

Miniaturized and automated sample preparation

Abstract

Sample preparation is an essential first step of any analytical process. It is often the most time-consuming and error-prone step of the whole process and classical approaches require substantial amounts of toxic reagents. Newer developments try to consider as much as possible principles of green analytical chemistry (GAC). The course is especially relevant for scientists interested in microextraction technologies, sample preparation, green chemistry, and sustainability.

In the first part of the course, the GAC principles with a focus on sample preparation will be introduced along with fundamentals of phase partitioning as a basis for any sample preparation method. It will continue with an overview of current sample preparation methods with subsequent LC or GC-based separation of analytes and expected trends in the area for the future. Emphasis will be on miniaturized sorptive techniques such as SPME in GC, and inline-SPE and column-switching for broad coverage of analytes in LC. Application examples will mostly cover food and environmental analysis.

The second part of the course will focus on liquid-phase microextraction (LPME) and electromembrane extraction (EME). LPME and EME represent green alternatives to traditional extraction methods, where the use of hazardous solvents and chemicals is reduced to a minimum. Due to this, the techniques are expected to be important in the future. Both techniques can now be performed with commercially available equipment, and this will be covered by the course. Lectures will be focused on working principles of LPME and EME, method development, and performance.

Biography Stig Pedersen-Bjergaard

Stig Pedersen-Bjergaard is Professor at Department of Pharmacy, University of Oslo (Norway), and Professor (part time) at Department of Pharmacy, University of Copenhagen (Denmark). He has specialized in analytical microextraction technologies, based on artificial liquid membrane. He is inventor of hollow-fiber liquid-phase microextraction (LPME) and electromembrane extraction (EME). He has published more than 240 papers in international journals (H-index 57), is Contributing Editor of Trends in Analytical Chemistry (Elsevier) and Advances in sample Preparation (Elsevier), and Associate Editor of Journal of Pharmaceutical Analysis (Elsevier).

Biography Torsten C. Schmidt

Torsten C. Schmidt obtained is full professor for Instrumental Analytical Chemistry at the University of Duisburg-Essen (UDE, D) and scientific director at the IWW Water Centre in Muelheim an der Ruhr (D). Since 2009 he is director of the Centre for Water and Environmental Research (ZWU) at UDE, since 2019 dean of the faculty of chemistry. In 2013, he received the Fresenius Award of the German Chemical Society. His main research interests include the development and application of analytical methods with a focus on separation techniques (GC, LC), sample preparation, high-resolution mass spectrometry and compound-specific isotope analysis, process-oriented environmental chemistry, and oxidation processes in water technology. On these topics, he coauthored 2 books and more than 280 scholarly articles, ORCID: 0000-0003-1107-4403.