



Spectroscopy Society of Pittsburgh

January Meeting

Wednesday – January 21, 2015

Duquesne University



5:30 PM Technology Forum Speaker's Presentation - **Laura Falk Hall located in Mellon Hall**
5:30 to 6:30PM Social Hour - **City View Café (6th Floor of Union)**
6:30PM Dinner - **City View Café (6th Floor of Union)**
8:00PM Business Meeting– **Laura Falk Hall located in Mellon Hall**
8:15PM Technical Program Speaker's Presentation– **Laura Falk Hall located in Mellon Hall**

Deadline for Dinner Reservations 1/15/15 at NOON

[On-line Reservations](#)

TECHNICAL PROGRAM - 8:15 PM

Paul Cremer – Pennsylvania State University
“**Surface Specific Spectroscopy**”

We have employed surface specific vibrational spectroscopies to interrogate the interactions of ions with self-assembled monolayers and proteins at aqueous interfaces. The results provide direct insight into ion-surface interactions. In particular, I will discuss the behavior of cations and anions as they relate to the Hofmeister series, which is a rank ordering of the efficacy of these species to influence the physical behavior of colloidal and interfacial systems in solution (Figure 1).

Figure 1. Schematic diagram of the VSFS (vibrational sum frequency spectroscopy) setup for quartz/water interface studies. Analogous experiments were also conducted at other solid/liquid and liquid/vapor interfaces.

Experiments consisted of a combination of sum frequency generation and thermodynamic measurements. Ion specific effects at these interfaces were found to be determined by several factors. These include the sign and magnitude of the surface potential, ion pairing effects in the double layer, as well as the presence of polar and nonpolar interfacial moieties. At negatively charged, hydrophilic surfaces, we found that Na^+ adsorption and double layer formation was modulated by the nature of the counterion in solution (Figure 2).

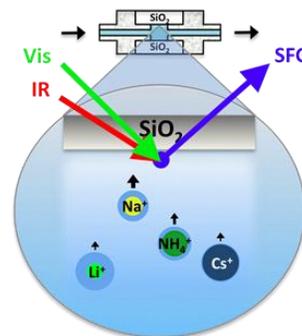
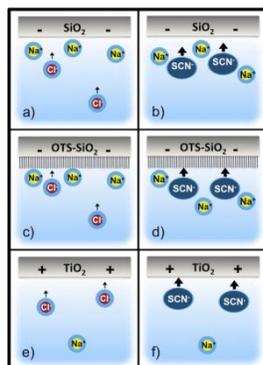


Figure 2. Schematic illustration of the partitioning of ions to positively/negatively charged and hydrophilic/hydrophobic interfaces in aqueous solutions.



For the anions, it was found that SCN^- was less depleted at the interface compared with better hydrated anions such as Cl^- . The same ordering was observed for the anions whether this interface was relatively hydrophobic or hydrophilic. Changing the sign of the charge at the interface also led to a similar Hofmeister ordering. Curiously, the ordering for cations at these aqueous interfaces was found to be more sensitive to the specific surface chemistry. Moreover, at negatively charged hydrophilic surfaces, the smallest and best hydrated cations were mostly favored over more poorly hydrated cations. By contrast, well hydrated cations were repelled from more apolar surfaces. Li^+ displayed somewhat anomalous behavior. All of these results will be described in relation to behavior at the polymer/aqueous and protein/aqueous interfaces.



Paul Cremer is from Milwaukee, WI and received his B.A. from the University of Wisconsin-Madison in 1990 and his Ph.D. in chemistry at the University of California-Berkeley in 1996. He was the American Chemical Society, Irving S. Sigal Postdoctoral Fellow at Stanford University from 1996-1998. Following this, he was a professor of chemistry at Texas A&M University for 14 years where he most recently held the Arthur E. Martell Chair in chemistry. In January, 2013 his laboratory moved to the Penn State University where he currently serves as the J. Llyod Huck Chair in Natural Sciences. He is a Fellow of the American Chemical Society as well as the American Association for the Advancement of Science. He also serves as an associate editor for the Journal of the American Chemical Society. The Cremer

group works in the intersection of physical chemistry, biological chemistry, sensor design, and nanomaterial science. This involves the development of high throughput microfluidic devices, which allows his group to investigate protein folding, protein-membrane binding interactions, and the properties of lipid bilayers in lab-on-a-chip formats. These microfluidic experiments are complemented by spectroscopies and microscopies such as sum frequency generation (SFG), ATR-FTIR, surface enhanced Raman spectroscopy, fluorescence quenching, and NMR to elucidate the molecule level details of biointerfacial processes. This has provided new insights into ion interactions with lipid membranes and proteins in aqueous solutions.

TECHNOLOGY FORUM - 5:30 PM

Teri Grendzinski, National Aviary

“African Penguins: The Other Penguins in Pittsburgh”

Teri Grendzinski will be discussing some of the common misconceptions about penguins. She will be accompanied by an African Penguin from the National Aviary.



Teri Grendzinski is the Supervisor of Animal Collections at the National Aviary where she has worked for 21 years. She has experience caring for birds from hummingbirds to condors. She oversees the staff that provides care for the animals that live on exhibit and in the off exhibit breeding areas. She also helps to hand raise baby birds and takes care of the new birds coming into the collection.

Dinner Reservations:

Please register on-line at <http://www.ssp-pgh.org/monthly-meeting-rsvp/> to make dinner reservations NO LATER THAN Thursday, January 15, 2015 at noon. This month's entrée will be Chicken Saltimbocca or a vegetarian option. Dinner will cost \$10 (\$5 for students) and checks can be made out to the SSP. If you have any dietary restrictions, please indicate them when you RSVP.

Parking Instructions:

The Duquesne University Parking Garage is located on Forbes Avenue. Upon entering the garage, receive parking ticket and drive to upper floors. Pick up a parking chit at the dinner or meeting.