You are
cordially invited
to attend

The 36th Annual

Harry G. Fair
Memorial Lecture in
Chemical Engineering

Thursday, February 25, 2010
Seminar – 3:00 P.M.
M-204 Sarkeys Energy Center
100 East Boyd
University of Oklahoma
Norman, Oklahoma

Coffee and refreshments will be served prior to the lecture.

Harry G. Fair Memorial Lecturers

2010	Juan J. de Pablo, University of Wisconsin-Madison
2008	Donald R. Paul, University of Texas at Austin
2007	David Mooney, Harvard University
2007	John Prausnitz, University of California, Berkeley
2006	George Georgiou, University of Texas at Austin
2005	James A. Dumesic, University of Wisconsin
2004	Robert C. Armstrong, Massachusetts Institute of Technology
2003	Nicholas Peppas, University of Texas at Austin
2002	Richard C. Alkire, University of Illinois
2001	Ralph T. Yang, University of Michigan
2000	Enrique Iglesia, University of California, Berkeley
1999	George Stephanopoulos, Massachusetts Institute of Technology
1998	Stuart L. Cooper, University of Delaware
1997	Keith E. Gubbins, Cornell University
1996	H. Scott Fogler, University of Michigan
1995	Gary L. Haller, Yale University
1994	Christopher W. Macosko, University of Minnesota
1993	Larry V. McIntire, Rice University
1992	Dan Luss, University of Houston
1991	E. N. Lightfoot, University of Wisconsin
1990	George A. Samara, Sandia National Labs
1989	James Wei, Massachusetts Institute of Technology
1988	C. Judson King, University of California, Berkeley
1987	Eli Ruckenstein, SUNY Buffalo
1986	Stuart W. Churchill, University of Pennsylvania
1985	John M. Campbell, John M. Campbell & Co.
1984	Richard G. Askew, Phillips Chemical Co.
1983	B. H. Sellers, Sellers Chemical Co.
1982	Lynn T. Reed, Warren Petroleum Co.
1981	Robert S. Purgason, Perry Gas Processors
1980	A. B. Slaybaugh, Conoco Inc.
1979	Charles R. Perry, Perry Gas Cos.
1978	Raymond W. Lowe, E. I. DuPont de Nemours
1977	Laurance S. Reid, Ball-Reid Engineers Inc.
1976	Harry L. Blomquist Jr., Coastal States Gas Co.
1975	Stanley Learned, Phillips Petroleum Co.

School of Chemical, Biological and Materials Engineering
College of Engineering
University of Oklahoma
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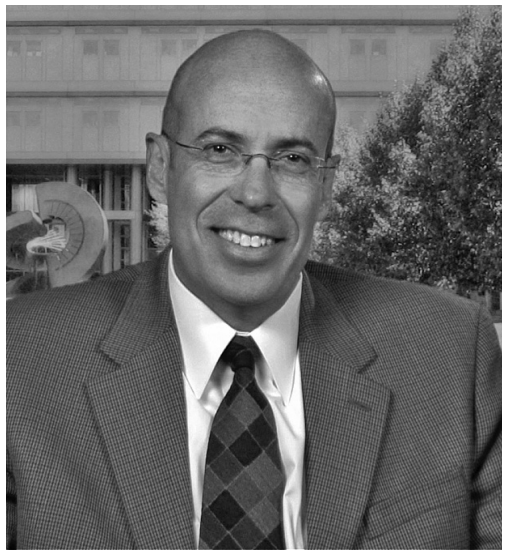
2010



Juan J. de Pablo
Chemical and Biological Engineering
University of Wisconsin - Madison
Madison, Wisconsin, USA

Driven Assembly at the Nanoscale, and its Application to Nanofabrication

Harry G. Fair

Each year, a special lecture is given in memory of Harry G. Fair, an outstanding OU alumnus. Fair was born in Okmulgee, Oklahoma, on June 3, 1916, and earned his bachelor of science degree in chemical engineering in 1939. He joined Phillips Petroleum Co. in 1939 and worked his way up to vice president for supply and transportation, with responsibility for worldwide exchange of crude oil and all transportation facilities. In 1966, Fair joined M.W. Kellogg Co. as executive vice president in charge of all engineering activities. He was named executive vice president of Coastal States Gas Corp. in 1971, a post he held until his death on July 27, 1974. A member of a number of professional societies and a licensed professional engineer, Fair was active in service to society and his alma mater.

This lecture is made possible by the Harry G. Fair Memorial Fund established by his widow, Jane Swift Fair. Arrangements for the lecture are made by the School of Chemical, Biological and Materials Engineering in OU's College of Engineering.

Driven Assembly at the Nanoscale, and its Application to Nanofabrication

Juan J. de Pablo

Chemical and Biological Engineering
University of Wisconsin - Madison
Madison, Wisconsin, USA

There is considerable interest in devising nanofabrication strategies that rely on the molecular self-assembly of complex fluids and materials. Our efforts over the past several years have been focused on conceiving strategies to drive and direct that self assembly, largely by developing multiscale modeling models and methods capable of predicting the structure and properties of complex fluids and materials under external fields, including confinement, electric fields, or flow fields. These models and methods can vary considerably in nature and level of resolution, depending on the system and issues of interest. In this presentation I will discuss three modeling approaches, along with their usefulness and limitations, in the context of three distinct nanofabrication platforms. The first is concerned with the elongation and presentation of long DNA molecules in nanofluidic channels. A coarse grain model, that includes fluctuating hydrodynamic interactions, has been used to design a gene mapping device and to interpret experimental data pertaining to the structure and dynamics of confined chromosome-length DNA. The validity of our results is established by comparison to experiments, to results of detailed molecular dynamics simulations, and to results from coarse grain Lattice-Boltzmann simulations. The second application is concerned with the study of liquid-crystal based biosensors. A multiscale model has been used to design liquid-crystal based devices in which nanoscale particles self assemble into highly regular structures, including chains, upon exposure to proteins or virions. As discussed in this presentation, the model can be used to explain the defects and transmission images that arise in laboratory experiments. The model is validated by comparison to results from experiments and atomistic simulations. The third application is concerned with the formation of ordered, defect-free block copolymer structures on nanopatterned substrates. A new mesoscopic formalism has been developed to describe the structure and dynamics of block copolymer blends and composites, and we use it to explain the effects of surfaces and different types of confining walls on the free energy (and the concomitant stability) of a variety of morphologies of interest for lithographic fabrication. The results of these calculations are consistent with experimental observations, and also with those of detailed many-body simulations.

Juan J. de Pablo Biography

Juan de Pablo is the Howard Curler Distinguished Professor of Chemical Engineering. He is the Director of the NSF-funded Materials Research Science and Engineering Center (MRSEC) on Nanostructured Interfaces at the University of Wisconsin, Madison. Prior to assuming the Directorship of the MRSEC, Prof. de Pablo was Director of the University of Wisconsin's Center for Nanotechnology (CNTECH). Prof. de Pablo received his PhD from the University of California, Berkeley. He holds a BS degree in chemical engineering from the National University of Mexico. He specializes in the modeling and characterization of complex fluids, macromolecular solutions and polymeric materials for advanced applications. He is the author of over 300 publications, a textbook, and several patents. He has received numerous awards, including a PECASE award from the National Science Foundation, a Teacher-Scholar Award from the Dreyfus Foundation, and several awards for outstanding teaching. He is a fellow of the American Physical Society, and he currently serves as Associate Editor of Physical Review Letters, Journal of Physics Condensed Matter, and Journal of Materials Research.