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**Title: Online hyphenation of liquid chromatography (LC) and supercritical fluid chromatography (SFC) for two-dimensional analysis of complex samples**

*Couplage en ligne de la chromatographie liquide et de la chromatographie en fluide supercritique pour l'analyse compréhensive bidimensionnelle d'échantillons complexes*

**Context**

Comprehensive two-dimensional chromatography provides such a large peak capacity that it is foreseen as the most efficient separative tool for the analysis of complex samples, especially when coupled to mass spectrometry detection. Supercritical fluid chromatography (SFC) is a separation technique using a non-polar CO<sub>2</sub>-based mobile phase. The combination of SFC and LC is attractive for the 2D analysis of complex samples containing neutral molecules, or samples for which LC x LC suffers insufficient orthogonality<sup>1</sup>. The team "Chromatography and Hyphenated Techniques" has a strong expertise on the optimization of chromatographic methods and has been working for several years on LCxLC for fundamental understanding and for different application areas in collaboration with different industrial partners. Despite first experiences in hyphenating LC with SFC<sup>2,3,4</sup>, scientific challenges remain before online LC x SFC becomes routine.

**Project**

The objective of this work is to contribute to real advancements to improve the potential of LC x SFC separation. They will include (1) improvement of the technical implementation, especially the sample transfer between LC and SFC, involving dilution and/or focusing traps, (2) understanding the solutes behavior in the SFC dimension when transferred from different LC phases, (3) development of predictive tools, (4) MS data processing.

Relevant applications will be carried out in collaboration with our industrial partners. They may include but are not restricted to, microalgae extracts and depolymerized lignin, used as alternatives to petroleum.

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3- M. Sarrut, A. Corgier, G. Crétier, A Le Masle, S. Dubant, S. Heinisch, J Chromatogr. A 1402 (2015) 124-133

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