

Biography

Bob Pirok obtained his PhD cum laude in 2019 in Amsterdam and worked before at Shell. He is currently assistant professor at the University of Amsterdam and focuses on the application of chemometrics to analytical chemistry with a special interest in method development and data analysis for multi-dimensional chromatography. He is visiting professor at Gustavus Adolphus College and received a number of international recognitions including the Csaba-Horvath Young Scientist Award at HPLC2017 in Prague.

State-of-the-art Two-dimensional Liquid Chromatography

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Two-dimensional liquid chromatography is an extremely powerful technique that is rapidly becoming indispensable for the analysis of complex samples, because it (i) profits from a potentially much higher peak capacity than 1D-LC, (ii) exposes two chemical properties of the sample if the two separation modes are sufficiently different (i.e. “orthogonal”), (iii) allows highly complex samples to be separated and (iv) hyphenates separation modes with normally incompatible detectors, potentially providing additional sensitivity and selectivity [1,2].

2D-LC has become an attractive option for the analysis of complex non-volatile samples found in various fields (e.g. environmental studies, pharma, food, life, and polymer sciences) [3]. While 2D-LC complements the highly popular hyphenated LC-MS, the technique is also applied to the analysis of samples that are not compatible with mass spectrometry (e.g. high-molecular-weight polymers), providing important information on the distribution of the sample components along chemical dimensions (molecular weight, charge, lipophilicity, stereochemistry, etc.).

This presentation will explain the principles of heart-cut and (selective)comprehensive 2D-LC and address why the technique features better separation power than 1D-LC. Important topics such as modulation, data analysis and column selection will be covered. Practical guidelines for method development will be provided along with some notable applications. Finally, the latest developments within the field will be reviewed.

Literature:

[1] B.W.J. Pirok et al., Optimizing separations in online comprehensive two-dimensional liquid chromatography, *J. Sep. Sci.*, **2018**, 41(1), 68–98.

[2] Multi-Dimensional Liquid Chromatography, **2022**, CRC Press, 1st edition, ISBN: 9780367547660

[3] B.W.J. Pirok et al., Recent Developments in Two-Dimensional Liquid Chromatography: Fundamental Improvements for Practical Applications, *Anal. Chem.*, **2019**, 91(1), 240-263.