
FUEL CHEMISTRY NEWS

Newsletter of the ACS Division of Fuel Chemistry

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Spring 2009

Message from the Chair: Chunshan Song

Dear Members and Colleagues



It has been a great honor and privilege for me to serve you as the Chair of the ACS Fuel Chemistry Division, which has a long tradition of distinguished services to the professional fuel chemistry community.

First of all, I would like to thank all the current and past division officers who have contributed their time and efforts for the advance of our division in better serving the members and the professional fuel chemistry community worldwide. This division has become a major platform together with our sister unit-Petroleum Chemistry division for scientific and technological discussions of energy chemical research worldwide.

Energy has become the single most frequently used word and most talked about subject in the global research community in 2008. Fuel Chemistry Division and Petroleum Chemistry division are the two energy-centered units among the many divisions in ACS. In 2008 we have witnessed the worldwide energy crisis when the crude oil prices went above \$150 per barrel, a record high. It reminded us the earlier energy crises in 1978 and in 1974, and again raised global recognition for the importance of sustained long-term energy

research on alternative clean fuels. We also saw the rapid decline in oil prices towards the end of year to under \$40, which showed again the strong inter-dependence of global economy and energy prices.

Thanks to the outstanding efforts by Mercedes M. Maroto-Valer, our 2008 Program Chair and all the symposia organizers, the Fuel Division had a great year in our technical program in 2008, as highlighted below.

260 papers were accepted for presentation at the Fuel Program at the 235th ACS National Meeting in New Orleans during April 6-10, 2008. The symposia covered a broad range of topics in the following areas: fuel resources and conversion technologies (Coal and Gas to Liquids; Clean Energy, Fuels and Chemicals from Biomass; Ultraclean Transportation Fuels; Oxy-Fuel Combustion), theoretical and fundamental aspects (Computational Methods and Molecular Modeling in Fuel Chemistry; Advances in Analytical Characterization for Fuel Science), sustainable energy (Green Chemistry for Sustainable Energy Supply and Conversion), materials and environmental aspects (Chemistry of Carbon Materials and Nanomaterials; Hybrid Nanotechnologies for an Enhanced CO₂ Fixation; Mercury and Other Trace Elements in Fuel;), a general symposium (Advances in Fuel Science and Technology) and a Storch Award Symposium honoring Simon R. Kelemen.

162 papers were accepted in the Fuel Program at the 236th ACS National Meeting in Philadelphia, PA, August 17-21, 2008. The symposia topics covered fuel resources (Heavy Hydrocarbon Resources; Oil Shale; Gas Hydrates and Clathrates), hydrogen energy (Hydrogen Fuel Science and Technology), conversion and reactor technologies (Microreactor Engineering in Fuel Science; Membranes for Energy and Fuel Applications), and environmental aspects (Carbon Capture and Storage; Fine Particulate Formation and Emissions from Fuel Combustion; Ash and Slag Chemistry in Power Systems) and general fuel science (Advances in Fuel Science and Technology).

In addition, there were a number of joint symposia between ACS and AIChE at the ACS Spring 2008 meeting that Fuel Division actively co-sponsored, which was coordinated also by our 2008 program chair. We sincerely thank Mercedes and all the symposia organizers for their hard work and important contributions.

Congratulations to Simon R. Kelemen as the winner of the Henry Storch Award, to Mike Serio and Phil Britt as the winners of Fuel Division Distinguished Service Award in 2008.

Congratulations also to all the winners of the two 2008 Richard Glenn Awards for Best Papers, only one paper is selected among all the papers presented at each of the two 2007 national meetings based on a rigorous review and evaluation process. We have honored the winners at the division dinners at the two national meetings in 2008.

In 2008 we also had new volunteers join us as division officers. We now have a new editor for the Division Newsletter, Michelle Kidder of Oak Ridge National Laboratory; a new Regional Meeting Liaison, E. Gerald

Meyer of University of Wyoming; and a new Program Chairs for 2011, Subramani Velu of BP Research Centre. Our warm welcome is extended to all of them.

The Division always welcomes more participants and more volunteers, particularly young professionals in chemical sciences and technologies in industries, national labs and academia. Working together we can make our division and the profession a more attractive community for our current and future members. We also welcome recommendations on future symposium topics and symposium organizers concerning national meetings, and please send them to Program Secretary Joe Calo at <joseph_calo@brown.edu>, or to any one of the program chairs and division officers listed in the Fuel Div web page maintained by Randy Winans at <<http://www.anl.gov/PCS/acsfuel/>>.

Personally I would like to take this opportunity to thank all the friends in ACS Fuel Chemistry Division who have guided or supported me in serving our Division for over 15 years, particularly Harold Schobert, Alan Scaroni, Masakatsu Nomura, John Larsen, the late Frank Derbyshire, Howard Stephens, Anthony Cugini, Mike Serio, Jim Franz, Kate Carrado, Marek Wójtowicz, Randy Winans, Semih Eser, Phil Britt, Eric Suuberg, Sarma Pisupati, Jonathan Mathews, Mike Klein, Henrik Topsoe, Jacob Moulijn, Isao Mochida, Slavik Kasztelan and many others. During my term as Division Chair following the term as Chair Elect, I have enjoyed working closely with Ed Olson, Chuck Taylor, Joe Calo, Angela Lueking, Dave King, Joseph Helble, Mercedes Maroto-Valer, Andy Herring, Chang-Jun Liu, and Velu Subramani. Last but not least, I want to thank Pennsylvania State University for supporting my services to ACS for all these years.

In closing, I look forward to continuing my service to Fuel Chemistry Division as past chair next year together with our 2009 Chair Chuck Taylor, 2009 Chair Elect Caroline Burgess Clifford and all Fuel Division officers and volunteers.

Best wishes to all of you for a Happy and Prosperous 2009.

Sincerely,

Chunshan Song
2008 Chair, ACS Fuel Chemistry Division
Professor of Fuel Science and Chemical Engineering
Director of EMS Energy Institute
The Pennsylvania State University



2008 Storch Award.

Dr. Simon R. Kelemen of ExxonMobil Research and Engineering Company has been awarded the Storch Award in Fuel

Science for 2008 sponsored by the Fuel Chemistry Division of the ACS and Elsevier Ltd. Henry H. Storch Award is given annually to an individual who has made outstanding contributions to research in the field of fuel science. Special consideration is given to innovation and novelty in the use of fuels, characterization of fuels, and advances in fuel chemistry that benefit the public welfare or the environment. His coal research as pioneered the use of direct vs. wet chemical characterization probes for quantifying heteroatom structures and reactivity. The body of work in sulfur and nitrogen characterization is today considered definitive. He discovered a method for determining carbon aromaticity based on X-

ray Photoelectron Spectroscopy (XPS) II to II^* signal intensity. He pioneered methods to quantify sulfur forms in coal using XPS and Sulfur K-edge X-ray Absorption Near Edge Structure (XANES) Spectroscopy. These methods enabled the first direct quantification of sulfur forms in coal and established their variation with coal rank. His studies were the first that directly followed coal sulfur thermal and oxidative transformations. He established XPS methods for quantifying nitrogen forms in coal and established their variation with coal rank. The XPS method was used to quantify the thermal transformation of nitrogen during coal pyrolysis that was coupled to fundamental processes in combustion. The XPS methods for nitrogen characterization have been subsequently patterned by most workers in the field. Current studies of peat, pyrolyzed peat, lignite and coal reveal for the first time the chemical pathways of nitrogen and sulfur during coalification. Simon extensively employed advanced direct characterization methods in research into coal utilization, petroleum formation processes and gasoline additive formulation. The integrated use of direct characterization tools has enabled the modeling of the chemical structure of complex organic solids. The approach was used to quantify the chemical structure of gasoline combustion chamber deposits and this knowledge directed additive strategies for their mitigation in gasoline formulations. He showed how information derived from direct characterization methods could be used to create representative chemical structural models of coal and kerogen. He has led a major modeling program to predict oil and gas composition and yields. Dr. Kelemen has a well respected international reputation in the fuels science community. He is an active contributor at ACS meetings and Gordon Research Conferences. In addition to

interacting well with his colleagues at ExxonMobil, he interacts and communicates effectively with scientists in academics and Government laboratories. He is articulate, knowledgeable, and has over his career demonstrated a keen ability to get to the heart of a problem and then proceed to carry out fundamental chemical characterization studies to understand and solve it. He is an excellent representative of the longer-range industrial research scientist who should be recognized by this award. His thorough, insightful, and original approach to fundamental questions in the areas of coal and oil shale kerogen structural characterization and the progress he has made in describing the maturation and processing of fuel stocks in terms of chemical structures and chemical reactions have been a model to scientists engaged in fuel science throughout the world.

Awards

Fuel Chemistry Distinguished Service Award;

Phillip Britt (Oak Ridge National Laboratory, Oak Ridge, TN) and Mike Serio (Advanced Fuel Research Inc., Harford, CT).

The Distinguished Service award is presented to individuals who have been members of the division for at least ten years and who have had, in the opinion of the selection committee, a significant and continued impact on the advancement of fuel chemistry through research, teaching, service or a combination of the three over an extended period of time. The awards recognize their significant contributions to governance in the Fuel Chemistry Division.

Spring 2008 Meeting in New Orleans: ACS Fuel Glenn Award for Best Paper

From Sp2007 Meeting in Chicago: 98 papers were accepted for the meeting, 15 papers were nominated as Glenn Award candidates, 14 reviewers were assigned;

Selected Winner:

ACS Fuel Division Paper #80, Sp 2007 in Chicago

Title: NATURE AND CAUSES OF VISIBLE LIGHT ABSORPTION BY PRIMARY ORGANIC AEROSOL FROM SOLID FUEL COMBUSTION

Authors: Tami C. Bond, Amadu M. Kanu, Yanju Chen, and Haolin Sun

Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign

Yanju Chen attended ACS Spring 2008 Fuel meeting and rec'd the award on behalf of all authors.

Fall 2008 Meeting in Philadelphia: ACS Fuel Glenn Award for Best Paper

From Fall 2007 Boston Meeting: 286 papers were accepted, 34 nominations were nominated as Glenn Award candidates, 23 of the 34 had multiple reviews.

Selected Winner:

RE: ACS Fuel Division Paper #270, Fall 2007 (Presented in Session B on Thursday afternoon, Boston Fa07)

Title: Hydrogen generation and purification in Pd nanopore hollow fiber membrane reactor

Authors: M. P. Harold, S. H. Israni,
Dept. of Chemical and Biomolecular Engineering, University of Houston

S. H. Israni attended ACS Fall 2008 Fuel meeting and rec'd the award on behalf of all authors.

Past-Chair and Program Chair Awards

Past-Chair Award

Edwin S. Olson
Energy & Environ Research Center
University of North Dakota

2008 Program Chair Award

M. Mercedes Maroto-Valer
University of Nottingham
School of Chem. Environ & Mining Engr.

International Outreach

At the invitation of ACS Office of International Activities, Chunshan Song attended the first joint Symposium between the American Chemical Society (ACS) and Chinese Chemical Society (CCS) which took place in November of 2008 at the Dalian Institute of Chemical Physics (DICP) in Dalian, China. Chunshan provided a lecture on Clean Coal Technology. A summary of the symposium can be seen at http://portal.acs.org/portal/fileFetch/C/WPCP_011241/pdf/WPCP_011241.pdf



ACS Fall 2008, Philadelphia, PA, Fuel Division Dinner.



New Elections

New Fuel Division Regional Meeting Liaison, Dr. E. Gerald Meyer, University of Wyoming, was elected as the new Chair of the Rocky Mountain Region for the next two years.

Newsletter Editor, Michelle K. Kidder, Oak Ridge National Laboratory, Oak Ridge, TN. Please forward any news or events to kidderm@ornl.gov

Changes

Beginning in 2009, the nominations for the Storch award will be received at the Spring meeting, and the award will be presented at the Fall meeting. Eric Suuberg is taking over coordination of the Storch Award from Randy Winans. Our thanks to Randy for years of outstanding service.

Sue Brandes honored

Sue Brandes, former chair of the Fuel Division, died of a tragic accident in 2007. In her honor, the Division will donate \$1500 in Sue's name to a library to buy books in the energy field. In addition, recognizing Sue's interest in the role of women in science and the ACS, a proposal is being formulated to provide travel grant support for women, which is expected to be acted upon at the Spring meeting in Salt Lake City.

Technical Program at a Glance

Compilation of the number of papers and Division membership were updated through the 2008 Philadelphia meeting. Figures 1 (a, b) clearly show the significant increase in papers presented from 2002-2007 (as reported from the Program Committee and Technical Program Secretary's Report,

August 2008, prepared by J. M. Calo, Brown University, Providence, RI).

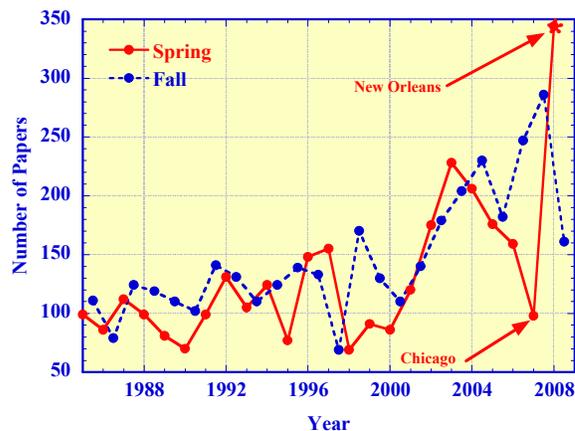


Figure 1(a). Papers presented in the FUEL Program at the Spring and Fall National ACS Meetings from 1985-2008.

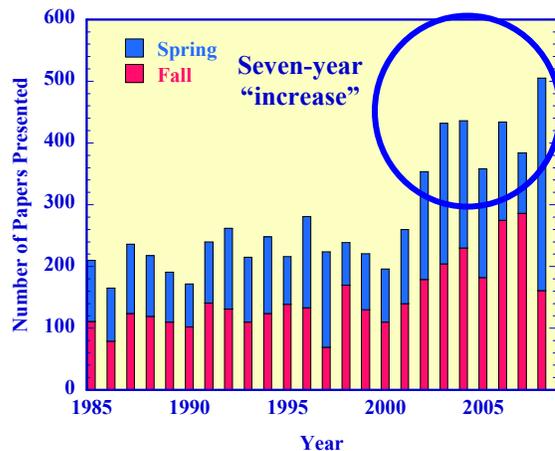


Figure 1(b). Total number of papers presented in FUEL Symposia (Spring & Fall meetings) from 1985-2008.

Fall 2009
238th - ACS National Meeting & Exposition
August 16-20, 2009, Washington, DC

Online submission of abstract (150 word) and preprint paper (2-pages) via ACS website
<http://oasys.acs.org/oasys.htm>

Instructions for preprint papers available on-line at <http://www.anl.gov/PCS/acsfuels/>
Deadline for abstract and preprint March 23, 2009

Storch Award Symposium – Organized by winner.

Energy and Globalization – **Andrew M. Herring**, Department of Chemical Engineering, Colorado School of Mines, Golden, CO 80401, Tel: (303) 384-2082, Email: aherring@mines.edu, **ACS Keynote event**, co-organizers, other divisions TBD.

Fuel Processing for Fuel Cells – **Chunshan Song**, Department of Energy & Mineral Engineering, Pennsylvania State University, C211 CUL, University Park, PA 16802-2323, USA, Tel: (814) 863-4466, Email: csong@psu.edu; **Donald Hoffman**, Office of Naval Research, 875 N. Randolph Street, Ships and Engineering Systems Division, Code 331, Arlington, VA 22203-1995, Tel: (703) 696-0614, E-mail: Donald_Hoffman@onr.navy.mil

Fuel Cell Chemistry and Operation – **Nancy Garland**, Department of Energy, Nancy Garland, Office of Energy Efficiency and Renewable Energy, Hydrogen, Fuel Cells and Infrastructure Technologies Program, Tel: (202) 586-5673, Email: Nancy.Garland@ee.doe.gov; **Allison M. Fisher**, Motorola Labs - Energy Technologies Lab, 2100 E. Elliot Rd. MD EL325, Tempe, AZ 85284, Ph. 480-413-4036, Email: allison.fisher@motorola.com; **Paul F. Mutolo**, 204 Baker Laboratory, Cornell University, Ithaca, NY 14853, Tel: (607) 255-4928 Email: pfm2@cornell.edu, **Vijay Ramanii**, Department of Chemical Engineering, Illinois Institute of Technology, Room 235 Perlstein Hall, Tel: 312.567.3064, Email: ramani@iit.edu

Biological and Enzymatic Fuel Cells – **Scott Calabrese-Barton**, Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, MI 48824, Tel: (517) 355-0222, Email: scb@msu.edu

Hydrogen Storage – **S. Thomas Autry**, Molecular Interactions & Transactions – A, Pacific Northwest National Laboratory, PO Box 999, MSIN: K2-57, Richland, WA 99352, E-mail: tom.autrey@pnl.gov

Chemistry of Renewable Fuels and Chemicals – **Andrew M. Herring**, Department of Chemical Engineering, Colorado School of Mines, Golden, CO 80401, Tel: (303) 384-2082, Email: aherring@mines.edu, **Phillip F. Britt**, Chemical Sciences Division, Oak Ridge national Laboratory, P.O. Box. 2008, 1 Bethel Valley Road, Bldg 4500S, MS-6129, Oak Ridge, TN 37831, Tel: (865) 574-4986, Email: brittpf@ornl.gov, **A. C. Buchanan, III**, Physical Organic Chemistry, Oak Ridge National Laboratory, Chemical Sciences Division, 1 Bethel Valley Road, P.O. Box

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Renewable Energy and Water – Kyoung S. Ro, USDA-ARS Coastal Plains Soil, Water & Plant Research Center, 2611 West Lucas Street, Florence, SC 29501, Tel: 843-669-5203 x107, Email: Kyoung.Ro@ars.usda.gov; **Devinder Mahajan**, BNL/SBU Joint Appointment, Brookhaven National Laboratory/Stony Brook University Upton, New York 11973-5000, Tel.: (631) 344-4985; E-mail: dmahajan@bnl.gov; **Kenneth Stone**, USDA-ARS Coastal Plains Soil, Water & Plant, Florence, SC 29501, Tel.: (843) 669-5203 ext. 111; Kenneth.Stone@usda.ars.gov

Biofuels for Transportation – Robert L. McCormick, National Renewable Energy Laboratory, 1617 Cole Blvd, MS 1633, Golden, CO 80401, Tel: (303) 275-4432, Email: Robert_McCormick@nrel.gov; **André Boehman**, Fuel Science, 114B Hosler Building, University Park, PA 16802-5000, Tel: (814) 865-7839, Email: boehman@ems.psu.edu

Advances in CO₂ Conversion and Utilization – Yun Hang Hu, Department of Materials Science and Engineering, Michigan Technological University, Houghton, MI 49931, Tel: (906)-487-2261, Email: yunhangh@mtu.edu

Thermal, Photochemical, and Photovoltaic Solar Energy Production

Research in Global Climate Challenges.

Computational Methods and Modeling in Fuel Chemistry – Daniel T. Daly, Alabama Institute for Manufacturing Excellence, University of Alabama, Tuscaloosa, AL 35487, Tel: (205) 348-3500, Email: dan.daly@ua.edu

General Papers in Fuel and Energy Chemistry – Andrew M. Herring, Department of Chemical Engineering, Colorado School of Mines, Golden, CO 80401, Tel: (303) 384-2082, Email: aherring@mines.edu

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