

# **SFC/SFE Short Course**

## **SFC/SFE Europe 2021 October 3, 2021**

### **Course Description**

This course will focus on fundamentals and advances in supercritical fluid chromatography (SFC) employing carbon dioxide-based mobile phases. Particular emphasis will be directed toward pharmaceuticals and other fields where SFC currently plays or will play a critical role such as lipidomics, specialty chemicals and polymers, biodiesel, foods and vitamins, natural products, and flavors/fragrances. Example applications in these areas will be used throughout the course as teaching illustrations. Attendees will gain the following knowledge:

- Fundamentals of CO<sub>2</sub>-based mobile and extracting phases – why do SFC and SFE?
- Practical advantages of SFC & SFE over GC-based and HPLC-based separations and liquid-based extraction – speed, cost, selectivity, etc.
- An understanding of SFC instrumentation, how it has improved over the years, and differences between SFC and HPLC equipment
- Method development in analytical-scale SFC and preparative-scale SFC - special considerations for scale-up
- Fundamentals of chiral SFC separations
- How to choose stationary phases for achiral and chiral SFC separations
- Which mixtures are suitable for SFC, and which mixtures may not be suitable?
- The role of modifiers/entrainers and additives in SFC and SFE separations
- Options for detection in SFC, with special emphasis on SFC/MS
- What are the latest developments and what is the future of SFC?

### **Target Audience**

Anyone currently using GC, HPLC or other chromatographic techniques for analysis and/or purification and interested in learning how SFC can increase efficiency while reducing costs, or how SFC could be implemented as a complementary, orthogonal technique, will find this course of interest. This includes academic and industrial separation scientists, process chemists, laboratory and R&D managers in the pharmaceutical, specialty chemicals and polymers, food, lipidomics, biodiesel, natural products, flavors/fragrances, materials and medical research industries. Actual experience or knowledge of SFC is not required. Some knowledge of chromatographic principles is desirable.

**Agenda:**

9:00 am - Registration  
10:00 – Introduction of Instructors and Course Orientation  
10:10 – Fundamentals of Supercritical Fluids and Introduction to SFC & SFE  
11:10 - Instrumentation in Analytical-Scale SFC  
11:40 - Method Development for Chiral Analytical-Scale SFC  
12:30 – Lunch  
1:10 - Method Development for Achiral Analytical-Scale SFC  
2:10 – Preparative-Scale SFC  
3:10 – Break  
3:25 - Detection in SFC, with special emphasis on SFC-MS  
4:15 - Introduction to Supercritical Fluid Extraction  
5:15 – Discussion, Q&A  
5:30 – Adjourn

**Biography of Course Instructors**

**Pinkston Biography:** J. David Pinkston is Technical Services Manager – Preservative Systems at Archer Daniels Midland Company. His research interests have included the development and application of various forms of pressurized fluid chromatography and the coupling of these separation methods to intelligent detectors, such as mass spectrometry. Most recently, his interested have focused on oil/fat chemistry, degradation, and preservation, flavor/aroma chemistry, and trace-level contaminants. David received his Ph.D. in 1985 from Michigan State University working in separations and mass spectrometry. He was Chair of the ACS's Division of Analytical Chemistry in 2002 – 2003, was the Division's Program Chair for the Fall 2002 and Spring 2003 National ACS Meetings, and has served on the Executive Committee of the Subdivision of Chromatography and Separations Chemistry. David is on the Board of the Green Chemistry Group. He has authored or co-authored over 60 publications, and presented over 130 lectures, the majority of which are in the areas of SFC and SFC/MS. David (with Larry Miller and Larry Taylor) wrote "Modern Supercritical Fluid Chromatography: Carbon Dioxide Containing Mobile Phases", published in 2019 by Wiley. He has taught various versions of the SFC short course since the early 1990s. David loves downhill skiing, and is an avid cyclist.

**Miller Biography:** Larry Miller is a Senior Principal Scientist in the Discovery Analytical Sciences group at Amgen in Cambridge, MA. He graduated with a BS degree from the University of Illinois in Urbana-Champaign and a MS from Roosevelt University. He has over 30 years of experience performing small molecule achiral and chiral purifications at the mg to multi-kg scale. During his career he spent 20 years at Searle/Pharmacia and has spent the last 13 years at Amgen At Amgen he is responsible for discovery and early development purification support utilizing preparative SFC and HPLC. Larry has over 30 peer-reviewed publications, over 40 presentations at scientific meetings and serves as co-instructor for SFC short courses in the US and Europe. In addition, Larry is the President of the Green Chemistry Group which organizes the annual SFC conference.

**West Biography:** Caroline West is an associate professor in analytical chemistry at the University of Orleans, France. She is a Junior member of the French University Institute, a

service of the Ministry of Higher education distinguishing a small number of university professors for excellent research.

Her main scientific interests lie in fundamentals of chromatographic selectivity, both in the achiral and chiral modes mainly in SFC, but also in HPLC. She is also applying these methods to samples of pharmaceutical interest and natural products. She has authored 4 book chapters and about 100 papers in international peer-reviewed journals, and has presented about 100 lectures in national and international conferences and seminars. In 2015, she received the “LC-GC Emerging Leader in Chromatography” award from LC-GC North America and was ranked twice among the “Top 40 under 40” (2014 & 2018) and once in “The Power List” (2019) by The Analytical Scientist. She is also an advisory board member for several journals in separation science (Analytical Chemistry, Journal of Chromatography A, Chromatographia, LC-GC North America).