WSS/CI Western States Section/Combustion Institute

2007 FALL TECHNICAL MEETING
WESTERN STATES SECTIONS OF THE COMBUSTION INSTITUTE
Hosted by Sandia National Laboratories
TUESDAY, October 16, 2007

7:00 **Registration**
8:00 **Welcome Address - Jerald A. Cole, Hydrogen Ventures LLC, WSS Chair**
8:10 **Welcome Address – Andrew McIlroy, Combustion Research Facility, Sandia National Laboratories**
8:30 **Invited Presentation: Session Chair: Derek Dunn-Rankin:**
Non-Traditional Fuels for High-Efficiency, Clean Combustion Engines
Dr. Charles J. Mueller, Sandia National Laboratories
Announcements – Christopher R. Shaddix, Sandia National Laboratories

	1A: Engine Diagnostics (room-1) **Session Chair: Daniel L. Flowers**	**1B: Turbulent Combustion (room-2)** **Session Chair: Liangyu Wang**	**1C: Laminar Combustion (room-3)** **Session Chair: Habib Najam**
9:35	**07F-1** On feasibility of CO LIF applied to automotive engines. *Seungmook Oh, Duk-Sang Kim, Will F. Colban, Paul C. Mile, Sandia National Laboratories*	**07F-4** A tabulated closure for turbulent non-premixed flames. *Vaidya Sankaran, Tomasz G. Drozda, Jackson R. Mayo, Joseph C. Oefelein, Alan R. Kerstein, Sandia National Laboratories*	**07F-7** Laminar flame speeds of dry and moist syngas fuel mixtures. *Janea Magallanes, Vincent McDonell, University of California, Irvine*
9:55	**07F-2** Optimized two-line tracer PLIF measurements of temperature and composition in an IC engine. *David A. Rothamer, Jordan A. Snyder, Ronald K. Hanson, Stanford University; Richard R. Steeper, Sandia National Laboratories*	**07F-5** Similarity and difference of flame-flow interactions in an open tube and in a closed chamber. *V'yacheslav Akkerman, Vitaly Bychkov, Umea University (Sweden); R.J.M. Bastiaans, L.P.H. de Goey, J.A. van Oijen, Eindhoven Univ. of Technology (The Netherlands); Lars-Erik Eriksson, Chalmers University of Technology (Sweden)*	**07F-8** MBMS investigation of a laminar tetrahydrofuran flame. *T. Kasper, N. Hansen, Sandia National Laboratories; J. Wang, B. Yang, T.A. Cool, Cornell University; P.R. Westmoreland, University of Massachusetts, Amherst*
10:15	**07F-3** Experimental and theoretical investigations of temperature and pressure dependence of alkyl and substituted alkyl radical reactions with O_2. *Judit Zádor, Giovanni Meloni, Ravi X. Fernandes, Leonard E. Jusinski, Craig A. Taatjes, Sandia National Laboratories*	**07F-6** Identification and parameterization of low-dimensional manifolds in turbulent flames. *Alessandro Parente, Leonardo Tognotti, University of Pisa, James Sutherland, Philip J. Smith, University of Utah*	**07F-9** Influence of oxygen on autoignition temperature of liquid hydro-carbon fuels in a counterflow setup. *Stefan Humer, Kalyanasundaram Seshadri, University of California, San Diego*

10:35	**BREAK**		
	2A: Reaction Kinetics (room - 1) **Session Chair: John R. Creighton**	**2B: Turbulent Combustion (room - 2)** **Session Chair: Tomasz G. Drozda**	**2C: Laminar Combustion (room - 3)** **Session Chair: Vincent G. McDonnel**
10:55	**07F-10** Spectral optimization and uncertainty quantification of a detailed kinetic model for ethylene combustion. *David A. Sheen, Xiaoqing You, Hai Wang, University of Southern California*	**07F-14** Characterization of differential diffusion effects during the constant volume ignition of a temperature stratified lean premixed hydrogen/air mixture subject to decaying turbulence. *Fabrizio Bisetti, J.-Y. Chen, University of California at Berkeley; Jaqueline H. Chen, Sandia National Laboratories; Evatt R. Hawkes, University of New South Wales, Australia*	**07F-18** Analysis of methane-air edge flame structure. *Habib N. Najm, Sandia National Laboratories, Mauro Valorani, Francesco Creta, University of Rome, Italy; Dimitris Goussis, National Technical University of Athens, Greece*
11:15	**07F-11** A detailed kinetic reaction mechanism for combustion of *n*-alkanes up to *n*-hexadecane. *Charles Westbrook, William Pitz, Olivier Herbinet, Emma Silke, Lawrence Livermore National Laboratory; Henry Curran, National University of Ireland, Galway*	**07F-15** Full characterization of the fluctuating hydroxyl concentration in a turbulent non-premixed hydrogen-nitrogen jet flame. *Jiayao Zhang, Galen B. King, Normand M. Laurendeau, Purdue University*	**07F-19** Linear stability of detonations with reversible chemical reactions. *S.T. Browne, J.E. Shepherd, California Institute of Technology*
11:35	**07F-12** Shock tube ignition delay times for hydrogen-oxygen-argon mixtures at low temperatures and high pressures. *Genny Pang, David Davidson, Ronald Hanson, Stanford University*	**07F-16** Combustion reaction model generation using principal component analysis. *James C. Sutherland, Alessandro Parente, University of Utah*	**07F-20** The role of cracking in the oxidation of *n*-dodecane. *Xiaoqing You, Fokion N. Egolfopoulos, Hai Wang, University of Southern California*
11:55	**07F-13** Speedy solution of quasi-steady state species by combination of fixed-point iteration and matrix inversion. *Jyh-Yuan Chen, Yuk Fai Tham, University of California at Berkeley*	**07F-17** A conditional moment closure analysis of the interplay of soot and enthalpy evolution. *Allen Ricks, John Hewson, Alan Kerstein, Sheldon Teszen, Sandia National Laboratories; Jay Gore, Purdue University*	**07F-21** A numerical investigation of induction time and laminar flame speeds for C1-C3 hydrocarbons with nitrous oxide. *Orval Powell, Christopher Dreyer, Paul Papas, Colorado School of Mines*
12:15	**LUNCH**		

13:15	**Invited presentation: Session Chair: John E. Dec** ***The Measurement of Dissipation in Turbulent Flames: A Major Challenge for Laser Diagnostics.*** **Noel T. Clemens, University of Texas – Austin**		
	Session A3: Flame Synthesis (room - 1) **Session Chair: Perrine-Pepiot Desjardins**	**Session B3: Catalytic Combustion (room - 2)** **Session Chair: JoAnn S. Lighty**	**Session C3: I.C. Engines (room - 3)** **Session Chair: Joseph E. Shephard**
14:20	**07F-22** Light extinction-based monitoring of particle size distributions during sorbent injection for mercury emissions control. *E.M. Lee and H.L. Clack,* *Illinois Institute of Technology*	**07F-25** A thermodynamically consistent model of hydrogen oxidation over palladium. *Tsutomu Shimizu, Hai Wang,* *University of Southern California*	**07F-28** Detailed chemical kinetic mechanism for biodiesel surrogate. *Olivier Herbinet, William J. Pitz, Charles K. Westbrook,* *Lawrence Livermore National Laboratory*
14:40	**07F-23** Flame synthesis of nanostructured metal oxides. *Wilson Merchan-Merchan,* *University of Oklahoma; Alexei V. Saveliev,* *University of Illinois at Chicago*	**07F-26** One-step model for the catalytic ignition of propane-oxygen-nitrogen mixtures over platinum. *B. Lounsbury, J. Steciak, S. Beyerlein, K. Leichliter,* *University of Idaho*	**07F-29** Fast prediction of HCCI and PCCI combustion with an artificial neural network-based chemical kinetic model. *W. Thomas Piggott, Salvador M. Aceves, Daniel Flowers, Lawrence Livermore National Laboratory;* *J.Y. Chen,University of California, Berkeley*
15:00	**07F-24** Opposed flow flame synthesis of tungsten oxide nanostructures. *Wilson Merchan-Merchan, University of Oklahoma; Alexei V. Saveliev, University of Illinois at Chicago*	**07F-27** Anionic/nionic/electrostatic field effects in hot surface catalyzed combustion. *Weera Paramasawat, Jirayu Chaosukhum, Apisak Meesrisom, Pongphisanu Muangchareon, Edwin Jahngen, William W. Bannister (Chemistry Department); James Egan (Physics Department); Wipoo Sriseubsai, Fang Lai, Ramaswamy Nagarajan (Plastics Engineering Department); Hongwei Sun (Mechanical Engineering Department), University of Massachusetts*	**07F-30** Direct use of wet ethanol in a HCCI engine: experimental and numerical results. *J. Hunter Mack, Robert W. Dibble,* *University of California, Berkeley;* *Daniel L. Flowers, Salvador M. Aceves,* *Lawrence Livermore National Laboratory*
15:20	**BREAK** **WOMEN in COMBUSTION COFFEE** **(Social Room)**		

	Session A4: Soot Mechanism (room - 1) **Session Chair: Judi Steciak**	**Session B4: Turbulent Combustion (room - 2)** **Session Chair: Joseph C. Oefelein**	**Session C4: Detonations (room - 3)** **Session Chair: Adam T. Holley**
16:00	**07F-31** A combined *ab initio* and photoionization mass spectrometric study of polyynes in fuel-rich flames. *N. Hansen, Sandia National Laboratories; S.J. Klippenstein, Argonne National Laboratory; Phillip Westmoreland, University of Massachusetts; T. Kasper, K. Kohse-Höinghaus, Bielefeld University, Germany; J. Wang, T.A. Cool, Cornell University*	**07F-35** Large eddy simulation of an industrial furnace with RQL combustion system. *Liangyu Wang, Heinz Pitsch, Stanford University*	**07F-39** Stability of detonations and the receptivity problem. *Anatoli Tumin, University of Arizona*
16:20	**07F-32** Soot fragmentation in laminar premixed ethylene-air flames. *V. Romano, A F. Sarofim , J.S. Lighty, University of Utah*	**07F-36** *A-Priori* analysis of conditional moment closure modeling of turbulent soot formation using direct numerical simulation. *David Lignell, University of Utah; John Hewson, Jacqueline H. Chen, Sandia National Labs*	**07F-40** Detonation in gaseous isopropyl nitrate mixtures. *James Karnesky, Joe Shepherd, California Institute of Technology*
16:40	**07F-33** Soot formation and radiation in a laminar jet flame of prevaporized JP-8 surrogate burning in air. *Christopher R. Shaddix, Timothy C. Williams, Sandia National Laboratories*	**07F-37** Large eddy simulation of the combustion in a solid propellant airbag gas generator. *Yan Jin, UC Davis; Rainer Friedrich, TU Munich*	**07F-41** WITHDRAWN
17:00	**07F-34** Shock tube studies of soot formation in rich heptane/oxygen mixtures with DME/acetone/butanal additives. *Zekai Hong, David F. Davidson, Ronald K. Hanson, Stanford University*	**07F-38** Spatial scales of reaction, extinction, and dissipation in the near field of non-premixed turbulent jet flames. *Sebastian A. Kaiser, Jonathan H. Frank, Sandia National Laboratories*	**07F-42** Investigation of statistical nature of ignition. *Swati Bhanderi, Sally Moffett, Joseph Shepherd, California Institute of Technology; Eddie Kwon, Boeing*
18:00	**RECEPTION**		

WEDNESDAY, October 17, 2006

8:30 **Invited Presentation: Session Chair: William J. Pitz**

Recent Advances in Flame-Sampling Molecular-Beam Mass Spectrometry.

Phillip R. Westmoreland, University of Massachusetts – Amherst

Announcements

	Session A5: Heterogeneous Combustion (room – 1) **Session Chair: Jeongmin Ahn**	**Session B5: Modeling (room – 2)** **Session Chair: Tianfeng Lu**	**Session C5: Laminar Combustion (room – 3)** **Session Chair: Ingmar Schoegl**
9:35	**07F-43** NO_x formation in laboratory investigations of oxy-coal combustion. *Christopher R. Shaddix, Sandia National Labs; Alejandro Molina, Universidad Nacional de Colombia*	**07F-46** Multicomponent-liquid-fuel vaporization with complex configuration. *William A. Sirignano, Guang Wu, University of California, Irvine*	**07F-49** Studies of combustion characteristics of biofuels in premixed and non-premixed flames. *Y.L. Wang, C. Ji, A.T. Holley, F.N. Egolfopoulos, University of Southern California*
9:55	**07F-44** Seeking an optimum droplet size for water-mist fire suppression. *S.B. Johnson, UC Davis (Currently with CD-adapco, Melville, NY) J.-P. Delplanque, UC Davis*	**07F-47** Spatial vapor distribution around a monodisperse acetone droplet stream exposed to asymmetric radiant heating. *K. Ammigan, H L. Clack, Illinois Institute of Technology*	**07F-50** Effect of H_2O and NO on extinction and re-ignition of vortex-perturbed hydrogen flames in counterflow. *Uen Do Lee, Chun Sang Yoo, Jacqueline H. Chen, Jonathan H. Frank, Sandia National Laboratories*
10:15	**07F-45** Experimental study and structural group analysis for soot reduction tendency of oxygenated fuels. *Perrine Pepiot-Desjardins, Heinz Pitsch, Stanford University; Andre L. Boehman, Pennsylvania State University*	**07F-48** Modeling of entrained flow mercury adsorption on sorbents. *Michael Morrill, JoAnn Lighty, University of Utah*	**07F-51** Extinction and autoignition behavior of gasoline and its surrogate in a counterflow setup. *Stefan Humer, Kalyanasundaram Seshadri, University of California, San Diego*
10:35	**BREAK**		

	Session 6A: New Technology (room – 1) Session Chair: James Sutherland	Session B6: Modeling (room – 2) Session Chair: Jonathan H. Frank	Session C6: I.C. Engines (room – 3) Session Chair: Paul C. Miles
10:55	**07F-52** Ultra-rich combustion in parallel channels to produce syngas from methane. *Ingmar Schoegl, Janet L. Ellzey, University of Texas at Austin*	**07F-56** Direct numerical simulation of extinction and reignition in a non-premixed turbulent ethylene jet flame. *David Lignell, University of Utah; Jacqueline Chen, Sandia National Laboratories; Tianfeng Lu, Chung Law, Princeton University*	**07F-60** Numerical and experimental investigation of ions in a homogeneous charge compression ignition (HCCI) engine. *Gregory Bogin Jr., J.-Y. Chen, Robert W. Dibble, University of California, Berkeley*
11:15	**07F-53** Lewis number effects on extinction limits in heat-recirculating burners. *Chien-Hua Chen, Paul D. Ronney, University of Southern California*	**07F-57** A 3D DNS study of the stabilization of a turbulent lifted hydrogen/air jet flame in an autoignitive heated coflow. *Chun Sang Yoo, Jacqueline H. Chen, Sandia National Laboratories; Ramanan Sankaran, Oak Ridge National Labs*	**07F-61** Early injection and spray-targeting in an automotive diesel engine. *Sanghoon Kook, Seik Park, Choongsik Bae, Korea Advanced Institute of Science and Technology (KAIST)*
11:35	**07F-54** Demonstration of an external combustion micro-heat engine. *Jeonghyun Cho, Jungmin Lee, Chien Shung Lin, Lindsay Sanford, James Huang, Cecilla D. Richards, Robert F. Richards, Jeongmin Ahn, Washington State University*	**07F-58** Numerical simulation of unsteady flows and shape oscillations in liquid droplets induced by deployment needle retraction. *Yan Jin, Benjamin D. Shaw University of California, Davis*	**07F-62** Autoignition of lean *iso*Octane – air mixtures in an RCEM. *S. Scott Goldsborough, Marquette University*
11:55	**07F-55** Combustion model with fuel injection into and air flow past a cavity. *Ben J. Colcord, William A. Sirignano, University of California, Irvine*	**07F-59** Sensitivity analysis of uncertainty in model prediction. *Trent Russi, Andrew Packard, Ryan Feely, Michale Frenklach, University of California, Berkeley*	**07F-63** Visualization of diesel spray penetration, cool-flame, ignition, high-temperature combustion, and soot formation using high-speed imaging. *Lyle M. Pickett, Sandia National Labs*
12:15	**LUNCH**		

	Session A7: Reaction Kinetics (room – 1) Session Chair: Olivier Herbinet	Session B7: Diagnostics (room – 2) Session Chair: Nils Hansen	
13:10	**07F-64** Steady state radical pool concentration controls overall reaction rate. *John R. Creighton*	**07F-67** Investigation of photolytic interferences in nanosecond and picosecond excitation schemes for two-photon laser-induced fluorescence imaging of atomic hydrogen in flames. *Waruna D. Kulatilaka, Brian D. Patterson, Jonathan H. Frank, Thomas B. Settersten, Sandia National Laboratories*	
13:30	**07F-65** Theoretical rate coefficients for the reaction of methyl radical and hydroperoxyl radical and for methylhydroperoxide decomposition. *Ahren W. Jasper, Combustion Research Facility, Sandia National Laboratories; Stephen J. Klippenstein, Lawrence B. Harding, Chemistry Division, Argonne National Laboratory*	**07F-69** Detailed soot particle size distributions and modeling study of ethylene/oxygen/argon flames doped with benzene. *Aamir D. Abid, Hai Wang, University of Southern California*	
14:45	**LAB TOURS**		