



Society for Analytical Chemists OF PITTSBURGH



OCTOBER MEETING

Monday, October 6, 2008
8:00 p.m.

Duquesne University
Laura Falk Hall

Dinner: City View Café (6th Floor)



HENRY S. WHITE, PH.D.

PROFESSOR OF CHEMISTRY
UNIVERSITY OF UTAH

"Electrochemistry in Synthetic and Biological Nanopores"



5:30 PM	Social Hour.....	Student Union – City View Café (6 th Floor)
6:30 PM	Dinner.....	Student Union – City View Café (6 th Floor)
7:30 PM	Student Affiliate Meeting.....	Mellon Hall – Room 410
7:40 PM	Business Meeting.....	Mellon Science Building – Laura Falk Hall
8:00 PM	Technical Meeting.....	Mellon Science Building – Laura Falk Hall

ABSTRACT:

Advances in molecular biology and analytical chemistry have led to a new class of sensors based on electrochemical and electrical measurements of molecular fluxes and ion conductances in pores of nanometer dimensions. In this presentation, the fabrication of biochemical sensors based on “glass nanopore electrodes” and “glass nanopore membranes”, will be described. These structures are fabricated from glass and quartz, and contain a single conical shaped pore with orifice radius between 5 and 500 nm. A consequence of the conical shape is that the observable ion conductance (or redox molecule flux) largely reflects the magnitude of the solution resistance in the immediate vicinity of the pore orifice. This property makes the electrical response of the glass nanopores very sensitive to small numbers of chemical interactions between analyte molecules and the orifice surface.

Glass nanopore electrodes and membranes with orifice radii as small as 5 nm have been chemically modified by: covalent attachment of receptor molecules to the glass surfaces; by filling the pore volume with polymers and hydrogels; and by deposition of lipid bilayers across the pore orifice. These chemical modifications impart selectivity and sensitivity (single molecule and single particle detection) for a diverse range of applications, including protein ion channel recordings; (2) resistive pulse counting of particles with diameters as small as 10 nm; (3) sensors for a variety of environmental stimuli (e.g., photons, pH); and (4) use as a structural support for ion-selective electrodes.

DINNER RESERVATIONS:

Please email Larry Senor, Arrangements Co-Chair at senor@pittcon.org, by Thursday, October 2, 2008 to make dinner reservations. Should you not have email, please call Larry at 724-327-4428. If you want to be placed on the permanent dinner list, let Larry know when you RSVP. The entrée for October is Wiener Schnitzel. Dinner will cost \$8 (\$4 for students) and checks can be made out to the SACP. If you have any dietary restrictions, let Larry know when you leave message.

PARKING:

Duquesne University Parking Garage entrance is on Forbes Avenue. Upon entering the garage, you will need to get a parking ticket and drive to upper floors. Bring your parking ticket to the dinner or meeting for a validation sticker. Contact Dr. Mitch Johnson at Duquesne University if any difficulties arise.

BIOGRAPHY:

Henry S. White received the B.S. degree in chemistry from the University of North Carolina (1978) and the Ph.D. degree in chemistry from the University of Texas (1983). Following a postdoctoral appointment at the Massachusetts Institute of Technology, he joined the faculty of the Department of Chemical Engineering and Materials Science at the University of Minnesota, where he was the McKnight and Shell Professor of Chemical Engineering. In 1993, he moved to Chemistry at the University of Utah.

Professor White's research spans experimental and fundamental electrochemistry, with interests in biological, physical, and materials chemistry. His group has contributed to electrochemistry in nanoscale domains, interfacial electric field effects on the behavior of surface-confined redox molecules, electroosmotic transport of drugs through human skin, application of magnetic fields in electrochemistry, SECM methodology for visualizing and quantifying porous membrane transport, and theory describing the interplay of molecular transport and the electrical double layer. Current research interests include electrochemistry in ultrathin-layer cells, the nanopore electrode sensor, electrochemical particle counting methods, collision theory at nanoscale electrodes, and magnetoelectrochemistry using magnetic electrodes. He is the recipient of the Faraday Medal of the Royal Society of Chemistry, the Reilley Award of the Society of Electroanalytical Chemistry, the Grahame Award of the Electrochemical Society, and the ACS Analytical Division Award in Electrochemistry, and the University of Utah Distinguished Scholarly & Creative Research Award. White is an Associate Editor of the *Journal of the American Chemical Society*.