WSS/CI Western States Section/Combustion Institute

2019 FALL TECHNICAL MEETING
WESTERN STATES SECTION OF THE COMBUSTION INSTITUTE
Hosted by Sandia National Laboratories - Albuquerque, NM

Monday, 14 October 2019

7:30 – 4:00 **Registration:** Foyer
7:30 – 8:00 **Breakfast:** Salon F
8:00 - 8:20 **Welcome Address in Salon E:** Amanda Dodd, *Computational Science and Analysis, Sandia National Laboratories*
Welcome Remarks: John Hewson, *Sandia National Laboratories*
Guillaume Blanquart, *Section Chair, U.S. Western States Section*

8:20 – 9:20 **Plenary Lecture in Salon E: Hai Wang, *Stanford University***
Session Chair: Paul D. Ronney, *University of Southern California*

9:20 – 9:30	**Transition to Morning Sessions**		
	Fire I Salon E **Session Chair: A.J. Kurzawski**	**Engines I** Salons C-D **Session Chair: D. Olsen**	**Heterogeneous Combustion** Salons A-B **Session Chair: B. Windom**
9:30 – 9:50	**1A01:** Solid-dominant ignition thresholds for cellulose under extreme irradiation *J.D. Engerer, A.L. Brown*	**1B01:** High-speed optical measurements of combustion and soot processes in stratified gasoline sprays ignited by a laser-induced plasma *H.S. Sim, F. Tagliante, L.M. Pickett, S.A. Skeen*	**1C01:** Thermodynamic characterization of combustion systems *D.T. Banuti*
9:50 – 10:10	**1A02:** Parametric sensitivity study of reacting solids exposed to high heat flux environments *E.T. Zepper, A.L. Brown, S.N. Scott*	**1B02:** Spatio-temporal progression of two-stage autoignition for diesel sprays in a low-reactivity ambient: n-Heptane pilot-ignited premixed natural gas *R. Rajasegar, Y. Niki, Z. Li, M. Musculus*	**1C02:** Combustion and droplet behavior of jet fuel surrogates in a two-phase reacting flow *S. Lucas, R. Alsulami, M. Hageman, M. Knadler, B. Windom*
10:10 – 10:30	**1A03:** Investigation of radiation-kinetics interactions in near-limit flames in low-pressure downward flame spread *S. Bhattacharjee, L. Carmignani, K. Dong*	**1B03:** Investigating boundary layer flashback of a high turbulence intensity jet flame at gas turbine conditions *N. Auwaijan, V. McDonell*	**1C03:** Flame blowout and liftoff of jet fuels with different physical and chemical properties *R. Alsulami, B. Windell, S. Lucas, B. Windom*
10:30 – 10:50	**1A04:** Constructing and accessing tabulated chemistry for fire scenarios *E. Armstrong, M.A. Hansen, R.C. Knaus, J.C. Hewson, J.C. Sutherland*	**1B04:** Reduced chemical kinetics model for low-speed pre-ignition investigation *K. Tran, K.E. Niemeyer, C.L. Hagen*	**1C04:** Effect of carbon-based nanomaterial additives on droplet evaporation characteristics of crude oil *G. Singh, M. Esmaeilpour, A. Ratner*
10:50 – 11:10	**BREAK –** Foyer		

	Fire II Salon E **Session Chair: S.N. Scott**	**Engines II** Salons C-D **Session Chair: V. McDonell**	**Chemical Kinetics** Salons A-B **Session Chair: N. Labbe**
11:10 – 11:30	**1A05:** Modeling high heat flux combustion of coniferous trees using chemically reacting Lagrangian particles *H. Mendoza, A. Brown, A. Ricks*	**1B05:** Ignition, flame propagation, and end-gas autoignition studies of natural gas/EGR blends in a rapid compression machine *J. Mohr, A. Zdanowicz, J. Tryner, K. Gustafson, J. Venegas, B. Windom, D. Olsen, A. Marchese*	**1C05:** Thermal analysis of iodine-based surface reactions on aluminum particles *I. Shancita, K.K. Miller, M.L. Pantoya*
11:30 – 11:50	**1A06:** Stability of laminar flames on inclined fuel surfaces *R.S.P. Hakes, W. Coenen, A.L. Sánchez, M.J. Gollner, F.A. Williams*	**1B06:** The effect of EGR on knock suppression, efficiency, and emissions in a stoichiometric, spark ignited, natural gas engine *S. Bayliff, A. Marchese, B. Windom, D. Olsen*	**1C06:** *n*-Heptane autoignition and speciation in a rapid compression expansion machine *S. Van Horn, K. Kumar*
11:50 – 12:10	**1A07:** Understanding the role of low pressure on upward flame spread over thin cotton *M. Thomsen, S. Fereres, C. Fernandez-Pello, D.L. Urban, G.A. Ruff*	**1B07:** Effect of fuel reactivity and end-gas temperature on autoignition and flame propagation rate in primary reference fuel mixtures at elevated temperature and pressure *A. Zdanowicz, J. Mohr, J. Tryner, K. Gustafson, B. Windom, D.B. Olsen, G. Hampson, A.J. Marchese*	**1C07:** Termolecular chemistry facilitated by radical-radical recombinations and their impact on flame speed predictions *Y. Tao, A.W. Jasper, Y. Georgievskii, S.J. Klippenstein, R. Sivaramakrishnan*
12:10 – 12:30	**1A08:** On the boundary layer surrounding fire whirls *A.D. Weiss, P. Rajamanickam, W. Coenen, A.L. Sánchez, F.A. Williams*	**1B08:** Operation of a SI engine fueled by simulated exhaust anode tail-gas from a SOFC *A. Balu, T. Bandhauer, B. Windom, S. Garland, R. Braun, D.B. Olsen*	**1C08:** Comparing mechanism reduction methods with pyMARS: Python-based Model Automatic Reduction Software *P.O. Mestas, K.E. Niemeyer*
12:30 – 1:30	**LUNCH –** Salon F **Women in Combustion Lunch –** Salon F		
	Fire III Salon E **Session Chair: M. Thomsen**	**Engines III** Salons C-D **Session Chair: R. Rajasegar**	**Coal and Biomass Combustion** Salons A-B **Session Chair: J.C. Sutherland**
1:30 – 1:50	**1A09:** Modeling soot emissions in coarse grid simulations *A.J. Josephson, R.R. Linn*	**1B09:** 3-D Modeling of the CFR engine for the investigation of knock on natural gas *D. Bestel, B. Windom, D. Olsen, A. Marchese, S. Bayliff, H. Xu*	**1C09:** Insight on required conditions to achieve MILD coal combustion *H. Zhou, J. McConnell, T.A. Ring, J.C. Sutherland*
1:50 - 2:10	**1A10:** Smoldering combustion of cellulose, hemicellulose, and lignin: Investigating the roles of fuel composition, density, oxygen concentration and moisture content *W.J. Jayasuriya, K.E. Niemeyer*	**1B10:** Predictive modeling of a spark ignition SOFC anode tailgas engine *M. Countie, B. Windom, T. Bandhauer, S. Garland, R. Braun, D. Olsen*	**1C10:** Development of a digital twin for a biomass boiler: Preliminary results *O. Diaz, J.C. Parra, S. Harding, L. Marshall, S. Smith, J. Thornock, M. Hradisky, J. Spinti, P. Smith*

	Fire III Salon E **Session Chair: M. Thomsen**	**Engines III** Salons C-D **Session Chair: R. Rajasegar**	**Coal and Biomass Combustion** Salons A-B **Session Chair: J.C. Sutherland**
2:10 - 2:30	**1A11:** Differences in production of pyrogenic biochar between healthy and beetle-affected trees in the Medicine Bow-Routt Badger Creek fire *A. Howell, V.R. Zambrano, M. Bretfeld, E. Belmont*	**1B11:** Combustion modelling and simulation of dilute syngas fuels in a CFR engine *G. Padhi, A. Balu, S. Garland, D. Olsen, T. Bandhauer, B. Windom*	**1C11:** Modeling the effect of ash build-up in fire-side furnace on radiation heat transfer *J.C. Parra-Álvarez, O. Díaz-Ibarra, T. Ring, S. Smith, M. Zhou, B. Isaac, P. Smith*
2:30 – 2:50	**1A12:** Initiation of pyrolysis from high flux exposures *A.L. Brown, J.D. Engerer, A.J. Ricks, J. Christian*	**1B12:** On the application of the Livengood-Wu correlation towards assessing the impact of compression history on compression ignition combustion in a multi-mode engine *A. Shah, S.S. Goldsborough, D.E. Longman, T. Rockstroh*	**1C12:** Improvement of computational efficiency for discrete ordinate radiation calculations through the use of dimensionally adaptive mesh techniques *T. Williams, B. Adams*
2:50 - 3:10	**BREAK** - Foyer		
	Fire IV Salon E **Session Chair: A.L. Brown**	**Diagnostics and Detonations** Salons C-D **Session Chair: H.S. Sim**	**Mixing/Micro/Turbulent** Salons A-B **Session Chair: V.H. Rapp**
3:10 - 3:30	**1A13:** Effect of ambient pressure on the piloted ignition and subsequent flame spread across simulated electrical wires *L. Gagnon, J.L Urban, C. Fernandez-Pello, V.P. Carey, Y. Konno, O. Fujita*	**1B13:** Analysis of laser focusing effect on quantification of LII images *C.R. Shaddix, T.C. Williams*	**1C13:** The cross-scale flux of kinetic energy by baropycnal work in premixed reacting flows *C.A.Z. Towery, J. Urzay, A.Y. Poludnenko, P.E. Hamlington*
3:30 - 3:50	**1A14:** Predicting limits of cascading failure of thermal runaway in stacks of Li-ion pouch cells *A.J. Kurzawski, R. Shurtz, L. Torres-Castro, J. Lamb, J.C. Hewson*	**1B14:** Theoretical uncertainty analysis of a high-temperature ammonia diagnostic *Z. Ferman, J. Kalman*	**1C14:** Advanced heat recirculating counterflow reactors utilizing additive manufacturing *P. Radyjowski, D. Bourell, J.L. Ellzey*
3:50 - 4:10	**1A15:** Infrared measurements of forward heat conduction during simulated microgravity flame spread in the narrow channel apparatus *M. Berry, F. Miller, S. Olson, I. Wichman*	**1B15:** Emissivity measurements of YAG:Dy and MgFGeO:Mn *W. Flores-Brito, P. Vorobieff, J.T. Mahaffey, A. Vackel, K.N.G. Hoffmeister*	**1C15:** Can machine learning predict fuel properties accurately? *M.A. Mayer, T. Huntington, A. Comesana, V.H. Rapp, K.E. Niemeyer*
4:10 – 4:30	**1A16:** Numerical simulation of high-speed oxy-fuel detonation in a pulse detonation tube using space-time Conservation Element and Solution Element (CE/SE) method *S.K. Karra, S.V. Apte*	**1B16:** Characterization of small-arms muzzle flash using high-speed thermal infrared imaging *M. Larson, V. Morton, F. Marcotte, B. Saute*	**1C16:** Effects of fluidizing gas on copper-manganese mixed oxide's reactivity for chemical looping combustion of CH_4 *T. Barua, S. Horlick, B. Padak*
5:00	**Reception –** Salon F		

WSS/CI Western States Section/Combustion Institute

Tuesday, 15 October 2019

7:30 – 12:00 Registration: Foyer
7:30 – 8:00 Breakfast: Salon F
8:00 - 8:05 Opening Remarks and Announcement in Salon E: John Hewson, *Sandia National Laboratories*
8:05 – 9:05 Plenary Lecture in Salon E: Sara McAllister, *U.S. Forest Service*
Session Chair: Fletcher Miller, *San Diego State University*

9:05 – 9:15	**Transition to Morning Sessions**		
	Laminar Flames I Salon E **Session Chair: A.L. Sánchez**	**Soot I** Salons C-D **Session Chair: E. Belmont**	**Turbulent Flames** Salons A-B **Session Chair: D. Lignell**
9:15 – 9:35	**2A01:** Counterflow combustion with multiple flames under high strain rates *W.A. Sirignano*	**2B01:** Influence of physical properties of conventional, alternative, and surrogate jet fuels on soot formation in a spray flame *R. Alsulami, B. Windell, B. Windom*	**2C01:** Reproducing the local characteristics of compressible turbulent flows at a low cost: Derivation and application *G. Beardsell, G. Blanquart*
9:35 - 9:55	**2A02:** Near-limit H_2-O_2-N_2 combustion in nonpremixed counterflow mixing layers *J. Carpio, P. Rajamanickam, A.L. Sánchez, P.D. Ronney, F.A. Williams*	**2B02:** Carbon nanoparticle production through propane pyrolysis experimentation and modeling *N. Bauer, F. Miller*	**2C02:** Stochastic simulation of turbulent reacting flows with variable Schmidt numbers *D. Lignell, T. Starick, I. Wheeler, J. Frei*
9:55 - 10:15	**2A03:** A high flux forest fire scenario for assessing relative model accuracy for CFD tools *A.L. Brown, H. Mendoza, E. Koo, J. Reisner*	**2B03:** Aerosol formation from biomass and major biomass constituents *L. McLaughlin, E. Belmont*	**2C03:** Soot and radiation interactions in turbulent jet flames studied with Reynolds-averaged Navier-Stokes simulations *A. Baumgart, T. Voskuilen, P. Sakievich, J. Hewson*
10:15 - 10:35	**2A04:** The combined effects of chemical order and stoichiometry on nonpremixed edge flames *F. Al-Malki, P. Ronney*	**2B04:** Modeling soot in oxy-coal combustion systems using Large Eddy Simulations *K. Brinkerhoff, A. Josephson, B. Isaac, J. Thornock, A. Fry, D. Lignell*	**2C04:** Combustion in regenerative air-fuel glass furnace *C.-H. Hung*
10:35 – 10:55	**BREAK** - Foyer		

	Laminar Flames II Salon E **Session Chair: W.A. Sirignano**	**Soot II** Salons C-D **Session Chair: A.J. Josephson**
10:55 – 11:15	**2A05:** Normal strain rate and pressure effects using detailed and global chemistry models in a CH_4-air counterflow flame *C.-F. López-Cámara, A.J. Juanós, W.A. Sirignano*	**2B05:** A Python-based platform to investigate soot formation and growth *B. Blanksma-Stark, K.E. Niemeyer*
11:15 – 11:35	**2A06:** Investigation of the effect of ozone on flame propagation of n-heptane cool flames at sub-atmospheric pressures *M.Q. Brown, E.L. Belmont*	**2B06:** Simulating soot formation in model flames *W. Pejpichestakul, A. Cuoci, T. Faravelli, J.F. Glusman, H.A. Michelsen, J.W. Daily*
11:35 – 11:55	**2A07:** Experimental characterization of freely propagating *n*-decane cool flames at sub-atmospheric pressures *M.C. Brown, E.L. Belmont*	**2B07:** A numerical study of soot formation in diesel impinged spray combustion and its comparison with experiments *Z. Zhao, M. Tang, L. Zhao, X. Zhu, S.-Y. Lee*
11:55 - 12:15		
12:15	**Adjourn** **Cantera Workshop in Salons C-D open to all** **Sandia National Laboratories Tour individuals that signed up only**	

2019 WSSCI Fall Technical Meeting Author List