

Case Western Reserve University
10900 Euclid Avenue
Cleveland, Ohio 44106-7078

Frontiers in Chemistry

CASE WESTERN RESERVE UNIVERSITY



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The Sixty-Sixth FRONTIERS IN CHEMISTRY

2006-2007

FRONTIERS IN CHEMISTRY

Case Western Reserve University
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The Frontiers in Chemistry series has been held on campus since 1941. The speakers are sponsored by local industrial and government laboratories and the University. The lectures are free.

SCHEDULE: Most lectures are on Thursday at 4:30 p.m. However, one lecture is on Friday at 4:00 p.m. Coffee and tea are available before the lectures.

LOCATION: Most of the lectures are in the Goodyear Lecture Hall. However, the lectures of Thursday, September 21, and Friday, October 13, are in the Schmitt Auditorium.

PARKING: Parking is available at all Case Visitor parking lots. Bring your parking stub for validation.

DINNER: The lectures are generally followed by dinner at a local restaurant. Those who wish may join the dinner (participants pay the restaurant individually). Reservations are required by the Monday preceding the lecture.

INQUIRIES AND DINNER RESERVATIONS:

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FRONTIERS LECTURE SERIES COMMITTEE

Prof. Malcolm E. Kenney

Chair, *Frontiers in Chemistry* Series
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Dr. Orest Adrianowycz
GrafTech International

Dr. Saeed Alerasool
BASF Catalysts LLC

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Ferro

Dr. Michael Meador
NASA

Dr. Madhukar Rao
Sherwin-Williams

Dr. Scott Rickert
NanoFilm

Dr. Richard Vickerman
Lubrizol

The University acknowledges with appreciation the guidance provided by the external members of the Frontiers in the Chemistry Lecture Series Committee. Additional support has been provided by Bridgestone Firestone and Sherwin-Williams.



Chemical Dynamics

Powering the Planet: The Challenge for Science in the 21st Century September 21, 2006

The supply of secure, clean, sustainable energy is arguably the most important scientific and technical challenge facing humanity in the 21st century. Energy security, national security, environmental security, and economic security can likely only be met through addressing the energy problem within the next 10 - 20 years.



Daniel G. Nocera
W. M. Keck Prof. of Energy and Prof. of Chemistry

Massachusetts Institute of Technology

Case Chemical Dynamics Lecturer

DNA Charge Transport Chemistry and Biology

Friday, October 13, 2006

Long range signaling among DNA-bound proteins through DNA-mediated charge transport may permit the rapid detection of DNA lesions and mispairs within the cell. This presentation will describe photophysical, electrochemical and biochemical experiments conducted to characterize charge transport through DNA.



Jacqueline K. Barton
Arthur and Marian Hanisch Mem. Prof. of Chemistry

California Institute of Technology

Innovation Chem Tech Lecturer

Dynamics of Electrons at Interfaces on the Femtosecond Timescale

October 19, 2006

Ultrafast electron dynamics at metal/molecule interfaces are studied by two-photon photoemission on the femtosecond time-scale and nanometer length-scale. This technique can be used to study of the dynamics of chemisorption, electron solvation, localization, and interfacial momentum scattering.



Charles B. Harris
Gilbert Newton Lewis Professor of Chemistry

University of California, Berkeley

Case Chemical Dynamics Lecturer

Single Molecule Spectroelectrochemistry

November 9, 2006

In the last decade our group has been investigating the spectroscopy of conjugated polymers, one molecule at a time, in order to address several central issues in how conjugated polymeric materials function in critical applications such as organic light emitting displays (OLEDS) and photovoltaic devices for solar energy conversion.



Paul F. Barbara
Johnson-Welch Regents Chair and Professor of Chemistry

University of Texas, Austin

Case Chemical Dynamics Lecturer

Molecular Electronics: Driving Electrons through Molecules

November 16, 2006

The nature of charge transport in molecular junctions will be discussed. The talk will center on scattering theory, vibronic coupling structural disorder and device applications.



Mark A. Ratner
Morrison Professor of Chemistry

Northwestern University

Case Chemical Dynamics Lecturer

Bioinorganic Chemistry

Metal Clusters in Biology: An Ongoing Challenge to Inorganic Synthesis

February 22, 2007

Complex metal cluster sites in biology are examined in the context of chemical synthesis. Recent developments in the synthesis of the the Fe-S and Mo-Fe-S clusters of nitrogenase and the Ni-Fe-S cluster of carbon monoxide dehydrogenase are described.



Richard H. Holm
Higgins Professor of Chemistry

Harvard University

Energizer Lecturer

Myths, Misconceptions, and the Molecular Mechanism of Lead Poisoning

March 8, 2007

Even though lead poisoning is the most common environmentally-caused disease in the United States, the molecular mechanism of lead poisoning has remained largely unexplored until recently. New studies on the biochemistry of Pb(II) have pointed to new potential targets for lead and have unveiled fundamental misconceptions about the biological chemistry of lead.



Hilary A. Godwin
Howard Hughes Medical Institute Professor

Northwestern University

Lubrizol Lecturer

Interactions of Dirhodium Biologically Active Complexes with DNA

March 22, 2007

Our spectroscopic and X-ray crystallographic studies as well as the various biochemical assays we have conducted have provided unambiguous evidence that dirhodium compounds bind to nucleobases, DNA fragments and double-stranded DNA. These studies provide a backdrop for the design new anticancer drugs.



Kim R. Dunbar
Davidson Professor of Science
Professor of Inorganic Chemistry

Texas A&M University

NASA Lecturer

Supramolecular Metal Clusters as Nanoscale, Chiral Flasks

April 26, 2007

Supramolecular architectures found in nature have inspired the design, synthesis and use of nanoscale molecular clusters formed through self-assembly from simple metal and ligand components. The clusters made are homochiral and resolvable because of tris-bidentate chelation at the metal vertices and mechanical linkage between the metal vertices.



Kenneth N. Raymond
Professor of Chemistry

University of California, Berkeley

BASF Catalysts Lecturer