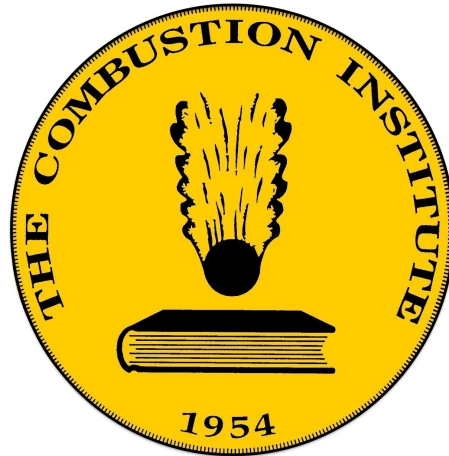


COMBUSTION INSTITUTE CANADIAN SECTION



SPRING TECHNICAL MEETING

MAY 13-16, 2019



PROGRAM GUIDE

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Sponsors

We would like to acknowledge the financial support from:



General Information

Welcome to UBC

The University of British Columbia would like to welcome you to the Combustion Institutes's Canadian Section spring technical meeting. Our technical program includes two plenary lectures, a panel discussion, 64 paper presentations, and premixed flame/soot workshop. The technical program presentations all take place on the third floor of the Arts building. Our social program includes the welcome reception on Monday evening at UBCO's Sunroom located at the second floor of the Administration building, Okanagan Lake cruise on Tuesday afternoon, as well as a banquet on Wednesday evening at the University Center 200-Ballroom (UNC 200). The locations of the Arts, Administration, and the University Center buildings are highlighted on the UBCO map available on the last page of this document.

We sincerely wish you enjoy your visit to UBC's Okanagan campus.

- Prof. Sina Kheirkhah, Conference chair
- Prof. Steven Rogak, Conference co-chair
- Prof. Patrick Kirchen, Conference co-chair
- Prof. Kendal Bushe, Conference co-chair
- Prof. Joshua Brinkerhoff, Conference co-chair

Acknowledgements

We would like to acknowledge the financial support from:

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- University of British Columbia's School of Engineering
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- Malcolm Petch

We are thankful to Professors Seth Dworkin and Dipal Patel, the chair and the co-chair of 2018 CICS meeting. Their inputs were very instrumental and helpful for organizing the 2019 meeting.

Mr. Ryan Hirowatari and UBC Okanagan bookstore staff, thank you for providing us with an outstanding discount for the conference gifts.

Thanks to Dr. Brian Crosland for providing support related to the conference website as well as data management.

Special thanks to Dr. Kheirkhah's research group for their help in organizing the meeting:

- Sajjad Momhammadnejad Daryani
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- Deepanshi Sisodiya
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- Jesse Morales

Welcome Reception

Participants are invited to our welcome reception on Monday May 13, starting at 6:00 pm. The event will be held at UBCO's Sunroom located at the second floor of the Administration building. The address is 1138 Alumni Ave., Kelowna, BC, V1V 1V7 (see the map on the last page of this program). Refreshments and hors d'oeuvres will be served.

Registration Desk and Information Table

The registration desk will be open:

- Monday, May 13 from 6:00 pm to 8:00 pm during the welcome reception at the UBCO's Sunroom (see the dotted blue box on the last page).
- Tuesday May 14 and Wednesday May 15, from 8:00 am to 5:00 pm at the Arts building third floor foyer and near the presentation rooms. The Arts building address is 1147 Research Road, Kelowna, BC V1V 1V7 (see the green solid box on the last page)

Lunches and Refreshments

Free lunches will be served on both Tuesday and Wednesday noons. Coffee and refreshments will be served during the coffee breaks.

On Thursday, lunch and coffee will be served for the soot and premixed flame workshop registered attendees.

In addition to the free lunch above, some UBCO coffee shops/restaurants (Sunshine, Starbucks, Tim Hortons, and Comma) are open during the CICS meeting. Please see the link below for their working hours.

<https://okanagan.housing.ubc.ca/dining/places-to-eat/>

Proceedings

Each registrar may download the proceedings from the following website with username and password communicated with the attendees via email.

Web address: <http://combustion-institute.ca/paper-download>

The submitted papers are available in the folder named: "CICS 2019 submitted papers".

Wireless Internet Access

Wireless internet is available through Eduroam using your home institution's login information. Participants without access to Eduroam may use the ubcvisitor WiFi connection. No password is required for ubcvisitor WiFi, and guests may sign-in using their email address.

Transportation

Air Travel: Kelowna's airport address is: 5533 Airport Way, Kelowna, BC V1V 1S1. The airport is located within 5-10 mins drive from the UBC's Okanagan campus.

Ground Transportation: Access from UBC's Okanagan campus to downtown Kelowna is available through BCTransit buses, with the schedule available at: <https://www.bctransit.com/kelowna/schedules-and-maps>

Parking

The University of British Columbia's Okanagan campus closest parking lots to the venue are E and G lots. Our G parking lot is relatively spacious, and the guests are recommended to park in this lot. The cost of day pass is \$7 for the G Lot. Those who are staying in conference accommodation will get a special discount code for parking when they check-in.

Okanagan Lake Cruise

On Tuesday May 14th, the buses will leave the parking lot G (see the pink box on the last page of the program) at 6:45 pm. The buses will return the guests to the parking lot G by about 10:00 pm. There will be a cash-bar available on the boat. The boat kitchen will have limited food for purchase as well. This event is available to the guests who responded to the original communication saying that they are interested.

The Plenary Lectures, Panel Discussion, and Technical Sessions

All conference talks will be held on the third floor of the Arts building in rooms Arts 366 and 376. Plenary lectures and panel discussion will be held in Arts 366.

Instruction for Presentations

Please prepare your CICS meeting presentations to be **15 minutes** long. The time allotted for each presentation time slot will be 20 minutes. Speakers will be invited to present for 15 mins, leaving 3 minutes for questions and answers, and 2 minutes for transitions. **A computer running Microsoft Windows will be provided in all rooms. You are asked to bring your presentations on a USB flash drive and transfer it to the computer on the morning of each day or during the coffee break preceding your talk. Speakers using Apple computers are invited to test their presentations beforehand or bring their own computers, along with the appropriate adapter to the VGA cable. Please make sure your laptop functions properly with the projector during the break preceding your session.**

Technical Sessions

Tuesday May 14, 2019

08:00 – 08:30	On-site Registration (Arts building third floor)	
08:30 – 08:40	Welcome and Opening Remarks (Arts 366)	
08:40 – 09:30	Plenary Lecture I (Arts 366) “Advancing measurements in reacting flows” Professor Simone Hochgreb The University of Cambridge Chair: Sina Kheirkhah	
	Arts 366	Arts 376
	Topic: Heterogeneous and Spray Combustion Chair: Larry Kostiuik	Topic: Pollutant Formation–1 Chair: Gilles Bourque
09:40 – 10:00	Effects of initial temperature on laminar burning velocity in premixed methane/air counterflow flames <i>F. Blais, P. Julien, M. McRae, S. Goroshin, and J. M. Bergthorson</i>	Improved quadrature-based moment closure methods for soot prediction in laminar diffusion flames at atmospheric and elevated pressures <i>J. Y. Xing and C. P. T. Groth</i>
10:00 – 10:20	Modes of particle combustion in flat iron stagnation flames on a hot counter flow burner <i>M. McRae, P. Julien, S. Goroshin, D. L. Frost, and J. M. Bergthorson</i>	Remote detection of sodium signatures as an indicator of liquid carry-over into flare flames in North Dakota <i>Z. R. Milani, A. M. Jefferson, and M. R. Johnson</i>
10:20 – 10:40	Tracking fuel particle fates in a packed bed combustor <i>E. Wiens, R. Skiffington, and W. L. H. Hallett</i>	Measuring H ₂ O and black carbon correlation in turbulent flare plumes and implications for field measurement technologies <i>S. P. Seymour and M. R. Johnson</i>
10:40 – 11:00	Coffee Break (Arts third floor foyer)	
	Arts 366	Arts 376
	Topic: IC & Gas Turbine Engine Combustion – 1 Chair: Gaby Ciccarelli	Topic: Fire Research–1 Chair: Fengshan Liu
11:00 – 11:20	An experimental study on the effect of intake pressure on a natural gas-diesel dual-fuel engine at a low load <i>S. Dev, H. Guo, and B. Liko</i>	Multi-physics modeling of FRP composite combustion <i>J. Langot, M. Lévesque, and E. Robert</i>

Tuesday May 14, 2019

11:20 – 11:40	Analysis of a change of valve timing on split-cycle engine performance <i>S. D. Bello and A. Sobiesiak</i>	Predicting burning rates in multicomponent liquid pool fires <i>A. Yip, M. J. Pegg, and J. B. Haelssig</i>
11:40 – 12:00	Diesel engine NO _x reduction using a PD-type fuzzy iterative learning control with a fast response NO _x sensor <i>A. Norouzi, M. Aliramezani, and C. R. Koch</i>	Use of NIR transmission measurements to evaluate in-use performance of firefighters' protective clothing <i>H. Ohalele, D. Torvi, and S. Noble</i>
12:00 – 12:20	Effect of injector rail pressure and split injection on natural gas/diesel dual-fuel engine at low load conditions <i>A. Yousefi, H. Guo, and M. Birouk</i>	Video analysis of smoke density in full-scale fires <i>J. Ellingham and E. J. Weckman</i>
12:20 – 13:40	Lunch on the Arts third floor foyer CICS Board Meeting at Arts 104	
	Arts 366	Arts 376
	Topic: IC & Gas Turbine Engine Combustion – 2 Chair: Nick Eaves	Topic: Pollutant formation–2 Chair: Seth Dworkin
13:40 – 14:00	Effect of natural gas energy fraction on natural gas/diesel dual-fuel engine under low and high load conditions <i>A. Yousefi, H. Guo, and M. Birouk</i>	Soot formation in turbulent swirl stabilized spray flames of jet A-1 blended with 10% ethanol <i>T. M. Rault and Ö. L. Gülder</i>
14:00 – 14:20	Extending the load limits of DME in an HCCI/SACI engine <i>X. Yu, S. LeBlanc, and M. Zheng</i>	Sooting propensity changes by addition of ethanol to ethylene diffusion flames at elevated pressures <i>S. Yang and Ö. L. Gülder</i>
14:20 – 14:40	Flame kernel establishment strategies and its effect on flame propagation process <i>X. Yu, S. LeBlanc, and M. Zheng</i>	Effect of sodium chloride on the evolution of size and mixing state of soot particles from a sooting laminar diffusion flame <i>M. Kazemimanesh, C. Kuang, L. W. Kostiuik, and J. S. Olfert</i>

Tuesday May 14, 2019

14:40 – 15:00	Negative valve overlap peak pressure based in-cycle control for HCCI combustion using direct water injection <i>D. Gordon, C. R. Koch, C. Wouters, B. Lehrheuer, S. Pischinger, M. Wick, and J. Andert</i>	Exploration of the combustion efficiency and emission indices of a steam co-flow diffusion flame with vertically offset exit planes <i>M. Zamani, S. Mobaseri, J. S. Olfert, and L. W. Kostiuik</i>
15:00 – 15:20	Shock-tube combustion of diesel spray and homogeneous methane-air under proto-typical diesel engine conditions <i>A. C. Merkel and G. Ciccarelli</i>	Spectrally and temporally resolved LII interference emission in a laminar diffusion flame <i>S. Musikhin, R. Mansmann, G. J. Smallwood, T. Dreier, K. J. Daun, and C. Schulz</i>
15:20 – 15:40	Coffee Break (Arts third floor foyer)	
	Arts 366	Arts 376
	Topic: IC & Gas Turbine Engine Combustion – 3 Chair: Kyle Daun	Topic: Pollutant formation–3 Chair: Murray Thomson
15:40 – 16:00	Experimental study of chamber wall-temperature effect on thermoacoustic oscillations of a small-scale power generator <i>R. Heydarlaki, W. Aitchison, P. Kostka, and S. Kheirkhah</i>	Preliminary emission measurements of black carbon, NO _x , and organic compounds from a lab scale flare with entrained droplet <i>O. W. Bello, D. B. Thi, B. Savareear, J. J. Harynuk, L. W. Kostiuik, and J. S. Olfert</i>
16:00 – 16:20	Effect of partial premixing level on PVC amplitude and acoustics of confined swirling partially premixed flames <i>M. M. A. Ahmed and M. Birouk</i>	Preliminary investigation into the effects of turbulent crosswinds on flaring performance <i>J. Armitage, D. J. Corbin, A. M. Jefferson, G. Kopp, and M. R. Johnson</i>
16:20 – 16:40	Experimental study of the effect of acoustic dampers on the stability of confined swirling partially premixed flames <i>M. M. A. Ahmed and M. Birouk</i>	Quantifying the effect of kinetic uncertainties on NO predictions at engine-relevant pressures in premixed methane-air flames <i>A. Durocher, G. Bourque, and J. M. Bergthorson</i>
16:40 – 17:00	A control orientated diesel engine NO _x emission model for on board diagnostics and engine control with sensor feedback <i>M. Aliramezani, A. Norouzi, C. R. Koch, and R. E. Hayes</i>	Spectral mass absorption cross section of soot from gas flares: Evidence of variability and development of a phenomenological model <i>B. M. Conrad and M. R. Johnson</i>

Tuesday May 14, 2019

17:00 – 17:20	A machine learning modeling approach for HPDI dual fuel CNG engines <i>M. Karpinski-Leydier, R. Nagamune, and P. Kirchen</i>	Soot particle concentration estimator applied to a transient turbulent non-premixed jet flame <i>L. Zimmer, S. B. Dworkin, A. Attili, H. Pitsch, and F. Bisetti</i>
17:20 – 17:40	Study of ignition in a direct injected, compression ignition natural gas engine with modified hot surfaces <i>M. A. Ali and J. S. Wallace</i>	Quantifying benzene destruction efficiency in lab-scale flares <i>N. T. Brooker, B. M. Crosland, and M. R. Johnson</i>
18:45 – 22:00	Okanagan Lake cruise (Buses depart at 18:45 from parking lot G)	

Wednesday May 15, 2019

08:30 – 9:00	On-site Registration (Arts building third floor)	
09:00 – 09:50	Plenary Lecture II (Arts 366) “What have we learned from high pressure soot studies – on track to finding a soothing solution or falling into a black hole?” Professor Ömer Gülder University of Toronto, Institute for Aerospace Studies Chair: Clinton Groth	
	Arts 366	Arts 376
	Topic: Detonation, Explosion, and Supersonic Combustion Chair: Cecile Devaud	Topic: Laminar Flames Chair: Patrick Kirchen
10:00 – 10:20	On reconsideration of the method for calculating oxygen balance of propellant oxidizers <i>Y. T. Rajan, A. Chowdhury, N. Kumbhakarna, P. Ahirwar, and I. Namboothiri</i>	Actuation of premixed stagnation flame by nanosecond pulsed plasma at atmospheric pressure <i>J. Lambert, S. Coulombe, G. Bourque, and J. M. Bergthorson</i>
10:20 – 10:40	Detonation propagation in a linearized representation of a rotating detonation engine <i>C. D. Metrow and G. Ciccarelli</i>	Maximum Entropy inspired interpolative moment closure for non-gray radiative heat transfer in laminar diffusion flames <i>J. A. R. Sarr, C. P. T. Groth, and J. T. C. Hu</i>
10:40 – 11:00	Coffee Break (Arts third foyer)	
11:00 – 12:20	Panel Discussion (Arts 366) Every new car sold in 2040 will be zero-emission Panellists: Andrzej Sobiesiak, Seth Dworkin, Patrick Kirchen, and Hongsheng Guo Moderator: Jeff Bergthorson	
12:20 – 13:40	Lunch on the Arts third floor foyer	
	Arts 366	Arts 376
	Topic: Pollutant Formation – 4 Chair: William Hallett	Topic: Turbulent Flames–1 Chair: Jeff Bergthorson
13:40 – 14:00	Analysis of the products and kinetic rates of methane thermal decomposition. Part I: Experimental apparatus <i>J. Tatum, A. Punia, M. Secanell, L. W. Kostiuk, and J. S. Olfert</i>	Non-flamelet behavior of hydrogen-enriched methane-air turbulent premixed flames <i>S. Mohammadnejad, P. Vena, S. Yun, and S. Kheirkhah</i>

Wednesday May 15, 2019

	Arts 366	Arts 376
14:00 – 14:20	Carbon conversion efficiency and emission indices from a lab-scale flare with air or steam assist <i>H. Ahsan, A. Ahsan, J. S. Olfert, and L. W. Kostiuk</i>	Towards quantifying the propensities of stable hydrogen-enriched methane-air turbulent premixed flames to blow-out and flash-back <i>S. Mohammadnejad, P. Vena, S. Yun, and S. Kheirkhah</i>
14:20 – 14:40	The effect of inorganic salts from flowback operations on the size, effective density, mixing state, and optical properties of soot from gas flares <i>U. Trivanovic, A. Baldelli, M. Kazemimanesh, B. M. Conrad, A. M. Jefferson, J. C. Corbin, M. R. Johnson, J. S. Olfert, and S. N. Rogak</i>	Application of the uniform conditional state model to turbulent non-premixed combustion <i>G. R. Hendra and W. K. Bushe</i>
14:40 – 15:00	The effect of hydrogen substitution on the real world NO _x and PM emissions of a heavy-duty diesel truck <i>J. D. Meiklejohn, P. Kirchen, S. N. Rogak</i>	First application of UCS as a predictive model for burner simulation <i>S. De Graaf, L. de Guillebon, M. Konle, G. Hendra, and W. K. Bushe</i>
15:00 – 15:20	Coffee Break (Arts third foyer)	
	Topic: New Technology Concepts Chair: Patrizio Vena	Topic: Fire Research-2 Chair: Hongsheng Guo
15:20 – 15:40	3D numerical study of a porous burner based on a diamond lattice geometry <i>P.-L. Billerot, L. Dufresne, and P. Seers</i>	Effect of apparatus configuration on gaseous fire whirl dynamics <i>M. T. Diab, J. B. Haelssig, and M. J. Pegg</i>
15:40 – 16:00	Analysis of the products and kinetic rates of methane thermal decomposition. Part II: Numerical models <i>A. Punia, J. Tatum, J. Olfert, L. Kostiuk, and M. Secanell</i>	Incipient fire characterization and learning algorithms for fire state determination <i>N. L. Ryder and E. J. Weckman</i>
16:00 – 16:20	Annual Business Meeting (Arts 366)	
18:00 – 21:00	Conference Banquet at the University Center 200- Ballroom (UNC 200)	

Thursday May 16, 2019

	Arts 366	Arts 376
	Topic: Turbulent Flames–2 Chair: Qiang An	Topic: Diagnostics–1 Chair: Bob Koch
09:00 – 09:20	Flow topologies of reactive jet in turbulent flow at low velocity ratios <i>M. M. Hossain, D. Corbin, and G. A. Kopp</i>	Temperature and pressure correction of wavelength modulation spectroscopy concentration measurements <i>M. Yeremi, D. E. Sommer, J. Son, P. Kirchen, and S. N. Rogak</i>
09:20 – 09:40	Assessment of conditional source-term estimating for high pressure turbulent combustion modeling <i>C. Devaud, W. K. Bushe, and J. Bellan</i>	Inversion of tandem CPMA-DMA measurements to determine the two-dimensional mass-mobility distribution of soot <i>T. A. Sipkens, S. N. Rogak, and J. S. Olfert</i>
09:40 – 10:00	Coffee Break (Arts third floor foyer)	
	Topic: Turbulent Flames–3 Chair: Zekai Hong	Topic: Diagnostics–2 Chair: Timothy Sipkens
10:00 – 10:20	Large Eddy Simulations of Sandia flames D, E and F using doubly conditional source-term estimation <i>M. Mortada and C. B. Devaud</i>	Optical inference of flare combustion efficiency using thermochemical manifold reduction <i>R. B. Miguel, K. J. Daun, and J. Emmert</i>
10:20 – 10:40	Probability density function modelling in uniform conditional state simulation of turbulent flames <i>S. R. Taylor, G. R. Hendra, and W. K. Bushe</i>	The effect of primary particles polydispersity and effective density on radiative properties of soot aggregates <i>K. Babaee, T. A. Sipkens, and S. N. Rogak</i>
10:40 – 11:00	The effect of changing the lower heating value on the overall carbon conversion efficiency on an air co-flow diffusion flame <i>S. Mobaseri, J. S. Olfert, and L. W. Kostiuik</i>	Influence of aggregate size on the modeling of laser-induced incandescence of soot formed in a turbulent diffusion of Diesel <i>S. Menanteau and R. Lemaire</i>
11:00 – 11:20	Turbulence flame interaction in hydrogen-air premixed flames <i>J. Lai and D. Patel</i>	The effect of nanoparticle charge on laser-induced incandescence measurements of metallic nanoparticles <i>S. T. Moghaddam, S. Robinson-Enebeli, D. J. Clavel, G. J. Smallwood, A. Klinkova, and K. J. Daun</i>

Thursday May 16, 2019 (Soot and Premixed Flame Workshop*)

11:40 – 12:50	Lunch (Arts third floor foyer)
	Soot and premixed flame workshop (Arts 366) Chair: Patrizio Vena
	Soot
12:50 – 13:10	On the application of moment closures for soot modelling in laminar flames <i>Jacques Xing</i>
13:10 – 13:30	Measurements and modeling of laminar coflow propane and ethylene diffusion flames at different oxygen indices <i>Fengshan Liu</i>
13:30 – 13:50	Questions and discussions
13:50 – 14:10	Progress on global emission problems enabled by past insights <i>Matthew Johnson</i>
14:10 – 14:30	3-dimensional models of soot aggregates from electron tomography <i>Steven Rogak</i>
14:30 – 14:50	Questions and discussions
14:50 – 15:10	Coffee break (Arts third floor foyer)
	Premixed flame
15:10 – 15:30	Regimes of premixed turbulent spontaneous ignition and deflagration under gas-turbine reheat combustion conditions. <i>Bruno Savard</i>
15:30 – 15:50	Modelling premixed turbulent combustion: the flamelet method and its shortcomings <i>Cecile Devaud</i>
15:50 – 16:10	Conditional Source-term Estimation for modelling premixed turbulent combustion <i>Kendal Bushe</i>
16:10 – 16:30	Questions and discussions
16:30 – 16:50	Burning rates and flame surface area in premixed turbulent combustion <i>Larry Kostiuk</i>
16:50 – 17:10	Un-answered questions of turbulent premixed combustion: What we have learnt and What needs to be done <i>Sina Kheirkhah</i>
17:10 – 17:30	Questions and discussions

*Please note that our workshop seats are limited to the registered guests.

Plenary Lecture – I

Advancing measurements in reacting flows

Simone Hochgreb

Professor

Departments of Engineering,
The University of Cambridge

The development of robust models for reacting and non-reacting flows depends on the accuracy of measurements made for the validation of these models. These issues are particularly challenging in the case of unsteady or turbulent phenomena.

In this talk, we discuss challenges associated with time and space resolved measurements of temperatures, species and particles in flows. We discuss the use of non-intrusive, laser based measurements in the understanding of turbulent flames, combustion instabilities, entropy and compositional spots, the application of simultaneous velocity and temperature measurements, and the challenges associated with measurements of nanoscale particles. Finally, we revisit some classical measurements in turbulent flames, and reflect on how far we have travelled.

Plenary Lecture – II

What have we learned from high pressure soot studies - on track to finding a soothing solution or falling into a black hole?

Ömer Gülder

Professor of Aerospace Engineering
University of Toronto, Institute for Aerospace Studies

The details of the chemical and physical mechanisms of the soot formation processes in combustion remain elusive due to the highly complex nature of hydrocarbon flames. As a result, only a few principles are firmly established for atmospheric conditions. In spite of the fact that most combustion devices used for transportation operate at very high pressures, our understanding of soot formation at high pressures is limited, and there is a fundamental lack of experimental data and complementary predictive models. The intensity of combustion (or heat release per unit volume) scales approximately with the square of the operating pressure, thus the footprint of the combustion engine becomes smaller as the operating pressure is increased for a required power output. On the other hand, the rate determining chemical reactions involved in combustion, including the various soot production processes, are intrinsically nonlinear, and as a result the sensitivity of combustion events to pressure changes are not usually monotonic. Therefore, it is not trivial to scale information gathered from measurements at atmospheric flames to high-pressure combustion.

This talk will give a review of status of soot formation processes at elevated pressures covering the ongoing research in the author's laboratory as well as research efforts by others at several institutions. The main emphasis of the talk will focus on (a) response of soot formation rate to pressure, (b) sensitivity of sooting propensity of different hydrocarbon types to pressure, (c) sensitivity of soot aggregate morphology to pressure, and (d) change of soot nanostructure with pressure. The questions like "what have we learned so far from high-pressure studies?" and "what we would like to learn further?" will be discussed. The discussion will be limited to (a) non-premixed (diffusion) flames; reference will be made to premixed flames when necessary and when there is a logical connection, and (b) laminar flames because of the current limitations of intrusive and non-intrusive diagnostics at elevated pressures with turbulent flames. A brief discussion on the problems with some of the optical soot diagnostic techniques at high pressures will be included. Current high-profile studies such as the subjects of soot nucleation and growth at atmospheric conditions, which are recent hot subjects, will be pointed out. The efforts to improve our understanding of the chemistry (and physics) of nucleation process pursued by several researchers are currently in progress and future studies of soot at high pressures should include these subjects as well.

Panel Discussion

Every new car sold in 2040 will be zero-emission

Background

The government of British Columbia recently announced that: every new car sold in 2040 will be zero-emission. The premier of British Columbia stated that: “If we want British Columbians to be part of the solution for reducing air pollution, we need to make clean energy vehicles more affordable, available and convenient”. The panel discussion involves research staff from the government of Canada (NRC) and university researchers addressing the following questions.

1. Do the panellists agree that part of the solution for air pollution in British Columbia is having zero-emission cars by 2040? and why?
2. What are the implications of the statements in the background for combustion research?
3. How can/should the National Research Council of Canada convey the message from the university researchers and industry engineers to both the federal and the provincial governments of Canada?

Moderator

Jeff Bergthorson

Associate Professor of Mechanical Engineering at McGill University

Panellists

Andrzej Sobiesiak

Professor and Head of the Mechanical, Automotive, and Materials Engineering at the University of Windsor

Seth Dworkin

Associate Professor of Mechanical and Industrial Engineering and Canada Research Chair at the Ryerson University

Patrick Kirchen

Assistant Professor of Mechanical Engineering at the University of British Columbia

Hongsheng Guo

Senior Research Officer (National Research Council of Canada)

Campus Map

The dotted blue box: the location of the reception. The solid green box: the location of the technical meeting. The dotted-dashed black box: the location of the banquet. The solid pink box: the recommended parking lot and the pick up location for the Okanagan Lake cruise. The solid black circle is the location of check-in for conference accommodation.

