

Princeton University

Honors Faculty Members
Receiving Emeritus Status



May 2013

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Faculty Members Receiving Emeritus Status

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Frederick Lewis Dryer



Fred Dryer, a distinguished scholar in the field of energy conversion with a particular interest in the chemistry of combustion and the chemical kinetics of fuels and other materials, has been part of the Princeton community for more than forty-five years. He received his bachelor's degree in aeronautical engineering from Rensselaer Polytechnic Institute in 1966 and a Ph.D. degree in aerospace and mechanical sciences from Princeton University in 1972. He served on the professional research staff in the Department of Mechanical and Aerospace Engineering from 1971 to 1981, before joining the tenured faculty in 1981, becoming a full professor in 1983. His manifold contributions to the science of combustion helped establish Princeton as the premier center for combustion research in the world, and his students carry on his legacy in universities and research centers throughout the world.

Fred's work has always had substantial practical consequences. His research on the chemistry and chemical kinetics of fuels and hazardous waste materials has contributed to the understanding of ignition and combustion, and emissions generation and abatement, while his studies of fuel droplet formation and ignition bear on heavy industrial fuel combustion and emission control. His expertise in fire-safety-related issues has been widely recognized, and his discoveries on particle burning phenomena have important influences on materials processing. Since 1981, his collaborations with NASA have led to fundamental experiments on isolated droplet burning in low-gravity environments in drop tower, two NASA space shuttle glove box experiments, three shuttle compartment experiments, and, most recently, a continuing experimental effort onboard the International Space Station. The experiments and modeling tools developed by his group have contributed new understanding of the fundamental diffusion flame properties of model and real fuels, and to the advancement of fire safety criteria for low-gravity applications.

His publications span a wide range of environmental subjects, especially on hydrocarbon emissions from internal combustion engines, nitrogen oxides, and other pollutant interactions in high-performance gas turbines, and emissions interactions in energy conversion, chemical processing, and incineration. Most recently, his efforts have advanced new approaches for screening renewable alternative fuel candidates for transportation applications. His work has always been marked by the pursuit of both experimental and numerical approaches, which allows fundamental laboratory studies to be immediately incorporated into combustion models and applications development. As he joins the emeritus faculty, Fred's continuing interests in fundamental research and technology transfer include energy conversion efficiency improvements, emission abatement, non-petroleum-derived alternative fuels, fire safety, particle burning phenomena, and nano-catalytic materials.

Fred's work has been vital for producing models of combustion, and his detailed analysis of the kinetics of combustion processes has allowed others to make great progress in computational design and modeling of combustion energy conversion devices. His work has become even more important with time, as national priorities have emphasized the need for alternative fuels, higher efficiency, and lower environmental impact of energy conversion. Fred contributed invited plenary contributions to the International Proceedings of the Combustion Institute in 1976 and 1981, and he has been invited to present another plenary in 2015. In 2000, he and his coauthors received the Silver Medal of the Combustion Institute for contributions to understanding metal combustion. He received the Institute's Alfred C. Egerton Gold Medal in 2012 for his contributions to combustion kinetics.

In addition, Fred has been widely sought after as a member of government advisory panels, as a consultant to industry, and as a journal editor and organizer of conferences. Fred's services on advisory committees include efforts for the National Materials Advisory Board/ National Research Council (five times), NASA, Department of Energy, Defense Advanced Research Projects Agency, Army Research Office, and National Institute of Standards and Technology. He is a former associate editor and editorial board member of *Combustion Science*

and Technology, coeditor for the Proceedings of the 26th and 27th International Symposia on Combustion, and a former editorial board member of the *International Journal of Chemical Kinetics* and of *Progress in Energy and Combustion Science*. He is a member of the Combustion Institute, the American Chemical Society, and the National Fire Protection Association, and he is a fellow of both the American Society of Mechanical Engineers (ASME) and the Society of Automotive Engineers, and an associate fellow of the American Institute of Aeronautics and Astronautics.

Over the years, he has mentored more than forty graduate M.S.E. and Ph.D. students, fourteen postdoctoral research associates and seven professional research staff. Fred has served as an ASME faculty adviser, taken the lead in a number of ABET accreditations, and has always been an outstanding teacher. Fred served as the undergraduate departmental representative from 1984 to 1987, and as associate dean of academic affairs for the School of Engineering and Applied Science from 1987 to 1990. We look forward to enjoying Fred's continuing contributions and collegial fellowship.