

**2020 SPRING TECHNICAL MEETING
WESTERN STATES SECTION OF THE COMBUSTION INSTITUTE
Stanford University – Stanford, CA**

Monday, 23 March 2020

7:30 – 4:00 Registration (Note, breakfast is not provided)

8:00 – 8:15 Welcome Address

Welcome Remarks:

8:15 – 9:15 Plenary Lecturer: Michael Gollner, U.C. Berkeley

Title: *The Dynamic Behavior of Fires: from Wildfires to Fire Whirls*

9:15 – 9:25	Transition to Morning Sessions		
	Fires I	Laminar Flames/Detonations	Chemical Kinetics I
9:25 – 9:45	1A01: Burning rate of porous fuel beds: Axisymmetric versus line fire <i>S. McAllister</i> <i>USDA Forest Service</i>	1B01: Statistics of cellularly unstable expanding laminar flame <i>Z. Liu¹, V.R. Unni², S. Chaudhuri³, C.K. Law¹, A. Saha²</i> ¹ <i>Princeton University</i> ² <i>University of California San Diego</i> ³ <i>University of Toronto</i>	1C01: Computational design of sensitized combustion chemistry experiments <i>C. Ising, P. Rodriguez, D. Lopez, J. Santner</i> <i>California State University</i>
9:45 – 10:05	1A02: The effect of species and moisture content on flaming emissions from various vegetative fuels <i>P. Garg¹, T. Roche², J. Matz³, M. Eden³, J. Oakes³, C. Bellini³, M.J. Gollner¹</i> ¹ <i>University of California Berkeley</i> ² <i>University of Maryland</i> ³ <i>Northeastern University</i>	1B02: Diluent and spark-delay effects on flame stability in shock-tube flame speed experiments <i>A.J. Susa, A.M. Ferris, R.K. Hanson</i> <i>Stanford University</i>	1C02: Embedded error Bayesian calibration of thermal decomposition of organic composites <i>A.L. Frankell, R.M. Keedy, B.C. Houchens, E.B. Wagman, S.N. Scott</i> <i>Sandia National Laboratories</i>
10:05 – 10:25	1A03: Influence of particle size on self-sustained smoldering <i>A.H. Ross, D.L. Blunck</i> <i>Oregon State University</i>	1B03: Detonation limit behaviors of methane and natural gas <i>X. Shi, J. Crane, H. Wang</i> <i>Stanford University</i>	1C03: When models fail: Resolving the low temperature oxidation kinetics of tetrahydrofuran <i>K.S. Lockwood, N.J. Labbe</i> <i>University of Colorado Boulder</i>

	Fires I	Laminar Flames/Detonations	Chemical Kinetics I
10:25 – 10:45	1A04: Wind effects on smoldering behavior of simulated wildland fuels <i>J. Cobian-Iñiguez¹, H. Xiong^{1,2}, C. Fernandez-Pello¹, M. Gollner¹, S. Stephens¹, M. Finney³</i> ¹ University of California Berkeley ² University of Science and Technology of China ³ USDA Forest Service	1B04: Geometric modeling of detonation cellular propagation <i>J. Crane, X. Shi, H. Wang</i> Stanford University	1C04: First and second O₂ addition in low-temperature cyclopentane oxidation <i>A.L. Dewyer, J. Zádor, L. Sheps</i> Sandia National Laboratories
10:45 – 11:05	1A05: Effect of fuel bed properties on ignition by firebrands <i>D. Bean, D.L. Blunck</i> Oregon State University		1C05: Competitive oxidation of methane/ethylene fuel mixtures discerned by multi-isotopologue laser absorption spectroscopy <i>D.I. Pineda, F.A. Bendana, R.M. Spearrin</i> University of California Los Angeles
11:05 – 11:20	BREAK		
	Fires II	Laminar Flames	Biomass/Gasification
11:20 – 11:40	1A06: Sensitivity and uncertainty analysis on the dual-thermocouple technique for turbulent flame temperature measurements <i>X. Ren^{1,2}, D. Zeng³, Y. Wang³, G. Xiong³, G. Agarwal³, M.J. Gollner^{1,2}</i> ¹ University of Maryland ² University of California Berkeley ³ FM Global	1B06: Effect of hydrogen enrichment on hydrocarbon edge flames <i>A. Felden, L. Esclapez, M. Day</i> Lawrence Berkeley National Laboratory	1C06: X-ray absorption tomography measurements of solid fuel combustion in wildfire conditions <i>E. Boigné, M. Ihme</i> Stanford University
11:40 – 12:00	1A07: Comparison of experimental results with theoretical predictions of inclined laminar flame characteristics <i>R.S.P. Hakes^{1,2}, W. Coenen³, A.L. Sánchez², M.J. Gollner⁴, F.A. Williams²</i> ¹ University of Maryland ² University of California San Diego ⁴ University of California Berkeley ³ Universidad Carlos III de Madrid	1B07: On numerical computations of structures of nonpremixed flames <i>D. Shanmugasundaram¹, K. Narayanaswamy¹, L. Badiali², R. Khare³, K. Seshadri²</i> ¹ Indian Institute of Technology Madras ² University of California San Diego ³ Karlsruhe Institute of Technology	1C07: Ash effects on biomass char gasification rates <i>R. Wu, J. Beutler, L. Baxter</i> Brigham Young University

	Fires II	Laminar Flames	Biomass/Gasification
12:00 – 12:20	1A08: Effect of reduced ambient oxygen concentration and flow velocity on flame spread over simulated electrical wires <i>L. Gagnon¹, C. Fernandez-Pello¹, V.P. Carey¹, Y. Konno², O. Fujita²</i> ¹ University of California Berkeley ² Hokkaido University	1B08: Extinction of premixed flames with oscillating strain rates <i>A. Potnis¹, V.R. Unni¹, C.K. Law², A. Saha¹</i> ¹ University of California San Diego ² Princeton University	1C08: Bayesian decision theory for operational optimization of a biomass boiler <i>J.C. Parra-Alvarez¹, O. Diaz-Ibarra¹, S. Smith¹, L. Marshall², S. Harding¹, J. Thornock¹, J. Spinti¹, P. Smith¹</i> ¹ University of Utah ² Ontario Power Generation
12:20 – 12:40	1A09: Efficient simulations of propagating fires using adaptive mesh refinement <i>C. Lapointe, N.T. Wimer, J.F. Glusman, A.S. Makowiecki, P. Sardana, J.W. Daily, G.B. Rieker, P.E. Hamlington</i> University of Colorado Boulder	1B09: Laminar flame dynamics of multi-port fuel jets under acoustic forcing <i>A. Vargas, J. Guerrero, A.R. Karagozian</i> University of California Los Angeles	1C09: Developing a high fidelity simulation of a biomass boiler <i>O. Diaz¹, J.C. Parra-Alvarez¹, S. Harding¹, L. Marshall², S. Smith^{1,3}, J. Thornock^{1,3}, M. Hradisky¹, J. Spinti^{1,3}, P. Smith^{1,3}</i> ¹ Institute for Clean and Secure Energy ² Ontario Power Generation ³ University of Utah
12:40 – 13:55	LUNCH –		
	Fires III	Turbulent Flames I	Chemical Kinetics II
13:55 – 14:15	1A10: Upward flame spread over thin fabrics in normoxic atmospheres <i>M. Thomsen¹, C. Fernandez-Pello¹, D.L. Urban², G.A. Ruff²</i> ¹ University of California Berkeley ² NASA Glenn Research Center	1B10: Data-driven assignment of combustion submodels for large-eddy simulation <i>W.T. Chung¹, A.A. Mishra¹, N. Perakis^{1,2}, M. Ihme¹</i> ¹ Stanford University ² Technical University of Munich	1C10: Impact of pyrolysis species measurement uncertainties on the prediction accuracy of HyChem reaction model – A case study on Jet A <i>R. Xu, H. Wang</i> Stanford University
14:15 - 14:35	1A11: The use of fire resistant fabric to quantify firebrand production from trees <i>S. Adusumilli, T. Hudson, N. Gardner, D. Blunck</i> Oregon State University	1B11: Reduced-order thermochemical state manifolds with co-optimized linear embeddings and nonlinear mappings <i>B.A. Perry, M.T. Henry de Frahan, S. Yellapantula, R.W. Grout</i> National Renewable Energy Laboratory	1C11: Heat release from oxidation of aliphatic hydrocarbon groups and their effects on the piecewise characteristics and spontaneous combustion tendency of coal <i>T. Xu, J. Qi, X. Li, Y. Wu</i> Shanghai Maritime University
14:35 - 14:55	1A12: Downward flame spread rate over PMMA cylinders under external radiant heating <i>A. Rodriguez¹, M. Thomsen¹, C. Fernandez-Pello¹, M. Gollner¹, S. Olson², P. Ferkul²</i> ¹ University of California Berkeley ² NASA Glenn Research Center	1B12: A framework for experiment-based turbulent combustion modeling <i>R. Ranade, T. Echekki</i> North Carolina State University	1C12: Thermodynamic properties of key intermediates in the combustion of methyl methacrylate <i>G. Blanquart, J. Rabinovitch</i> California Institute of Technology

	Fires III	Turbulent Flames I	Chemical Kinetics II
14:55 - 15:15	1A13: An experimental study on flame spread over vertical corrugated cardboard: Influence of grain orientation <i>H. Xiong^{1,2}, L. Hu¹</i> ¹ University of Science and Technology of China ² University of California Berkeley	1B13: Diluent gas effects on turbulent consumption speed of Jet-A <i>J.M. Bonebrake, D.L. Blunck</i> Oregon State University	1C13: On the possible coexistence of two different regimes of metal particle combustion <i>I. Altman¹, A. Demko¹, K. Hill¹, M. Pantoya²</i> ¹ Naval Air Warfare Center ² Texas Tech University
15:15 - 15:35	1A14: Assessing fire toxicant formation in solid fuel combustion using laser absorption tomography <i>D.I. Pineda¹, J.L. Urban², R.M. Spearrin¹</i> ¹ University of California Los Angeles ² Worcester Polytechnic University	1B14: Error/cost-controlled Pareto-efficient combustion modeling as a multiple-choice knapsack problem <i>Q. Douasbin, M. Ihme</i> Stanford University	1C14: Kinetic modeling of NO emission for synthetic natural gas at high pressure: Transport parameter-dependent speciation analysis <i>F. Alam</i> Exponent Inc.
15:35 - 15:50	BREAK -		
	Fires/Soot	Turbulent Flames II	Chemical Kinetics III
15:50 - 16:10	1A15: Fire whirls in microgravity <i>M.R. Jones¹, S.B. Hariharan^{1,2}, M.J. Gollner², V.M. Valletta³, L. Ogorzalys³, E. Neumann³, P. Ferkul³, S. Olson³, E.S. Oran⁴</i> ¹ University of Maryland ² University of California Berkeley ³ NASA Glenn Research Center ⁴ Texas A&M University	1B15: Evolution of local statistics for premixed turbulent Bunsen flames <i>Y. Weng¹, A. Potnis¹, V.R. Unni¹, S. Chaudhuri², A. Saha¹</i> ¹ University of California San Diego ² University of Toronto	1C15: Systematic reduction and validation of a 96 species n-decane mechanism under engine-relevant conditions <i>G. Xiao</i> Wuhan University of Science and Technology
16:10 - 16:30	1A16: Effect of enclosure dimensions on formation of laboratory-scale fire whirls <i>J. Dowling¹, S.B. Hariharan^{1,5}, E.S. Oran², T. Xu^{1,3}, A. Stoppel^{1,4}, M.J. Gollner⁵</i> ¹ University of Maryland ² Texas A&M University ³ Shanghai Maritime University ⁴ University of Applied Sciences, Düsseldorf ⁵ University of California Berkeley	1B16: Compressibility effects in subsonic turbulent premixed flames <i>G. Beardsell, G. Blanquart</i> California Institute of Technology	1C16: Development of error-controlled compact mechanisms using reduction and optimization <i>G. Litrico, K. Puduppakkam, C. Naik, E. Meeks</i> ANSYS Inc.

	Fires/Soot	Turbulent Flames II	Chemical Kinetics III
16:30 - 16:50	1A17: HOMO-LUMO gaps of transition-metal-doped polycyclic aromatic hydrocarbons <i>N. Kateris, R. Xu, H. Wang</i> Stanford University	1B17: Turbulent combustion behaviour of premixed ammonia/hydrogen/nitrogen-air flames at different equivalence ratios <i>M. Rieth¹, A. Gruber², J.H. Chen¹</i> ¹ Sandia National Laboratories ² SINTEF Energy Research	1C17: Reaction-diffusion manifolds (REDIMs) reduced chemistry for the CH₄ counter-flow diffusion flames under oxygen-enriched MILD condition <i>C. Wu¹, C. Yu¹, U. Maas¹, Y. Sun²</i> ¹ Karlsruhe Institute of Technology ² Beijing Institute of Technology
16:50 - 17:10	1A18: Role of cyclopenta-ring and H atom in polycyclic aromatic hydrocarbon dimerization at high temperatures <i>R. Xu, C. Liu, H. Wang</i> Stanford University	1B18: Round jet diffusion flames under transverse acoustic forcing <i>M.A. Plascencia¹, M. Roa², A.R. Karagozian¹, D.G. Talley²</i> ¹ University of California Los Angeles ² Air Force Research Laboratory	1C18: A neural-network-based response surface method for reaction model optimization and uncertainty minimization <i>Y. Zhang¹, R. Xu¹, G. Smith², H. Wang¹</i> ¹ Stanford University ² SRI International
17:10 - 17:30	1A19: A ring-additivity method for benzenoid PAH property estimation <i>C.J. Pope</i> Cabrillo College	1B19: Combustion studies of MMA/GO_x for a hybrid rocket motor <i>C. Dhandapani, G. Blanquart, J. Rabinovitch</i> California Institute of Technology	1C19: A hybrid ODE integration approach for chemical kinetics based on stiffness <i>P.E. Lorson, K.E. Niemeyer</i> Oregon State University
17:30 - 17:50	1A20: Pyrolysis of sagebrush <i>M. Kier, D. Blunck, C. Hagen</i> Oregon State University		
18:00 – 20:00	Reception – The Market at Munger (Stanford Campus)		
20:00	Student Mixer – The Treehouse at Stanford (Stanford Campus, next to Tresidder Memorial Union)		

Tuesday, 24 March 2020

7:30 – 12:00 Registration (Note, breakfast is not provided)

8:00 – 8:05 Opening Remarks and Announcement:

8:05 – 9:05 Plenary Lecture: Nicole Labbe, University of Colorado at Boulder

Title: Kinetic Tools for Combustion Chemistry

9:05 – 9:15	Transition to Morning Sessions		
	Nanomaterials/Soot	Environmental/Reactions/Sprays	Engines
9:15 – 9:35	2A01: Implementation of a SpraySyn system for standardized spray flame synthesis studies <i>H.R. Fernández, S. Dasappa, J. Camacho</i> <i>San Diego State University</i>	2B01: A dispersion model for multi-component reacting flows <i>O.B. Shende, A. Mani</i> <i>Stanford University</i>	2C01: Group 2 UAS engine performance testing using SAE AS6971 draft standard <i>S. Scott, J. Benbrook, C. Hagen</i> <i>Oregon State University</i>
9:35 – 9:55	2A02: Computational fluid dynamics modeling of flame spray pyrolysis for nanoparticle synthesis <i>D. Dasgupta, P. Pal, R. Torelli, S. Som</i> <i>Argonne National Laboratory</i>	2B02: Gas appliances operating on hydrogen/natural gas mixtures and comparison with electrical counterparts <i>Y. Zhao, V. McDonell, S. Samuelsen</i> <i>University of California Irvine</i>	2C02: In-cylinder optical diagnostics of pre-chamber spark ignition systems for high-efficiency natural gas engines <i>R. Rajasegar¹, Y. Niki^{1,2}, J.M.G. Oliver^{1,3}, Z. Li¹, D. Carpenter^{1,4}, M.P.B. Musculus¹</i> ¹ Sandia National Laboratories ² National Maritime Research Institute ³ Universitat Politècnica de València ⁴ University of South Carolina
9:55 – 10:15	2A03: Synthesis of manganese oxide nanoparticles in premixed stagnation flames <i>S. Dasappa^{1,2}, J. Camacho¹</i> ¹ San Diego State University ² University of California San Diego	2B03: Effect of SO₂ on Cu-Mn oxide's reactivity with CH₄ in chemical looping combustion <i>T. Barua, B. Padak</i> <i>University of California Irvine</i>	2C03: Pre-ignition detection and damage mitigation in a spark-ignited engine <i>E. Singh, R. Dibble</i> <i>King Abdullah University of Science and Technology</i>
10:15 – 10:35	2A04: Carbon nanoparticle production through hydrocarbon pyrolysis experimentation and modeling <i>N. Bauer, F. Miller</i> <i>San Diego State University</i>	2B04: Non-premixed reactive volatilization reactor for catalytic partial oxidation of ethanol <i>Y. Lin, W.F. Northrop</i> <i>University of Minnesota</i>	2C04: Direct numerical simulation of multi-injection at low-temperature compression ignition engine conditions <i>M. Rieth¹, M. Day², E. Motheau², C.-B. Kweon³, J. Temme³, T. Lu⁴, L. Pickett¹, J.H. Chen¹</i> ¹ Sandia National Laboratories ² Lawrence Berkeley National Laboratory ³ CCDC Army Research Laboratory ⁴ University of Connecticut

	Nanomaterials/Soot	Environmental/Reactions/Sprays	Engines
10:35 – 10:55	2A05: Size-resolved modeling of optical absorption of small soot particles <i>K. Wan, X. Shi, H. Wang</i> <i>Stanford University</i>	2B05: Analysis of spray and gaseous fields in the Cambridge burner near lean blow-out <i>D. Mohaddes, M. Ihme</i> <i>Stanford University</i>	2C05: Influences of parametric variations on Spray A flames using high-Speed formaldehyde planar LIF and schlieren <i>H.S. Sim¹, N. Maes¹, L.M. Pickett¹, S.A. Skeen²</i> ¹ Sandia National Laboratories ² Dixie State University
10:55 – 11:10	BREAK		
	Microcombustion/New Concepts	Diagnostics	Engines/Numerics
11:10 – 11:30	2A06: Analyzing OH*, CH*, and C2* chemiluminescence of bifurcating FREI propane-air flames in a micro flow reactor <i>M.E. Baumgardner, J. Harvey</i> <i>Gonzaga University</i>	2B06: Synchrotron-based measurement of aluminum interaction with melt layer of solid propellants at motoring conditions <i>A.R. Demko¹, K. Hill¹, E. Ismael¹, A. Kastengren²</i> ¹ Naval Air Warfare Center ² Argonne National Laboratory	2C06: Numerical investigation of a dual-stage off-gas burner to support an SOFC/GT hybrid power system operating at elevated temperature and pressure conditions <i>D. Jaimes, V. McDonell, S. Samuelsen</i> <i>University of California Irvine</i>
11:30 – 11:50	2A07: Design and optimization of micro-combustor for portable charging applications <i>D. Dasgupta¹, V. Stelmakh², D. Longman¹, S. Som¹</i> ¹ Argonne National Laboratory ² Mesodyne, Inc.	2B07: Mid-IR laser absorption diagnostic for shock tube measurements of temperature in high-concentration experiments <i>S. Clees, V. Boddapati, R. Choudhary, R.K. Hanson</i> <i>Stanford University</i>	2C07: Reactor network analysis of a piloted model gas turbine combustor with hydrogen mixed natural gas <i>C. Hernandez, V. McDonell</i> <i>University of California Irvine</i>
11:50 – 12:10	2A08: Ignition mechanism of low-temperature transient plasma <i>S. Biswas¹, I. Ekoto¹, R. Scarcelli²</i> ¹ Sandia National Laboratories ² Argonne National Laboratory	2B08: A time-resolved gas chromatography sampling diagnostic for species measurements in extended test-time shock tube experiments <i>A.M. Ferris, D.F. Davidson, R.K. Hanson</i> <i>Stanford University</i>	2C08: Modeling transition to thermoacoustic instability in laminar combustors in a framework of synchronization <i>Y. Weng¹, V.R. Unni¹, R.I. Sujith², A. Saha¹</i> ¹ University of California San Diego ² Indian Institute of Technology Madras

	Microcombustion/New Concepts	Diagnostics	Engines/Numerics
12:10 – 12:30	2A09: Predicting bio-jet properties using a tree-based pipeline optimization tool <i>A.E. Comesana¹, T. Huntington¹, M. Mayer², K. Niemeyer², V.H. Rapp¹</i> ¹ Lawrence Berkeley National Laboratory ² Oregon State University	2B09: Infrared measurements of forward heat conduction during simulated microgravity flame spread in the narrow channel apparatus <i>M. Berry¹, F. Miller¹, S. Olson², I. Wichman³</i> ¹ San Diego State University ² NASA Glenn Research Center ³ Michigan State University	2C09: Data-driven selection of stiff chemistry ODE solver in operator-splitting schemes <i>S. Lapointe, S. Mondal, R.A. Whitesides</i> <i>Lawrence Livermore National Laboratory</i>
12:30 – 12:50	2A10: Challenges in predicting fuel properties with machine learning <i>M.A. Mayer¹, A. Comesana², T. Huntington², V.H. Rapp², K.E. Niemeyer¹</i> ¹ Oregon State University ² Lawrence Berkeley National Laboratory		
12:50	Adjourn		
13:15	SLAC Tour		