

*You are
cordially invited
to attend*

The 39th Annual

Harry G. Fair Memorial Lecture in Chemical Engineering 2013

Thursday, February 14, 2013
Seminar – 3:00 P.M.
Room M-204
Sarkeys Energy Center
100 East Boyd
University of Oklahoma
Norman, Oklahoma

Coffee and refreshments will
be served.

Accommodations on the basis of disabilities are
available by calling (405) 325-5811.

The University of Oklahoma is an equal
opportunity institution. 2/13

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Harry G. Fair Memorial Lecturers

- 2013 Alexis T. Bell, University of California, Berkeley
- 2012 Charles Zukoski, University of Illinois at Urbana-Champaign
- 2011 Peter C. Stair, Northwestern University
- 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.

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Norman, Oklahoma 73019-1004



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and Materials Engineering
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Alexis T. Bell

Chemical and Biomolecular Engineering
University of California
Berkeley, California, USA

*Effects of Local
Composition, Structure and
Confinement on the
Activity and Selectivity of
Catalytically Active Sites*



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.

Effects of Local Compositions, Structure, and Confinement on the Activity and Selectivity of Catalytically Active Sites

Alexis T. Bell

Chemical and Biomolecular Engineering
University of California
Berkeley, California, USA

The activity and selectivity of catalysts are strongly affected by the local environment of the active site. If the site is a well defined species, e.g. a metal cation, and metal oxo species, and can be described precisely, then it is possible to undertake careful modifications of the chemical and structural environment of the site. Such observations lead to the recognition that not only the electronic properties of the site, but also the spatial confinement of the site and the presence of elements not directly involved in the chemistry of the local site can affect the activity and selectivity of the site. This talk will illustrate these effects for several reactions and will demonstrate that considerable insight into the extent to which electronic versus structural factors affect the progress of catalytic reactions can be developed by combining experimental and theoretical techniques. Examples to be presented include the cracking and dehydrogenation of butane on H-MFI, H-BETA, and H-MOR; the carbonylation of dimethoxy methane by H-FAU and H-MFI; the oligomerization of propene by Ni-X; and the oxidation of propene to acrolein on $\text{Bi}_2\text{Mo}_3\text{O}_{12}$.

Alexis T. Bell

Alexis T. Bell is the Dow Professor of Sustainable Chemistry in Chemical Engineering in the College of Chemistry at the University of California at Berkeley, and Principal Investigator at Lawrence Berkeley National Laboratory.

He received his undergraduate degree in Chemical Engineering from the Massachusetts Institute of Technology in 1964 and his Ph.D. from there in 1967. Bell has recorded over 596 publications on various aspects of heterogeneous catalysis and chemical reaction engineering.

From 1979-1981 he was the Assistant Dean, College of Chemistry, at the University of California, Berkeley, and Chairman of the Department of Chemical Engineering 1981-1991 and 2005-2006. He was Dean of the College of Chemistry from 1994-1999. He was the Theodore Vermeulen Professor of Chemical Engineering from 2007-2009 and became the Dow Professor of Sustainable Chemistry in 2009.

He has served as Editor in Chief, Chemical Engineering Science, 2006-2011; Editor in Chief, Catalysis Reviews-Science and Engineering, 1985-present; and as Editor, Proceedings of the National Academy of Sciences, 2011-present.

His honors and awards include Elected to the National Academy of Engineering, 1987; Fellow, Japan Society for the Promotion of Science, 1994; Robert Burwell Lecturer, North American Catalysis Society, 2003; AIChE William H. Walker Award for Contributions to the Chemical Engineering Literature, 2005; Michel Boudart Award for the Advancement of Catalysis, 2007; Giuseppe Paravanno Award for Excellence in Research in Catalysis, given by the Michigan Catalysis Society, 2007; elected member of the American Academy of Arts and Sciences, 2007; identified as one of the "One Hundred Engineers of the Modern Era" by AIChE, 2008; elected member of the National Academy of Sciences, 2010; ACS George A. Olah Award for Research in Hydrocarbon or Petroleum Chemistry, 2013.