

► Thursday, October 22, 2009

► 1:00 P.M.

► 366 Colburn Laboratory

Dr. James A. Spearot

General Motors R&D Center

Director of the Chemical and Environmental Sciences Laboratory

James Spearot was appointed director of the Chemical and Environmental Sciences Laboratory at the General Motors R&D Center in August 1998. His laboratory's mission is to develop cost-effective environmental strategies and systems for General Motors products and processes. Key research areas for the laboratory include fuel-cell and energy-storage systems, commercially viable emissions control technology, environmental systems for material processing, fuel and lubricant systems for advanced powertrains, life-cycle analysis and advanced analytical measurements. Dr. Spearot serves as chief scientist for GM's Public Policy Center, lead executive for research programs in Russia and CIS countries, and manager of GM's Hydrogen Storage Innovation Program. He received a B.S. in chemical engineering from Syracuse University in 1967, and a master's and doctorate in chemical engineering from the University of Delaware in 1970 and 1972, respectively.

Dr. Spearot is the recipient of the ASTM Award for Excellence (1990), the Arch T. Colwell Merit Award from SAE (1987), the Award for Research on Automotive Lubricants from SAE (1987), and was recently elected as a Fellow Member of the Society of Automotive Engineers. Additionally, he was honored with a Lifetime Achievement Award from the USCAR.

“Catalysis Challenges for Improved Automotive Emissions Controls”

The demand for more efficient, light-duty motor vehicles having lower fuel consumption is the major driver for a global research effort directed at development of internal combustion engines (ICEs) capable of operating on lean air-fuel mixtures. Engine operation under lean conditions has been demonstrated as a method for improving fuel efficiency, but emissions control is challenging, particularly in regard to meeting regulatory limits for oxides of nitrogen (NOX). This seminar will focus on the status of emissions control technology designed for use during lean IC engine operation.

A short history of emissions control regulations and technology is provided in order to explain how we reached the current state of development. Future regulations on both emissions and fuel economy are pushing the global automotive industry toward development of catalyst systems that operate in an oxygen “rich” atmosphere. Such an atmosphere creates a very difficult environment for reducing oxides of nitrogen in the exhaust gas stream.

The performance, benefits and drawbacks of well-studied NOX control technologies such as urea selective catalytic reduction (SCR) and lean NOX traps (LNTs) will be compared with more recent concepts including hydrocarbon SCR for use in both gasoline and diesel applications. In addition, a new concept, referred to as passive ammonia SCR, will be described and its potential use for meeting future emissions standards is discussed.