



SoFlacs



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South Florida Section ACS

September 2018

Section Meetings

Thursday, September 27
5:00 – 5:50 PM
116W Wiegand Science Building
Barry University, Miami Shores

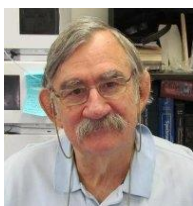
Friday, September 28
2:30 – 3:20 PM
166 Cox Science Building
University of Miami*, Coral Gables

Recent Developments in Supercritical Fluid Chromatography

Terry Berger, PhD, DIC

Supercritical Fluid Chromatography Solutions, Inc., Englewood, FL

In the last few years analytical scale supercritical fluid chromatography (SFC) instruments have been offered by 4 of the largest instrument vendors (Agilent, Jasco, Shimadzu, and Waters). While these instruments are sometimes characterized as "ultra-high performance" similar to ultra-high performance liquid chromatography (UHPLC), the extra-column dispersion in the SFC's is on the order of 35-90 μL^2 , whereas in LC such dispersion is sometimes $< 1\mu\text{L}^2$. The main reason for such low dispersion in HPLC is to enable the use of sub-2 μm column packings, which improves separation speed ≈ 10 x vs. 5 μm particles, provided efficiency is not significantly degraded. As sold, the SFC's are inadequate to provide such efficiency. Decreasing extra-column dispersion requires the use of shorter lengths of smaller ID connector tubing. The higher flow rates inherent in SFC vs. HPLC mean that flow in such tubing is turbulent, generating very high pressure drops in the tubing. Unlike HPLC, retention in SFC is partially dependent on fluid density (pressure). Large pressure drops in the tubing mean the actual pressure/density in the column is obscured. Further, large pressure drops result in adiabatic cooling or heating (erroneously called "resistive heating" in HPLC). This adds further confusion to understanding SFC. All this can be sorted out. Results are shown where instrument modifications result in full theoretical efficiency in both achiral and chiral chromatography, even using 3mm ID columns with sub-2 μm particles. Quite fast separations (5-10 sec.) are demonstrated. Columns as short as 2 cm were used. The effect of "resistive heating" are shown to be much less important than the literature suggests. A simple example of "mini-preparative" chromatography is presented where dereplication of a natural product (hops!) is presented.



Terry A. Berger received a PhD in analytical chemistry from Imperial College, University of London, UK, in 1976. He is considered by many to be the father of modern Supercritical Fluid Chromatography (SFC). Starting in 1985 at Hewlett Packard, he systematically undid many of the misconceptions about packed column SFC. In the process he deconvoluted density and solvent strength effects. He showed that, contrary to several proposed theories, large pressure drops did NOT result in serious efficiency losses. He introduced the use of additives, demonstrated the first separations of broad classes of compounds, and showed that packed SFC columns were broadly applicable to much more polar solutes than previously thought possible, such as small drug-like molecules, including primary amines. In 1995 he founded Berger Instruments which developed the first chiral method development systems, first successful semi-prep SFCs, first commercial SFC-MS, etc. Dr. Berger has published ~80 peer reviewed scientific papers, 2 books, 7 book chapters, 13 encyclopedia/reference work entries, and dozens of application notes. His book "Packed Column SFC", published in 1995, fundamentally changed the perception of SFC in separation science, making modern SFC more like HPLC than GC. He has received, or has in process, >25 patents in GC, SFC, and HPLC. Dr. Berger was awarded the Martin Gold Medal by the Chromatographic Society of Great Britain in 2004. His technical teams have won two IR&D100 awards. Dr. Berger continues to actively publish and is an editor and reviewer for chromatographic publications and societies.

*University of Miami has switched to the "pay by phone" app available on all mobile devices. All UM parking lots support the app, but purple lot (33010 pay code, see map) is the closest to the Cox Building. Parking in the purple lot is limited, so the red lot is also recommended and is reasonably close (5-min walk); see map at: <https://miami.app.box.com/s/98bmf71obzlt9eivfm7exj0lhtyv3n7p>

7:00 PM, Saturday, October 20

"Chemistry in Astronomy: Origin of the Elements!"

Dr. James Webb, Department of Physics, FIU

Stocker Observatory, Florida International University MM Campus,
11200 SW 8th Street, Miami. Limited access to the telescope.

RSVP to: delgadom@fiu.edu.



National Chemistry Week Family Day

Noon – 4:00 PM, Saturday, October 27

Museum of Discovery and Science
401 SW 2nd Street, Fort Lauderdale

Free admission for SoFL-ACS members and families
Chem Club students and faculty from universities and high schools
will present chem demos and hands-on activities

CONGRATULATIONS

SoFL-ACS Wins ChemLuminary Award

SoFL-ACS won a ChemLuminary award for the “Best NCW Event Organized by a Student Group” presented at the 20th annual ChemLuminary awards ceremony held on Tuesday, August 21, at the 256th ACS National Meeting in Boston. The award was for our 2017 NCW events at the Ft. Lauderdale and Miami museums of science where over 40 student volunteers from five university student chapters and one high school presented chemistry demos and hands-on activities for over 1500 children and adults at the two museums.



Pictured are Jesse Bernstein, Zaida Morales-Martinez, and George Fisher accepting the award from ACS President-Elect Bonnie Charpentier (right) and Michael McGinnis (left), Chair of the NCW/CCEW Committee on Community Activities.

Student Grace Suarez Won Second Place in ACS National CCEW Illustrated Poem Contest

Grace Suarez, a student at Howard Drive Elementary School in Miami, won second place in the K-2 grade category of the ACS national 2018 Chemists Celebrate Earth Week (CCEW) Illustrated poem contest pertaining to the theme, “Dive Into Marine Chemistry”. Grace’s winning poem is shown at the right and is featured on the CCEW’s website at www.acs.org/ccew. Thanks also go to her teacher, Migdelys Fernandez, for challenging her students to examine the world around them and for submitting their poems to the contest. The judges were very impressed by all the entries and saw the quality of the work as a direct impression of the teacher’s involvement. Congratulations Grace Suarez!

SoFL-ACS is Sponsoring the 2018 NCW Illustrated Poem Contest for K-12 Grade Students

Write and illustrate a poem using the National Chemistry Week theme, “Chemistry is Out of This World.” Your poem must be **no more** than 40 words in one of the following styles to be considered: HAIKU – LIMERICK – ABC POEM – ODE – FREE VERSE – END RHYME – BLANK VERSE. Each school can submit ONE entry in K-2, 3-5, 6-8, and 9-12 grade levels. Contest deadline: Wednesday, October 17; mail original artwork to: Dr. Milagros Delgado, FIU-Biscayne Bay Campus AC1-238A, 3000 NW 151st St, North Miami, FL 33181. For questions, email delgadam@fiu.edu

Possible topics to space chemistry include: Light, Stars, Atmosphere, Planets, Gases, Supernova, Ultraviolet Spectrum.

Entries will be judged based upon:

- Artistic Merit – use of color, quality of drawing, design and layout
- Poem Message – fun, motivational, inspiring about yearly theme
- Originality and Creativity – unique, clever, and/or creative design
- Neatness – free of spelling and grammatical errors

Winners of the SoFL-ACS section contest will advance to the ACS National contest for a chance to win \$300 (1st place) or \$150 (2nd place) in each grade level category. For further details and contest rules see:

www.soflacs.org

Morales-Martinez Wins Presidential Mentoring Award

SoFL-ACS’s Councilor Zaida Morales-Martinez is among 41 individuals and organizations who were awarded the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM), presented on June 26 at a ceremony in Washington, DC. Known affectionately by her students as “Mama Z”, Zaida has played a key role in the success of the ACS Scholars Program for college/university students and the Project SEED program for high school students. PAESMEM awards were established by the White House in 1995 and is administered by NSF to recognize excellence in mentoring.

Congratulations Zaida!



DIVE INTO MARINE CHEMISTRY

By: Grace Suarez

Unique animals become extinct because of oil that leaks.
The cleaning can take many weeks.
It’s harmful you see;
This pollution caused by human activity.
We can all do our part.
Now is a good time to start.



Grace Suarez