₂ fuel handling and use for efficient implementation

According to the European Strategic Energy Technology (SET) plan, implementation of hydrogen technology is

one of the key solutions to achieve the necessarv reductions in emission for the 2°C scenario. Hydrogen can connect the transportand energy sectors by fuelling most modes of transportation, as well as supporting the build-up of intermittent, renewable energy storage.

Several European projects have produced knowledge and prepared the ground for the market entry of hydrogen in transport and other applications, e.g. related to regulations, procedures, infrastructure, safety, training, social acceptance



From the preliminary hydrogen open jet fire tests at RISE Fire Research in Trondheim. Optical image in upper part of the figure, infrared image in the lower part. Photo: RISE Fire Research.

and facilitation of hydrogen technology. However, there is still a critical lack of relevant experimental work related to fires and explosions involving hydrogen in environments that require highly conservative approximations; such as tunnels, ships and other enclosed spaces. It is thus important to fill these knowledge gaps and improve the relevance and accuracy of consequence models and risk assessments. The SH_2IFT project shall increase competence within safe handling and use of both gaseous H_2 (GH_2) and liquid H_2 (LH_2), with focus on enclosed spaces and maritime transport.

This goal will be achieved through the following activities:

- Identify barriers for implementation of H₂ as fuel.
- Investigate the technical and physical processes involving GH₂ or LH₂, by medium- and large-scale fireand explosion experiments. Jet fire tests will be conducted to characterize GH₂ flames and study the effect from jet flames on surroundings in enclosed spaces. Tests will also be conducted to simulate BLEVE from vehicles with LH₂, and to study the potential for RPT from emission of LH₂ on water.
- Interested parties is invited to participate in a blind prediction study to calculate the thermal exposure and key parameters before the experiments are done. This is scheduled to take place in Q4, 2019.
- Develop new or improved and validated consequence models.
- Develop recommendations and information regarding safety.

SH₂IFT is a four-year project and started in April 2018. The consortium includes SINTEF Industry (coordinator), RISE Fire Research in Trondheim, SINTEF Energy, NTNU, the Norwegian Institute of Transport Economics and Christian Michelsen Research in Bergen.

SH₂IFT is funded by the Research Council of Norway, through the research program ENERGIX, as well as by industry partners and authorities.

For more information, please contact the project manager Reidar Stølen at reidar.stolen@risefr.no

Signed: Michael Försth, Ph.D., RISE

National Research Institute of Fire and Disaster, Japan

Investigation Report Published

An urban fire in Itoigawa-city, Niigata, Japan, on Dec 23rd 2016, was one of the worst urban fires for decades in Japan. NRIFD, as a part of Fire and Disaster Management Agency, investigated the fire. Early report on spot fires was presented in a poster session at 12th IAFSS in Lund. Final report was published and free to download at NRIFD website; <u>http://nrifd.fdma.go.jp/publication/gijutsushiryo/gijutsushiryo 81 120/files/shiryo no84.pdf</u> (in Japanese). Detailed timeline of the fire and factors of fire containment in each location are also provided in this report. You may find the information on this fire (in English) (Suzuki, S. & Manzello, S.L. Fire Technol (2018) 54: 1533. https://doi.org/10.1007/s10694-018-0751-x).

Awards

Dr. Sayaka Suzuki is the winner of the 2017 Young Investigator Award from Combustion Society of Japan (Japan section of the Combustion Institute) for her work on 'Pioneering Firebrand Research for Large Outdoor Fire Mitigation'. She was awarded during the 55th (Japanese) combustion symposium in Toyama, Japan.

Dr. Sayaka Suzuki won the Uchida Award (Young Investigator Award) from Japan Association of Fire Safety Engineering for her work on 'Seminal Research on Firebrand Generation and Ignition'. This award is named after Prof. Uchida, (the University of Tokyo, this is her alma mater too), a founder of JAFSE. She was awarded during the 2018 annual conference of JAFSE in Kitakyushu, Japan.

Dr. Kosuke Fujii is the one of winners of the 11th AOSFST Best Paper Awards for his paper on 'Influence of congestion in upper floor on pedestrian flow in staircase based on observational survey of evacuation drill in a high-rise building'. He was awarded during the 11th AOSFST in Taipei, Taiwan.

Dr. Nobuhito Ohtsu won the AIJ Young Researcher Award 2019 from Architectural Institute of Japan for his journal paper on 'Velocity and Transportation Ability of Transporting Vulnerable People during Tsunami Evacuation Drill in a Community - Outdoor evacuation with rollator, transport chair, wheelchair and cart in Shinyo Bokomi, Kobe, Japan' (<u>https://www.jstage.jst.go.jp/article/aija/82/734/82 837/ pdf/-char/ja</u>). He will be awarded during the 2019 annual conference of AIJ in Ishikawa, Japan.

Signed: Sayaka Suzuki PhD, NRIFD

News from Efectis Group

Efectis Group is a leading international fire testing and engineering company with 16 offices and laboratories across Europe. Efectis offers a comprehensive range of fire testing and accreditation services to manufacturers of construction products, regulatory compliance service and further consultancy to the construction sector.

Recent activities:

- Efectis and the Research Institutes of Sweden, RISE, signed a mutual Memorandum of Understanding in order to jointly support fire safety research. The experience of RISE combined with the expertise and authority of the Efectis laboratory, will contribute strongly to disseminating knowledge and to responding to the needs of stakeholders in fire safety.
- Efectis signed a contract with the European Commission to form the Technical Secretariat for the Fire Information Exchange Platform (FIEP). The objective of FIEP is to stimulate the exchange of experience between countries and to define a common ground for Fire safety in Europe.
- Efectis gave two presentations at the conference "Third Conference on Urban Safety and Fire services" in Tehran (Iran): "Lessons learned from fires in buildings above the average height of firefighters' aerial ladders" and "Fire safety in high rise buildings and specific risks on facades and roofs".
- With the support of CSTB, Efectis has been assigned by ADIVbois for a feasibility study to apply the methodologies and tools used in Fire Safety Engineering (FSE) for high-rise timber buildings (BBGH). A method of application of FSE for verifying fire stability has been defined. This methodology is already being used by the Efectis engineering department for high-rise timber building projects. Efectis is also one of the authors for CODIFAB (Professional Committee for the Development of French Furnishings and Wood Industries) of various guides to support not only the building manufacturers, but also the authorities, namely:
 - A guide for using wood for stairwells and elevator shafts in public buildings or residential buildings
 - A verification guide for warehouses with glulam structures in case of fire
- As a verification process of fixed water suppression systems, numerous full-scale tunnel fire tests were carried out by Efectis in a fire test tunnel in Gijon, Spain. A Very Heavy Goods Vehicle fire was simulated by pallet stacks. The evaluation result of the tests will help whether to implement the water mist system to a road tunnel in Singapore.



- Efectis Era Avrasya has provided fire engineering training to the administrative team of Kuwait Fire Service Directorate, regarding control, design, installation and inspection of fire systems and applications in various types of building.
- Gerhard Olivier, a master student from the TU Delft, is conducting experiments for his master thesis at Efectis Netherlands. The study investigates the fire performance of Cross-Laminated Timber CLT in terms of the influence of adhesive type and compartment configuration, through a series of small-scale compartment fire experiments containing exposed CLT walls. The overall aim of this research is to augment the current body of knowledge pertaining to the effect of exposed CLT on compartment fire dynamics, thereby increasing the confidence of designers and regulators alike in building constructions with combustible materials.
- Jet fires arising from high-pressure leakages represent a severe hazard in petroleum, petrochemical and gas plants, especially in offshore structures. To be able to obtain an optimization ability in fire protection applications, a numerical model of the test setup according to *ISO 22899-1* was developed in CFD code FDS and coupled one way with finite element code SAFIR. The results were validated with conducted tests.

Signed: Ersin Ferad, Efectis Nederland

News from INERIS

Standardisation activities in the domain of Energy storage

Guy MARLAIR was recently appointed as new chair of IEC TC120 (Energy Storage systems) by IEC Central Office, effective by April 2019, 1st. He still acts in this TC as convener of WG5 working on "safety considerations".

Project 62933-5-2 (IEC 62933-5-2 ED1) elaborated by TC120 WG5/PT entitled: *Electrical energy storage (EES)* systems Part 5-2: Safety requirements for grid integrated EES systems - electrochemical based systems) was approved in June 2019 at Committee level and should accordingly reach FDIS stage in Fall 2019

Study recently ordered by the UK Office for Product and Safety Standards

INERIS is one stakeholder in a study launched earlier this year by the *UK Office for Product and Safety Standards*, focusing on a survey regarding "safety of Domestic Energy Storage Systems". The study is performed by Intertek and is justified by queries raised by significant history of incidents that has paved the development of li-ion battery storage units and their various applications. The study aims at "understanding best practice in the design and installation of domestic energy storage systems and to provide Office policy makers a clear understanding of the safety risks to consumers and suggest ways in which these risks can be mitigated. One task entails a review of lessons learnt from incidents involving Li-ion battery fires. An interim report has been delivered to main stakeholders. Final report should be made publicly available by end of this year.

From interim reporting on fire statistics, following data were commented by Intertek:

- Solar related fires in Australia period 2011-2015: 400 reported fires in 4 States the number of fires correlated well to number of systems installed: only 2 out of 3 of those fires related to the battery itself
- Fire and PV systems until 2017 UK study: about46 fires related to PV until Jan 2017, 17% of them in domestic buildings, 45% in non-domestic and 8 in solar farms Batteries are not identified as root cause in any of those fire incidents, rather poor installation is identified as main cause (outdoor facility, water intrusion...°
- E-cigarette fires in the US 2009-2016: 291 reported fires, number correlates well with number of sales. 10 resulted in major fires (less than 5%)

Signed: Guy Marlair, INERIS Guy.marlair@ineris.fr

News from the National Research Council of Canada

Protecting structures from wildland fires

Fires in the Wildland-Urban Interface (WUI), which is an area where human developments such as homes meet with forest and wildland, have become a global issue, with recent disasters taking place all over the world. WUI fires can cause the ignition of many structures through flames, radiant heat and embers, over a short period of

time. This can overwhelm protection capabilities, lead to large evacuations, and create disasters and the potential for total loss of hundreds of homes in a few hours.

In Canada, over the last decade, there has been an average of 7,084 wildfires each year, involving 2.72 million hectares of wildland area [1]. The data shows that the number of evacuations caused by wildfires has increased by about 1.5 evacuations per year between 1980 and 2014, with more than 20 evacuations per year after 2010. Between 1980 and 2007, there were 547 evacuations involving over



Fort McMurray Wildfire, Alberta 2016 (Terry Reith, CBC)

200,000 people due to wildland fire events [2]. The substantial, negative impacts of WUI fires were illustrated by the 'Okanagan Mountain Park Fire' which affected the City of Kelowna in 2003, the 'Flat Top Complex Wildfire' that destroyed significant parts of Slave Lake in 2011, and the Fort McMurray wildland fire disaster—the most costly insured loss event in Canadian history. These disasters resulted in a loss of over 2,700 structures and roughly 3,400 living spaces. Total insured losses from these wildland fire disasters and the 2017 wildland fire catastrophe events in British Columbia are currently estimated to be ~\$4.8 billion [3].

Approximately 90,000 people (residents and workers) were evacuated during the Fort McMurray disaster event alone. In the Great Matheson Fire of Black River-Matheson, ON, 223 people lost their lives [4]. More recently, the 'Camp Fire' in California, USA, claimed the lives of 86 people and destroyed 18,804 structures [5].

Despite all efforts, wildfires pose a significant challenge to the residential population, mitigation efforts and existing infrastructure when located in a WUI setting. Wildfires are likely to become more severe and frequent as a result of climate change. The NRC has conducted a review to identify current practices and gaps in existing approaches and understanding, and thereby establishing potential research areas to address the gaps. This led to the NRC working on a number of initiatives to support a national effort to mitigate the risk posed by WUI incidents, some of these initiatives are:

- 1. The development of a National WUI Guide/Code for WUI fires for Canada. The NRC has developed a resource document, which will form the basis of the guidance document for WUI fires for use in Canada. The expectation is that the guidance document will eventually move into a Canadian WUI code. An international Technical Committee (TC) made of 22 members was formed, with the objective to review and finalize the WUI guide. The TC has met twice so far and a portion of the guide has been developed.
- 2. The development of new protocols or improvements in existing protocols for testing construction components to access their resilience in WUI incidents is also being pursued. A testing program is being planned to confirm existing testing methods or to develop new testing methods.
- 3. The development of modelling methods to better assess the impacts of wildfires on the buildings and construction components from radiation, convection and embers (see Figure 1).
- 4. The development of wildfires and WUI fires hazard/risk mapping (see Figure 2). The objective is to identify changes in wildfire activity zones across Canada under climate change influences. Maps, tools, and documentation to present zones of wildfire activity across Canada in historical and projected future climates



Figure 1: A computer numerical simulation of wildfire propagation near a WUI area



Figure 2: Length of fire season in days as indicated by Fire Weather Index (FWI) of the Canadian Forest Fire Danger Rating System for the year 2016. (Gridded weather data needed for the calculation of FWI elements have been taken from <u>Climate Forecast System Reanalysis</u>)

References:

- 1. Canadian Council of Forest Ministers. 2016. Canadian Wildland Fire Strategy: A 10-year review and renewed call to action. Canadian Council of Forest Ministers. Accessed January 5, 2017 from http://publications.gc.ca/collections/collection 2016/ccfm/Fo79-22-2016-eng.pdf
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- 3. Major WUI Fire Disasters Recorded by P&C Insurance Industry, 2000 to Present
- 4. <u>http://cdd.publicsafety.gc.ca/dtpg-eng.aspx?cultureCode=enCa&eventTypes=%27WF%27&dead=1%2c10000&normalizedCostYear=1&dynamic=false&eventId=46</u>
- 5. http://www.fire.ca.gov/communications/downloads/fact_sheets/Top20_Acres.pdf

Signed: Noureddine Bénichou, NRCC

News from NFPA and the Fire Protection Research Foundation

Fire Protection Research Foundation Medal

The 2019 Research Foundation Medal, recognizing the Fire Protection Research Foundation project completed in the previous year that best exemplifies the Foundation's fire safety mission, technical challenges that have been overcome, and a collaborative approach to execution, was awarded to *The Fire Safety Challenges of Tall Wood Buildings (Phase 2) project*. The project aimed to quantify the contribution of cross laminated timber (CLT) building elements (wall and/or floor-ceiling assemblies) in compartment fires and evaluate the relative performance of CLT systems compared to other building systems commonly used in tall buildings. As with

all Research Foundation projects, the work was guided by a project technical panel. National Research Council (NRC) Canada and Research Institute of Sweden (RISE) were contracted for technical services, and full-scale testing was conducted at the National Fire Research Laboratory at the National Institute of Standards and Technology (NIST).

The Foundation Medal was presented to Daniel Brandon, a researcher within the fire research division at the Research Institutes of Sweden; Matthew Hoehler, a research structural engineer at NIST; Birgit A.-L. Östman, affiliated with Linnaeus University in Växjö, Sweden; and Joseph Su, a principal research officer at the National Research Council of Canada, Fire Safety Unit.

New report: Evaluation of the Responsiveness of Occupants to Fire Alarms in Buildings: Phase 1 (March 2019) This Phase 1 effort focuses on literature review to gather information from the available materials on the effectiveness of fire alarm signals, voice alarms and mobile technology on notifying the building occupants in the event of an emergency. Download the full report, for free, from the Foundation website https://www.nfpa.org/News-and-Research/Resources/Fire-Protection-Research-Foundation.

New report: Vapor mitigation testing using fixed water spray system (April 2019)

The goal of this research project was to evaluate the effectiveness of fixed water sprays to prevent the development of flammable vapor clouds and control the fire in case of ignition. Download the full report, for free, from the Foundation website.

New report: Flammable refrigerants firefighter training: Hazard assessment and demonstrative testing (May 2019)

This project was part of the overall two-year project with a goal to enhance firefighter safety and reduce potential injury by providing training on the hazards from appliances with flammable refrigerants. It documents the information about flammable refrigerants technologies and the hazards to emergency responders and develop interactive training modules to transfer the knowledge to the fire service. Download the full report, for free, from the Foundation website.

Technical Note: *Combustible Dust Flame Propagation and Quenching in Pipes and Ducts* (December 2018) This report is a comprehensive literature review that identifies the parameters affecting propagation and quenching of flames involving combustible dusts within a piping or ductwork system. It can be downloaded from the Foundation website.

SUPDET 2019

The 2019 Suppression, Detection and Signaling Research and Applications Symposium (SUPDET) took place September 17-20 in Denver, Colorado. Since 1997, the Research Foundation has organized SUPDET®, an annual symposium which brings together leading experts in the field of fire protection engineering for the purpose of sharing recent research and development on techniques used for fire suppression, detection, and signaling. These events are generally attended by a variety of fire protection professionals, such as engineers, researchers, insurers, designers, manufacturers, installers, and AHJs. SUPDET 2019 covered the following topics:

Detection and Signaling:

- Multiple sensor and multiple criteria-based fire detection
- Power over ethernet and emerging technologies
- Home smoke alarm applications
- Use of data to improve performance/effectiveness
- Wildfire applications

Suppression:

- Advancements in protection of high hazard commodities
- Developments to address environmental concerns
- Protection of Li-Ion battery energy storage systems
- Reliability and maintenance of systems (including remote maintenance)
- Advancements with gaseous and clean agents

Fire Protection Research Foundation Student Project Initiative

The Fire Protection Research Foundation (FPRF) constantly works with NFPA Technical Committees to identify a range of research projects to meet their information needs. Some of these projects might well meet the requirements of graduate student projects and can be accessed through our "Student Project Initiative". The research requests that we receive from the Technical Committees are reviewed at the beginning of every year and around the month of May each year, the list of available student projects is updated.

These projects do not go through FPRF's competitive Request for Proposal process, rather they are allocated upon submittal of a request from an interested researcher. To process a request, we need the project title, the name of the faculty advisor willing to supervise and be the Principal Investigator, and the name of the student or group of students who will work on the project. The timeframes on these projects are flexible so that they fit into

the academic model and schedule. It is possible that FPRF has funding/stipend available to support the student/advisor for these projects. If the FPRF does not have funding to support the project, we still encourage the interested student/advisors to pursue a project if the project is still available.

The available projects can be accessed at the following link: <u>https://www.nfpa.org/News-and-Research/Resources/Fire-Protection-Research-Foundation/Student-project-initiative</u>. To request a project, send an email to <u>research@nfpa.org</u> with the following information: project name, faculty advisor, and student name(s). If you have any questions, please contact Sreeni Ranganathan at <u>sranganathan@nfpa.org</u>.

News from the Society of Fire Protection Engineers (SFPE)

SFPE Guide to Human Behavior in Fire, 2nd Edition Now Available

This single resource for the fire safety community distills the most relevant and useful science and research into a consensus-based guide whose key factors and considerations impact the response and behavior of occupants of a building during a fire event.

The Second Edition of *SFPE's Engineering Guide: Human Behavior in Fire* provides a common introduction to this field for the broad fire safety community: fire protection engineers/fire safety engineers, human behavior scientists/researchers, design professionals, and code authorities. The public benefits from consistent understanding of the factors that influence the responses and behaviors of people when threatened by fire and the application of reliable methodologies to evaluate and estimate human response in buildings and structures.

This Guide also aims to lessen the uncertainties in the "people components" of fire safety and allow for more refined analysis with less reliance on arbitrary safety factors. As with fire science in general, our knowledge of human behavior in fire is growing, but is still characterized by uncertainties that are traceable to both limitation in the science and unfamiliarity by the user communities. The concepts for development of evacuation scenarios for performance-based designs and the technical methods to estimate evacuation response are reviewed with consideration to the limitation and uncertainty of the methods. This Guide identifies both quantitative and qualitative information that constitutes important consideration prior to developing safety factors, exercising engineering judgment, and using evacuation models in the practical design of buildings and evacuation procedures. Besides updating material in the First Edition, this revision includes new information on:

- Incapacitating Effects of Fire Effluent & Toxicity Analysis Methods
- Occupant Behavior Scenarios
- Movement Models and Behavioral Models
- Egress Model Selection, Verification, and Validation
- Estimation of Uncertainty and Use of Safety Factors
- Enhancing Human Response to Emergencies & Notification of Messaging

The prediction of human behavior during a fire emergency is one of the most challenging areas of fire protection engineering. Yet, understanding and considering human factors is essential to designing effective evacuation systems, ensuring safety during a fire and related emergency events, and accurately reconstructing a fire.

The guide is available through Springer in hardcover format or as an e-book at: <u>https://www.springer.com/us/book/9783319946962</u>.

SFPE Handbook Editorial Staff Seeking Reviewers

SFPE is currently in the process of drafting the 6th edition of the SFPE Handbook of Fire Protection Engineering. As part of this process a peer review will be conducted of the content in the 5th edition. The purpose of this peer review is to organize an independent review of each chapter, and reviews across chapters. The goal of the review will be to suggest potential technical weaknesses, potential duplicate content, potential overlaps with other Chapters, potential areas for worked examples, and potential new or innovative content. If you are interested in participating as a peer reviewer please contact <u>Engineering@SFPE.org</u>.

SFPE Standards Making Committee on Fire Exposures Local Exposures Working Group Formulates 10 key Fundamental Principles for how to Define and Express Thermal Boundary Conditions

Predicting the temperature of exposed objects is one of the most-common and fundamental tasks in structural fire engineering. As a first step, thermal exposure must be specified. That can be done by measurements, fire modeling or standard specifications. These must be clear, well-defined and consistent. However, how these are interpreted is often clouded by a lack of common understanding of how the exposure parameters shall be used to estimate and calculate the temperature of exposed bodies.

Fire safety engineers typically use gas temperature, incident heat fluxes and — lately — adiabatic surface temperature (AST) to express thermal exposure. However, since approaches are not always consistent, the task group on Local Fire Exposures of the SFPE Standards-Making Committee (SFPE S.01) on Calculating Fire Exposures has formulated 10 key fundamental principles for how to define and express thermal boundary conditions in FSE.

The principles are general and can be applied to material reaction fire problems, such as time to ignition estimates and fire resistance of structures under very high temperature exposures.

The 10 principles are outlined in the February 2019 issue of *FPE Extra* entitled Ten Fundamental Principles on Defining and Expressing Thermal Exposure as Boundary Conditions in Fire Safety Engineering by SFPE Fellow Ulf Wickström (<u>https://www.sfpe.org/page/FPEeXTRAIssue38</u>). This article is also available in Spanish. (<u>https://www.sfpe.org/page/EdicinExtradeFPE21</u>).

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

News from ARUP

Fire Engineering Excellence Award 2019, The Hong Kong Institution of Engineers

Results of the inaugural Fire Engineering Excellence Award organized by the Hong Kong Institution of Engineers have been announced. Arup received two grand awards for projects under the Hong Kong category and Mainland/ Overseas category. The award presentation took place on 31 May 2019, together with the Fire Division Annual Symposium (<u>http://fe.hkie.org.hk/en it events inside Upcoming.aspx?EventID=87&Type Name=Events%20/%20Activities</u>). The award-receiving projects were:

- Ping An Finance Centre, China Grand Award under the Project Award Mainland/ Overseas category of The HKIE Fire Division Fire Engineering Excellence Award 2019 (FEEA)
- Central Police Station Compound (Tai Kwun) Grand Award under the Project Award Hong Kong category of The HKIE Fire Division Fire Engineering Excellence Award 2019 (FEEA)

Awards at the Council of Tall Buildings and Urban Habitat, Tall and Urban Innovation Conference, Shenzhen, 2019

The fire safety engineers at Arup were well-represented at the abovementioned conference in China. Arup won three Awards of Excellence and won the overall prize in the category of Fire & Risk Engineering:

- Award of Excellence winner and overall winner in the Fire & Risk Engineering category for developing and delivering the fire strategy for the Morpheus Hotel, Macau <u>https://www.arup.com/projects/morpheus</u>
- Award of Excellence winner in the Fire & Risk Engineering category for developing and delivering the fire strategy for the Ping An Finance Center, Shenzhen
- In collaboration with NFPA, the Award of Excellence Winner in the Innovation category for the development of the Exterior Façade Fire Evaluation and Comparison Tool (EFFECT[™]) <u>www.nfpaeffect.com</u>

Professionalising Fire Safety Engineering - the Warren Centre Project

Arup is a major sponsor and technical contributor to the current research at the Warren Centre at the University of Sydney looking into the role, regulation, competency, education and accreditation of fire safety engineers. This research follows concerns about the professional competence of fire safety engineers in the UK and Australia as expressed in the respective inquiry reports of Hackitt and Shergold/Weir. The design and review of fire safety solutions in buildings, often by unqualified fire safety engineers, as identified by Brian Meacham in his major international review of performance-based codes across seven countries, has reinforced the need to lift competence and professionalism of fire safety practitioners in many jurisdictions.

This is the broad thrust of the Warren Centre research. Arup's Marianne Foley, Nate Lobel and Peter Johnson, along with Professor Jose Torero from UCL and the University of Queensland team led by Dr David Lange and others, have completed major studies into the current regulation and accreditation, and education and competency of fire safety engineers. They have also examined the whole basis for fire safety design, strategy development and separate verification of performance. These studies and reports are forming the basis of further stages of research at the Warren Centre now getting under way examining the ideal role and responsibilities, future competency needs and the requisite education offerings for fire safety engineers required to meet the new challenges of building design. Copies of the research reports and more details of the research can be found at <u>www.thewarrencentre.org.au</u>.

Signed: Susan Lamont, ARUP

News from Meacham Associates

Research continues across a broad spectrum of areas, including environmental impacts of fire (with Lund University and INERIS), oxygen reduction systems (ORS) for fire prevention (with Zurich Insurance plc (Ireland) and Lund University), and a holistic approach to façade design, testing and regulation (with Lund University and Briab). Consulting activities are similarly diverse, ranging from providing peer-review services for complex performance-based designs (PANYNJ), to analyzing building fire safety requirements and fire test requirements across numerous countries, to undertaking building regulation reviews and developing a fire risk assessment tool for low- and middle-income countries (World Bank).

Participation in a wide range of professional conferences and workshops worldwide continues. To date this includes the 2019 NFCA Annual Conference, Orlando, FL, the SFPE Northern California and Nevada Chapter Fire Protection Engineering Seminar, San Ramon, CA, the IRCC Workshop on Building Regulations and Mandatory Standards in the Field of Sustainable Development, Beijing, China, the 2019 SFPE Europe Conference, Malaga, Spain, the 2019 NFPA Annual Convention and Expo, San Antonio, TX, the 2019 International Fire Safety Symposium (IFireSS), Ottawa, Canada, and Interflam 2019, Windsor, England. Upcoming events include the 10th APICI International Congress on Fire Safety Engineering, Madrid, Spain, the 2019 SFPE Annual Conference and Expo, Chandler, AZ and the November SFPE Switzerland Research and Education Colloquium, Zurich, Switzerland.

Signed: Brian Meacham, Meacham Associates

News from OFR Consultants

OFR Consultants is pleased to announce that it has joined the International Master of Science in Fire Safety Engineering (IMFSE) programme consortium to ensure that some of the brightest people are deservedly given the best opportunity at the start of their careers in fire safety engineering. In addition, OFR staff are also involved with providing lectures at various universities including Sheffield, Manchester, Warwick and Leeds.

In the area of standards development, OFR has been involved in the technical committees that have developed the recently updated version of BS 7974 – Application of Fire Safety Engineering Principles to the Design of Buildings, and the accompanying Published Documents. Danny Hopkin sat on the main committee as an independent expert, which led to him being the co-chair for both the PD 7974-1 and PD 7974-3 sub-committees. He was also a member of the PD 7974-5 and PD 7974-7 sub-committees. Separate to that, he was a member of a panel leaders PD 7974 co-ordination committee which has required working closely with the chair of PD 7974-2. Mike Spearpoint assisted on the PD 7974-1 committee.

OFR staff carry out and publish research in parallel with its ongoing fire safety engineering design work. A fair amount of this research is in collaboration with colleagues at universities and other institutions. In particular, there is the ongoing work in conjunction with BRANZ regarding the use of CLT in buildings and the survey of façade fire incidents in tall buildings sponsored by the Council on Tall Buildings and Urban Housing (CTBUH). For those interested, OFR has its own 'Lab' on ResearchGate that collates much of the research output, https://www.researchgate.net/lab/OFR-Consultants-Michael-Spearpoint.

Signed: Michael Spearpoint

News from the Fire Safety Team at Arcadis (UK)

Back in October 2017, the Fire Safety Team (FST) at Arcadis UK (<u>https://www.arcadis.com</u>) was created and has been led by Dr. Rodrigo Machado Tavares. In less than two years, the Arcadis FST has grown from three

members to eight members across the UK and is composed by Fire Safety Engineers and Fire Risk Assessors. The Arcadis Fire Safety Team provide technical support in Fire Safety for all project stages (i.e., design, construction and post-construction) in harmony with all other core-disciplines (e.g., MEP, sustainability, architecture etc.) supporting on Fire Safety Strategy reports, Fire Risk Assessments, Fire



Harmonic integration of all fire safety tasks

Protection systems amongst others harmonically as shown in the figure above.

The team has recently established a collaborative relationship with the Fire Safety Engineering Group (FSEG: <u>https://fseg.gre.ac.uk</u>) from The University of Greenwich in London, UK. FSEG is a pioneer research group and a global leader on Evacuation and Fire modelling. With this collaboration, the Arcadis FST started to develop expertise on Fire Safety Engineering solutions in line with BS 7974:2019 (*Fire Safety Engineering. Application of fire safety engineering principles to the design of buildings*) for estimating RSET (Required Safe Evacuation Time) and ASET (Available Safe Evacuation Time). As part of this plan, some of the members of the Arcadis Fire Safety Team (Mr. Kevin O'Neill, Ms. Holly Hawksworth and Mr. Paul Laughlin-Hyde) have undertaken the PPFM (Principles and Practice of Fire Modelling) short course by FSEG in June this year.

2019 has been already a great year for the Arcadis Fire Safety team with new members joining the team. The team has started to invest as well in Research and Development and the team is currently organising a Fire Safety Symposium... so more good news to come soon.

Signed: Dr. Rodrigo Machado Tavares

News from the International Water Mist Association

Winners of Young Talent Award/PhD

The winner of this year's "IWMA Young Talent Award / Ph.D." is Dr. Topi Matti Sikanen. The title of his winning Ph.D. thesis is: "Simulation of Transport, Evaporation and Combustion of Liquids in large-scale Fire Incidents". "The audience in Berlin at the 19th International Water Mist Conference, which will take place on 23rd and 24th October this year, can look forward to the presentation of Dr. Sikanen's thesis. As this year's winner of the IWMA Young Talent Award he is invited to the conference as one of the speakers", says IWMA General Manager Bettina McDowell. Next year the award will once again go to the best master thesis. Submissions are to be handed in before 30th April 2020. Details can be found on the IWMA webpage.

First runner-up this year was Dr. Iqbal Mahmud. The title of his thesis: Simulation of the Suppression of Fires using Water Mist".

19th International Water Mist Conference (IWMC) to take place in Germany

The IWMC 2019 will take place in Berlin, Germany, on 23rd and 24th October 2019. The conference venue will be the Ameron Abion Spreebogen Waterside Hotel. The first day of the conference will be all about systems in practice and will include the discussion. The second day of the conference will mainly be dedicated to research and testing. The flyer containing the agenda can be downloaded from the IWMA webpage and also from the conference webpage which is accessible directly via www.iwma.net. The registration period will end on 18th October.

IWMA Scientific Council welcome new Member

Christian Sesseng (RISE Norway) has joined the IWMA Scientific Council. Christian Sesseng graduated from the Norwegian University of Sciences and Technology in 2009 and has been working for RISE Norway ever since. He has now reached the position of a senior research scientist and has dealt with several topics in fire research such as extinguishing systems, fire detection, fire safety in the process industry, residential fire safety and fire investigations. He has a number of publications to his name covering topics like "fire incidents related to oil and gas production", "analysis of fatal fires" and "radiation from large flames".

Christian Sesseng says: "I am happy that the members of the council have accepted my application and I am looking forward to joining them in their effort to promote IWMA and the water mist technology based on scientific evidence."

The IWMA Scientific Council evaluates the submissions for the annual International Water Mist Conference and for the IWMA Young Talent Award. The members also answer questions from the industrial community and the interested public.

UPCOMING CONFERENCES

1st Asia-Pacific CI Summer School: Fundamental Combustion Problems in Fires (APCISS-1)

The 1st Asia-Pacific CI Summer School: Fundamental Combustion Problems in Fires (APCISS-1) will be held in Valparaíso, Chile, from November 10 - 15, 2019. For the first time in CI summer schools, fire safety will be the central topic in this school. The event will provide scholarships for graduate students, which will cover accommodation, meals and access to the different academic and social activities. They only need to arrange their travel to Valparaíso. Applications should be submitted through an online form available in the school website (www.apciss.cl). Scholars are expected to submit and present a poster during the school.

This will be a great opportunity for students to learn from highly recognized academics, to gain experience in communicating their research, and to access an international network of researchers and fellow students. For any inquiries, please email: <u>info@apciss.cl</u>

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

Underground constructions such as tunnels, garages, metros, mines and caverns are increasingly important parts of societal infrastructures. Enclosed spaces create challenges for emergency management, fire safety and security. This Symposium will offer an excellent opportunity for experts working with health, safety, transport, emergency management, risk, security, tunneling, design, systems, operation and research in underground spaces to exchange their experiences in an international forum. Registration will open in Autumn 2019.



The conference hotel has not yet been announced. Details can be found on the symposium website at <u>https://istss.se/</u>.

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.

CONTACTS: Visit the official conference website for more information: https://www.sfpe.org/page/CFA

HANDBOOK ON ENVIRONMENTAL IMPACTS OF FIRE – SEEKING CONTRIBUTIONS **ON FIRE FUNDAMENTALS, WILDLAND FIRE AND MITIGATION**

As noted in the last IAFSS Newsletter, a new handbook on Environmental Impacts of Fire is under development. We have a number of great contributors, and have added Margaret McNamee as co-editor. However, we would still like to add / expand contributions in a few areas. These include: fire fundamentals (basic chapter on fire chemistry, fire dynamics, etc.), fire impacts of industrial fires, fire impacts of wildland fires, and mitigation strategies. Complete draft chapters would be due by the end of 2019. If you are interested, please let Brian or Margaret know!

CALLS FOR PAPERS/ABSTRACTS

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

This conference will take place June 24-26, 2020, in Brisbane, Australia. The call for abstracts and instructions for submission can be found at http://sif2020.com/callforpapers. The deadline is January 10, 2020. The notification of abstract acceptance will be made on the March 6, 2020. The deadline for full paper submission will be May 1, 2020. Papers will be accepted on the basis of their quality and originality. Selected papers will be invited to submit an extended version to the published in a special issue of *Fire Technology*. Conference themes are:

• Numerical modelling of structures • Non-standard fire scenarios in

- Applications of structural fire engineering
- in fire including full frame behaviour • Concrete and masonry structures in fire • Material behaviour and
- Steel structures in fire
- Composite structures in fire
- Timber structures in fire
- Novel structures and/or materials

characterisation at high

in fire Passive fire protection materials

Any other topics related to the art, science and practice of structure engineering are also welcome.

temperature

Wood & Fire Safety 2020 - 9th International Scientific Conference

Although the due date for call for papers has passed, the call for poster abstracts is open until January 10, 2020. 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

structural fire engineering

• Other experimental research

related to structures in fire

structural fire engineering

• Probabilistic design methods in

- Forest fires
- Fires in historic buildings
- Others topics focus on wood & fire safety
- For details on submission see the website at www.wfs2020.sk.

6th International Conference on Fires in Vehicles (FIVE 2020)

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. The call for abstracts for this conference can be found at https://firesinvehicles.com/conference/. Conference topics include, but are not limited to:

- Regulations and standards ٠
- Fire suppression in vehicles
- Fire statistics •
- Fire mitigation strategies in vehicles
- Insurance issues
- Case studies
- Fire development in vehicles Fire detection in vehicles
- •
- First responder strategies
- Fire risks in vehicles with alternative fuels or alternative drives
 - New materials in vehicles
- The conference will be held in Amsterdam, October 8-9, 2020.

UPCOMING EVENTS -2019-2020

2019

Nov 10-15 1st Asia-Pacific Combustion Institute Summer School (Fundamental Combustion Problems in Fires) - Viña del Mar (Chile) - https://www.apciss.cl/2019/

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/
- Iune 24-26 11th International Conference on Structures in Fire (SiF 2020) – Brisbane (Australia) – http://sif2020.com
- Aug 24-26 World Conference on Timber Engineering 2020 (WCTE 2020) - Santiago (Chile) http://wcte2020.com/
- Oct 8-9 6th International Conference on Fires in Vehicles (FIVE 2020) – Amsterdam (The Netherlands) – https://firesinvehicles.com/

Job postings on the IAFSS Website

The EPSRC Sustainable Hydrogen Centre for Doctoral Training (CDT) is seeking PhD applications from individuals who wish to join a vibrant research community where diverse ideas are shared around a common vision for a low-carbon future (http://www.sustainablehydrogen-cdt.ac.uk/index.aspx). This year, we are seeking to recruit at least 12 PhD students across the four Universities (Nottingham, Loughborough, Birmingham and Ulster). Here at Ulster University we are looking for at least two PhD students in hydrogen safety. This is four years studentship covering UK/EU tuition fees and providing a tax-free stipend of up to £16,677 per annum. To apply, please email your CV and a covering letter to <u>beinspired@sustainablehydrogen-</u> cdt.ac.uk (copy to v.molkov@ulster.ac.uk).

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

MEMBER ANNOUNCEMENTS

Prof. Steven Spivak has book translated into Chinese

Steven M. Spivak, Prof. Emeritus, Fire Protection Engineering, The Univ. of Maryland (USA) had one of his two standards books on related policy, national and international. standardization translated into Chinese. Standardization Essentials: Principles and Practices by Drs. Spivak and Brenner, its of 300 pages replete with standards cartoons and noted contributors, was first published by CRC Press, Taylor and Francis Group: and is now available in a Chinese language edition. It's newly republished and being distributed in China by Tianjin Science and Technology Press. The original co-author and editor, Steve Spivak, remains active in textiles and clothing fire safety engineering and consulting. In addition, he serves as science and research chair with the Cleaning Industry Research Institute [www.CIRIscience.org] - whose activities include the science and research on matters of fire and disaster restoration and remediation, disinfection and control. CIRI launched in 2019 a

new print and on-line, peer reviewed *Cleaning Science Quarterly* (CSQ) journal. Steve Spivak also serves as chair of CSQ's Editorial Advisory Board, and CIRI science council.

Dr. Topi Matti Sikanen named IWMA 2019 Winner of the "Young Talent Award / Ph.D."

The winner of this year's "International Water Mist Association Young Talent Award / Ph.D." is Dr. Topi Matti Sikanen. The title of his winning Ph.D. thesis is: "Simulation of Transport, Evaporation and Combustion of Liquids in large-scale Fire Incidents". He will present his thesis at the 19th International Water Mist Conference in Berlin in October.

SFPE Foundation Proulx Scholarship awarded to Lund University Ph.D. student

The 2019 award is presented to Silvia Alejandra Arias Osuna, who is currently studying at Lund University. Her research relates Virtual Reality (VR) with studying human behavior in fire scenarios. This allows the conditions to simulate those that may otherwise be dangerous to have people participating.

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, <u>rfahv@nfpa.org</u>).

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. 44), the deadline for submissions is December 31, 2019.



http://www.iafss.org

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