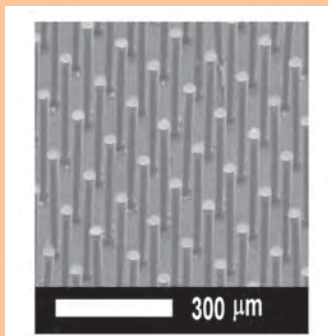


Frontiers in Chemistry
Case Western Reserve University
10900 Euclid Avenue
Cleveland, Ohio 44106-7078



CASE WESTERN RESERVE
UNIVERSITY EST. 1826

The Sixty-Eighth FRONTIERS IN CHEMISTRY



Fall



Spring

2008-2009

FRONTIERS IN CHEMISTRY

Case Western Reserve University
2008-2009

The Frontiers in Chemistry Series dates to 1941. The speakers are sponsored by local industrial and government laboratories, and the University. The lectures are free.

SCHEDULE Lectures are on Thursdays at 4:30 p.m. Coffee and tea are available before the lectures.

LOCATION The lectures are in the Goodyear Lecture Hall (Clapp 108).

PARKING Parking is available at all Case visitor parking lots. Please bring your parking stub for validation.

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

INQUIRIES AND DINNER RESERVATIONS

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INFORMATION

<http://www.case.edu/artsci/chem/>

FRONTIERS LECTURE SERIES COMMITTEE

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BASF Catalysts

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Energizer

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Goodyear

Dr. Kenneth Hardee
ELTECH Systems

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Dr. Daniel Knapton
Lubrizol

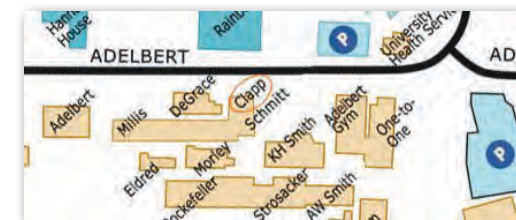
Dr. John Maloney
Ferro

Dr. Michael Meador
NASA

Dr. Madhukar Rao
Sherwin-Williams

Dr. Scott Rickert
NanoFilm

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



The great help of professors Scherson and Greenspan in this year's Frontiers is acknowledged.

Energy Storage

Conservation through Kinetic Energy Harvesting

September 25, 2008

Significant quantities of energy are available for capture and reuse provided suitable storage media are available. Electrochemical capacitor technology, fast becoming the preferred media due to its rapid and efficient capture rate plus high cycle life, will be featured and compared with alternative storage media.



John R. Miller

President
JME, Inc.
Cleveland

GLIEI Lecturer

Campus host Prof. Miller

Optimizing Electrode Materials for Use in Li-Ion Batteries

October 16, 2008

Cheap, safe batteries, which can be charged and discharged quickly, are durable, and can withstand a wide range of temperatures, are required for high power applications such as hybrid electric vehicles and electric vehicles. Our work on this problem has focused on understanding the role of local structure in electrochemical function.



Clare P. Grey

Professor and Associate Director
Center for Environmental and Molecular Science
Stony Brook

GLIEI Lecturer

Campus host Prof. Burgess

3-D Battery Architectures for Micropower Applications

October 23, 2008

Three-dimensional battery architectures offer a new approach for miniaturized power sources. This presentation will review recent advances in the development of 3-D microbatteries and the challenges facing this technology.



Bruce S. Dunn

Professor of Materials Science and Engineering
UCLA

NASA Glenn Lecturer

Campus host Prof. Protasiewicz

First Principles Methods for the Design of Materials

November 20, 2008

First principles methods can now be used to predict many properties of materials. Even crystal structure and surface chemistry, long elusive to computational modeling, can now be predicted with novel methods. I will show applications for materials in electrocatalysts and rechargeable batteries.



Gerbrand Ceder

R.P. Simmons Professor of Materials Science and Engineering
MIT

Energizer Lecturer

Campus host Prof. Anderson

Recent Materials Advances in Li-Ion Battery Research

February 12, 2009

The rational development of new and “greener” electrode materials is a tremendous challenge for chemists. We have created paths using low temperature reactions to prepare nano-size electrode materials and have used bio-synthesized materials to make electrodes.



Jean-Marie Tarascon

Professor
Laboratoire de Reactivite et de Chimie des Solides
Universite de Picardie Jules Verne

YCES Lecturer

Campus host Prof. Scherson

Molecular Evolution

Efforts to Expand the Genetic Alphabet

February 19, 2009

We have developed unnatural base pairs that are efficiently replicated by DNA polymerases and transcribed by RNA polymerases with efficiencies approaching that of natural base pairs. Along with an activity-based selection system that is being used to tailor polymerases to better accept the unnatural base pairs, we are exploring the expansion of the genetic alphabet for *in vitro*, and eventually *in vivo* applications.



Floyd Romesberg

Associate Professor
Department of Chemistry
Scripps Research Institute

Institute for Science of Origins Lecturer

Campus host Prof. Crespo

Molecular Self-Assembly

April 2, 2009

The lecture traces the structures and dynamics of molecules capable of recognition and catalysis. Their behavior as templates and containers will be discussed from a supramolecular chemistry perspective.



Julius Rebek, Jr.

Director and Professor
Skaggs Institute for Chemical Biology
Department of Chemistry
Scripps Research Institute

Lubrizol Lecturer

Campus host Prof. Lee

Systems Chemistry

April 16, 2009

Systems chemistry is an emerging discipline concerned with developing theoretical and synthetic models to uncover the chemical roots of biological information processing, organization, and function. In this lecture I will present various approaches developed in our laboratories for the design and study of self-replicating peptides, complex adaptive networks, and dynamic informational systems.



M. Reza Ghadiri

Professor
Department of Chemistry
Scripps Research Institute

Institute for Science of Origins Lecturer

Campus host Prof. Tochtrop

RNA-Mediated Epigenetic Inheritance

April 23, 2009

DNA rearrangements occur in many organisms but are most exaggerated in ciliates such as *Oxytricha*. This ciliate destroys 95% of its genome, and then unscrambles thousands of the resulting pieces. A complete RNA cache may provide a template for rearrangement, revealing the power of RNA molecules to sculpt information across generations.



Laura F. Landweber

Associate Professor
Department of Ecology & Evolutionary Biology
Princeton University

BASF Lecturer

Campus host Prof. Viswanathan