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<p>Professor John Langley (orcid.org/0000-0002-8323-7235) is an internationally recognised leader in chromatography - mass spectrometry (MS) with 40 years' experience, has >130 publications, ~20 years' experience with petrochemicals, including crude, aviation fuels, gasoline and diesel with particular interest in biodiesel. Instrumentation expertise covers most areas of hyphenation, including HPLC, SFC and GC, also 2D GC and 2D LC, and ion mobility with MS options over a range of low- and high-resolution instrumentation and tandem MS.</p>	

Supercritical Fluid Chromatography – Mass Spectrometry (SFC-MS)

SFC-MS solutions utilise the extensive separation power of the chromatography along with the selectivity of ionisation, e.g., electrospray ionisation (ESI), atmospheric pressure chemical ionisation (APCI), atmospheric pressure photoionisation (APPI) and unispray ionisation (UNI). Qualitative and quantitative analysis. SFC with Flame Ionisation detection (SFC-FID), Selerity Utah, affords a solution that is not dependent upon structure selective ionisation demanded by MS ionisation and detection. Partnership pending.

SFC work often backed up with LC-MS, GC-MS, 2DGC-MS and now 2DLC-MS

Example publications

Different detectors used with SFC, Separation Science and Technology, 2022, Book chapter, Graham Langley; Sergio Cancho-Gonzalez; Julie Herniman. DOI: 10.1016/B978-0-323-88487-7.00002-4.

Detection and Quantitation of ACCUTRACE S10, a New Fiscal Marker Used in Low-Duty Fuels, Using a Novel Ultrahigh-Performance Supercritical Fluid Chromatography–Mass Spectrometry Approach
Energy & Fuels, 2018, G. John Langley; Julie Herniman; Anastarsia Carter; Edward Wilmot; Maria Ashe; Jim Barker. DOI: 10.1021/acs.energyfuels.8b02459.

Evaluation of ultrahigh-performance supercritical fluid chromatography–mass spectrometry as an alternative approach for the analysis of fatty acid methyl esters in aviation turbine fuel.

Energy & Fuels, 2015, Waraporn Ratsameepakai; Julie Herniman; Tim J. Jenkins; Graham Langley DOI: 10.1021/acs.energyfuels.5b00103.

Characterization of silicone oil used in HV cable sealing ends

26th Nordic Insulation Symposium, Tampere, Finland, 2019, Suvi Virtanen; George Callender; Thomas Andritsch; James Pilgrim; David Wheatley; Richard Brown; Graham Langley; Oliver Cwikowski.

Controlling the positive ion electrospray ionisation of poly (ethylene glycols) when using ultra-high performance supercritical fluid chromatography-mass spectrometry

Journal of Separation Science, 2023, Sergio Cancho Gonzalez; Paul Ferguson; Julie Herniman; Graham John Langley. DOI: 10.1002/jssc.202300425.

Applicability of method.

SFC-MS is not molecular weight driven like GC-MS, where for the latter ~ 35 C atoms is approaching the upper limit for alkane using typical conditions.

Ionisation is the key, e.g., natural ester liquids ~ 900 g/mol molecular weight (~C50-60) are trivial to detect by SFC-MS.

Quantitation can be challenging if the matrix background is high, though the Accutrace work show low ppb detection levels.

Again, selective ionisation and good chromatography the key.

Sample preparation required.

Method strengths.

Estimated time for analysis.

Method weaknesses.

Result interpretation / visualisation / presentation.

Relevant Papers