



Order and Disorder in Chromatography

Dr. Lane C. Sander

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Abstract:

Covalently modified surfaces represent a unique state of matter that is not well described by liquid or solid phase models. The chemical bond in tethered alkanes imparts order to the surface in the form of anisotropic properties that are evident in chromatographic and spectroscopic studies. An understanding of the structure, conformation, and organization of alkyl-modified surfaces is requisite to the design of improved materials and the optimal utilization of existing materials. In recent years, the study of alkyl-modified surfaces has benefited from advances in modern analytical instrumentation. Aspects of alkyl chain conformation and motion have been investigated through the use of nuclear magnetic resonance spectroscopy, Fourier Transform infrared spectroscopy, Raman spectroscopy, fluorescence spectroscopy, and neutron scattering studies. Spectroscopic studies of these phases indicate that when shape selective conditions are employed, the surface ligands possess considerably more molecular order. Chromatography provides complementary evidence of alkyl chain organization through interactions with solute probes. Computational simulations offer insights into the structure of covalently modified surfaces that may not be apparent through empirical observation. Molecular dynamic simulations of phase models have also demonstrated that the alkyl ligands are more ordered under shape selective conditions and indicate that cavities may form on these relatively homogeneous surfaces, resulting in "slots" that may only accommodate molecules of a particular size and shape. This presentation reviews progress achieved in the study of the architecture of alkyl-modified surfaces.

About the Speaker:

Lane C. Sander received his Ph.D. in Analytical Chemistry at the University of Washington in 1982, under the direction of Prof. Larry Field. He was awarded a National Research Council Postdoctoral Fellowship at the National Institute of Standards and Technology (NIST; formerly the National Bureau of Standards) in 1982 to investigate the synthesis, characterization, and application of novel chromatographic sorbents. Initial efforts in collaboration with Dr. Stephen Wise led to the development of polymeric stationary phases, which characteristically exhibit enhanced discrimination of isomers based on molecular shape. These early chromatographic studies were expanded to include investigations of stationary phase morphology through spectroscopic approaches, and correlations with computational simulations of modified surfaces. Based on these findings, Dr. Sander developed the first column tailored for the analysis of carotenoid isomers, utilizing a polymeric C30 stationary phase. The goal of these research efforts is the improvement of chemical metrology in environmental, clinical, and food science disciplines.

Dr. Sander is a member of the American Chemical Society and the Chemical Society of Washington, and is a former President, Vice President and Program Chairman of the Washington Chromatograph Discussion Group. He is also a former lecturer at Georgetown University, and is an editorial advisory board member of the Journal of Chromatography. Dr. Sander has authored over 160 publications in the peer reviewed literature and other venues (book chapters, review articles, and NIST publications), and has one patent pending. He was awarded the Department of Commerce Bronze Medal for his research on fundamental studies in chromatography. He is currently Leader of the Organic Chemical Metrology Group within the Analytical Chemistry Division, NIST.

Location:
Integrated Service Solutions, Inc.

1565 Bustard Road
Lansdale, PA 19446
Tele. 610.287.3433

Times:
Executive Mtg - 5:00 pm
Social "Hour" - 5:45 pm
Dinner - 6:30 pm
Presentation - 7:30 pm

Cost of Dinner:
\$30 or MC/Visa /AmEx

Directions:
<http://integratedservicesolutions.com/directions.shtml>

NOTE TO STUDENTS: Full-time students with valid ID may attend dinner meetings at half price. **Faculty members at colleges and universities are urged to bring one or more students to the meeting. If they do, they also can attend at half-price.**

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- **Introductory HPLC – May 10-12, 2010**
- **Gas Chromatography – May 17-19, 2010**
- **Advanced HPLC with LC/MS – June 7-9, 2010**

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Dinner Choices: Buffet: including Asparagus and Sundried Tomato Penne Pasta in Chardonnay Cream Sauce, Chicken Picatta, and Teriyaki Pistachio Crusted Salmon.

For Reservations:

Please register/call before 4 p.m., **Friday, May 7th, 2010**. Please note that "no-shows" will be billed for the dinner.

Late reservations: We still want you to attend, so call now. However, we cannot guarantee your entrée selection for dinner.

Contact: We strongly recommend online registration <http://www.cfdv.org/> but you can also e-mail sheree@cfdv.org, or FAX 610-485-9467. For FAX/e-mail, please include your name, employer, work telephone & meal choice. Alternatively, call Ms. Sheree Gold at 610-742-4981 and provide same information.

Directions to:

Integrated Service Solutions, Inc.

From Philadelphia and South

- Take the Schuylkill Expressway, I-76 West
- Merge onto I-476 N (Blue Route) via exit 331B to Plymouth Mtg
- ****Toll Road**** (PA Turnpike) At Exit 20 stay on I-476 North East
- Exit 31 Lansdale Exit
- Turn left at Traffic Light at end of Ramp. Route 63 East/Sumneytown Pike
- 2nd light turn right at Bustard Rd. After making the turn you will see Towamencin Corporate Center. Make left turn into corporate center and immediate right into parking area. There is a sign in front of the building and plenty of parking.
- To gain access to the facility, press the call box button located to the right of the main entrance.