

## The Sixty-Ninth FRONTIERS IN CHEMISTRY

### FRONTIERS IN CHEMISTRY

Case Western Reserve University  
2009-2010

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** The 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

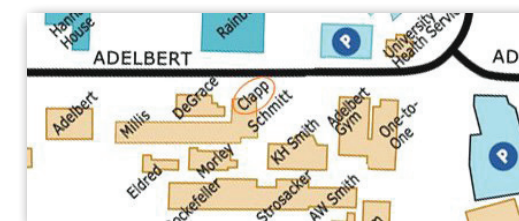
<http://www.case.edu/artsci/chem/>

### FRONTIERS LECTURE SERIES COMMITTEE

**Prof. Malcolm E. Kenney**  
Chair, *Frontiers in Chemistry* Series  
Department of Chemistry, CWRU  
[malcolm.kenney@case.edu](mailto:malcolm.kenney@case.edu)  
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<b>Dr. Orest Adrianowycz</b> GrafTech International	<b>Dr. Kenneth Hardee</b> ELTECH Systems
<b>Dr. Saeed Alerasool</b> BASF Catalysts	<b>Dr. Terrence Hogan</b> Bridgestone Firestone
<b>Dr. Pramod Arora</b> Innovation Chemical Technologies	<b>Dr. Michael Faile</b> Lubrizol
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<b>Dr. Frank Feddrix</b> Energizer	<b>Dr. Madhukar Rao</b> Sherwin-Williams
<b>Dr. William Francik</b> Goodyear	<b>Dr. Scott Rickert</b> NanoFilm

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



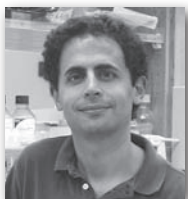
2009-2010

## Biological Chemistry

### Activity-Based Proteomics: Applications for Enzyme and Inhibitor Discovery

September 10, 2009

I will discuss our lab's efforts to develop and apply activity-based protein profiling for mapping enzymatic pathways in mammalian biology, with a particular emphasis on the functional characterization of dysregulated pathways in cancer. Future challenges facing the implementation of chemical strategies for functional proteomics will also be discussed.



**Benjamin F. Cravatt**

Professor and Chair  
Department of Chemical Physiology  
*Skaggs Institute for Chemical Biology*  
*Scripps Research Institute*

Case Lecturer

Campus host G. P. Tochtrop

### DNA Replication: The Coordination of Leading/Lagging Strand Synthesis

October 29, 2009

The copying of duplex DNA by a replisome requires that replication proceeds in opposing directions owing to the polarity of the DNA. How this is achieved by the T4 replisome has been the focus of ensemble and single molecule experiments.



**Stephen J. Benkovic**

Evan Pugh Professor and Eberly Chair  
in Chemistry  
Department of Chemistry  
*Pennsylvania State University*

Berdis and Lee Lecturer

Campus host I. Lee

### Bridged Polycyclic Natural Products: Inspirational Targets for Total Synthesis

November 5, 2009

Bridged polycyclic natural products contain substructures that inspire synthetic chemists to devise numerous and diverse strategies for their synthesis. This lecture will describe case studies wherein molecules of this type have inspired the development of new synthetic strategies and led to the discovery of new synthetic methods.



**John L. Wood**

A.I. Meyers Professor of Chemistry  
Department of Chemistry  
*Colorado State University*

Innovation Chemical Technologies Lecturer

Campus host R. Viswanathan

### Lessons from Bugs

November 19, 2009

A remarkable suite of genetically encoded small molecules mediates the interactions of insects, fungi, and bacteria in complex multilateral systems. Analysis of these molecules provides insights ranging from the discovery of new molecules with useful properties to the regulation and evolution of small molecule biosynthesis.



**Jon Clardy**

Professor of Biological Chemistry and  
Molecular Pharmacology  
Harvard Medical School  
*Harvard University*

Bridgestone-Firestone / Case Lecturer

Campus host R. Viswanathan

## Solar Energy

### Energy and Charge Transport in Self-Assembled Systems for Solar Energy Conversion

January 28, 2010

Our research is focused on understanding the fundamental structural and electronic requirements for efficiently moving energy, charge, and spin through molecules and materials. In this presentation we will describe our recent work on using photons to initiate and control the movement of energy and charge within new molecular systems produced by a combination of chemical synthesis and self-assembly.



**Michael R. Wasielewski**

Professor  
Department of Chemistry  
*Northwestern University*

NASA Lecturer

Campus host D. A. Scherson

### Paths to Improving the Excitonic Solar Cell

February 11, 2010

Polymer-based photovoltaic solar cells are an emerging technology, but are they emerging too slowly? This lecture will examine the basic science of these new devices to see where disruptive improvements in performance might be found.



**Garry Rumbles**

Research Fellow  
Department of Chemical Sciences and  
Nanoscience  
*National Renewable Energy Laboratory*

Energizer Lecturer

Campus host G. Sauvé

### Sunlight-Driven H<sub>2</sub> Formation by Photoelectrochemical Water Splitting

March 18, 2010

We are developing an artificial photosynthetic system that will utilize only sunlight and water as the inputs and will produce hydrogen and oxygen as the outputs. The photoanode and photocathode will consist of rod-like semiconductor components, with attached heterogeneous multi-electron transfer catalysts. These are needed to drive the oxidation or reduction reactions at low overpotentials.



**Nathan S. Lewis**

George L. Argyros Professor  
Division of Chemistry and Chemical  
Engineering  
*California Institute of Technology*

Case Lecturer

Campus host G. Sauvé

### Solar Fuels from Sunlight

April 8, 2010

Any new energy future with solar as a centerpiece must solve the problem of energy storage. The key is solar fuels, solar-driven water splitting to hydrogen and oxygen or solar-driven water reduction of CO<sub>2</sub> to hydrocarbons.



**Thomas J. Meyer**

Arey Distinguished Professor of Chemistry  
Department Chemistry  
*University of North Carolina, Chapel Hill*

Lubrizol Lecturer

Campus host J. D. Protasiewicz