

Technical Highlights for May 2012

Fuels, Engines, and Emissions Research Center (FEERC) Organizes 15th Department of Energy (DOE) Cross-Cut Lean Exhaust Emissions Reduction Simulations (CLEERS) Workshop

With more than 115 participants, the 2012 CLEERS Workshop was larger than in the past 2 years. This year's workshop was held from April 30th–May 2nd on the University of Michigan's (UM) Dearborn campus. The technical program included 4 invited and 29 contributed oral presentations as well as 10 posters on measurement, modeling, and simulation of emissions and emissions controls for advanced combustion engines. In addition, there was an invited industry panel presentation and discussion led by representatives from Cummins, Daimler, the Environmental Protection Agency (EPA), Ford, General Motors (GM), and UM. Besides organizing and coordinating the overall workshop, the Oak Ridge National Laboratory (ORNL) contributed five oral technical presentations:

- Josh Pihl – “Experimental Characterization of Chabazite-Zeolite SCR Catalyst Kinetics;”
- Todd Toops – “Mechanistic Investigation of Ethanol SCR of NO_x over Ag/Al₂O₃;”
- Teresa Barone – “An Analysis of DISI Particle Morphology;”
- Andreas Malikopoulos – “Stochastic Optimal Control for Advanced Propulsion Systems;” and
- Mi-Young Kim – “Enhancing Stability of Platinum on Silica by Surface Modification-Application to CO Oxidation.”

ORNL poster presentations included:

- Jae-Soon Choi – “N₂O Formation Pathways during the Regeneration of Lean NO_x Traps;” and
- Todd Toops – “Non-Destructive, Non-Invasive Neutron Imaging of Soot, Ash, and Washcoat Deposition in Particulate Filters.”

ORNL researchers also contributed extensively to several other oral and poster presentations by collaborators, including those by Pacific Northwest National Laboratory, the University of Houston, the University of Kentucky, the Prague Institute of Chemical Technology, Pennsylvania State University, and Gamma Technologies. Additional details and downloads of many of the presentations can be found on the CLEERS website (www.cleers.org) managed by ORNL.

FEERC Participates in 2012 DOE Annual Merit Review

Many FEERC staff participated in the 2012 DOE Annual Vehicle Technologies Merit Review. FEERC had over ten first-author podium presentations and were cited in numerous presentations from universities, other national laboratories, and other divisions across ORNL. This level of participation and reference demonstrated the breadth, depth, and impact of FEERC research in addressing the challenges of advanced transportation and the Vehicle Technologies Program.

FEERC Staff Working to Identify Detailed Barriers to DOE Goals –

Technical Seminar, Brainstorming, Assessment, Review and Planning with Cummins Partners

Staff members Andreas Malikopoulos, Maggie Connatser, Bill Partridge, and Post-Doctoral Research Associates Jon Yoo and Rodrigo Sanchez-Gonzalez of FEERC visited the Cummins Technical Center May 23rd for technical presentations and discussions in support of their ongoing DOE-sponsored collaborations. Dr. Malikopoulos presented a seminar titled “Self-Learning Calibration for Advanced Propulsion Systems” to the Cummins technical staff. In addition to those attending personally, many Cummins staff attended via web link include some at Cummins Emissions Solutions in Madison, Wisconsin. Dr. Connatser gave a Cooperative Research and Development Agreement (CRADA) update to a more focused group on her ongoing sensor and diagnostic work. Dr. Yoo and Dr. Sanchez-Gonzalez conducted separate meetings with Cummins engineers to plan the details of two measurements campaigns associated with the CRADA Combustion and SuperTruck projects; these campaigns will involve joint Cummins-ORNL work applying ORNL-developed analytical tools to assess certain aspects of development engine performance and are planned for the summer 2012 at Cummins facilities in Columbus, Indiana. These follow a similar January 2012 joint-work campaign where application of ORNL research expertise provided specific and novel insights regarding the performance of development air-handling hardware and control which were a key element of guiding modifications for improved performance. Dr. Partridge held planning meetings with his partners Dr. Alex Yezerets and Neal Currier (Emissions CRADA), Sam Geckler (Combustion CRADA) and David Koeberlein (SuperTruck project), and collaborator Mike Ruth (light-duty SuperTruck lead). These types of close and dynamic interactions between industry and national laboratory partners are central to maintaining efficient, focused, and relevant research teams for maximizing the value of the DOE funding which sponsors these programs and enabling effective advancement of the DOE efficiency goals.

FEERC Research was Featured in *Green Car Congress*

(<http://www.greencarcongress.com/2012/05/malikopoulos-20120524.html>):

Recent and current research of Dr. Andreas Malikopoulos on autonomous intelligent propulsion systems was featured in *Green Car Congress*. The article summarized research efforts towards making the engines of the vehicles capable of realizing their optimal calibration with respect to the driver's driving style. Dr. Malikopoulos has recently begun a DOE-funded project on developing autonomous intelligent plug-in hybrid electric vehicles (PHEVs). An early update of this work was presented at the DOE 2012 Annual Merit Review (AMR) meeting (DOE AMR VSS092).

FEERC Researcher was Invited to Attend the 10th Annual National Academies Keck Futures Initiative (NAKFI):

Dr. Andreas Malikopoulos was invited to attend the 10th Annual NAKFI Conference, The Informed Brain in a Digital World. NAKFI is a 15-year effort of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine to catalyze interdisciplinary inquiry and to enhance communication among researchers, funding organizations, universities, and the general public. The objective is to support the climate for conducting interdisciplinary research and to break down related institutional and systemic barriers. NAKFI works towards these objectives by harnessing the intellectual horsepower of approximately 150 individuals from diverse backgrounds who apply to attend its annual “think-tank” style conference and by awarding \$1 million in seed grants – on a competitive basis – to

conference participants to enable further pursuit of bold, new ideas and connections stimulated by the conference.