

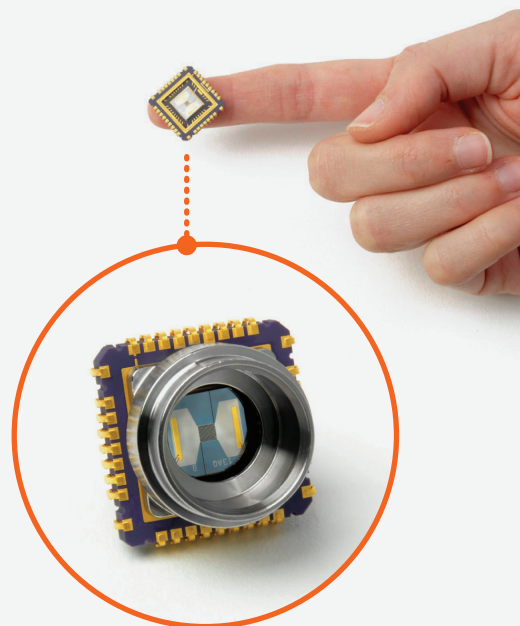
ultraFAIMS

A new dimension in Mass Spectrometry

TECHNICAL SPECIFICATIONS

Mass Spectrometer Compatibility

ultraFAIMS has been interfaced with a range of different mass spectrometers and ionization sources. We aim to develop interfaces for as many instruments as possible, so please contact us to see if your instrument is already supported. Custom interface designs may also be possible. The following list shows optimum specification for key source & inlet parameters:



<i>Inlet gas flow rate</i>	Optimal range for standard ultraFAIMS chips is 1-2L/min (lower and higher flow rates are possible, but may require a custom chip design)
<i>Operating temperature</i>	Must be stable for good performance, limited to 150°C at chip region
<i>Ionisation source type</i>	Any atmospheric pressure source should be compatible – for liquid-phase sources such as ESI the interface design must ensure good ion desolvation upstream of the chip
<i>Voltages</i>	The system is compatible with inlet voltages up to $\pm 6\text{kV}$
<i>Materials</i>	Materials present in the source region are gold-plated nickel, Rogers 4350B ceramic, stainless steel 316, PTFE, PEEK and Macor® ceramic (plus a small amount of solder)
<i>Liquid flow rate compatibility</i>	Tested from 50nl/min to 0.5ml/min

Performance

Transmission and separation performance are not purely determined by the ultraFAIMS chip and electronics, but also by the design of the interface, and the pre-existing constraints of the ionisation source and mass spectrometer inlet. The following figures are examples of performance obtained in specific cases:

<i>Transmission</i>	Dependent on interface design & ion mass/mobility. See the presentation below for example data
<i>Peak capacity/ separation performance</i>	Separation is dependent on analyte and gas flow rate, but peak capacity is usually in the range 10-20 (without modifiers)
<i>Dynamic range</i>	At least 3 orders of magnitude
<i>Maximum operating speed</i>	2ms per CF step (approx 200ms for a full sweep). In practice, scanning speed limit is determined by MS acquisition rate.



<i>Reproducibility</i>	Intra- and inter-day RSDs of <3% have been demonstrated
<i>Chip lifetime</i>	Dependent on usage, but typically 4-6 months is possible without cleaning. Regular cleaning may extend this further. Chips can be cleaned by sonicating in appropriate solvents and then drying thoroughly.

Communications Interface

Where possible, we work with our mass spectrometer vendor partners to integrate instrument control with the mass spectrometer hardware and software.

<i>Hardware interface</i>	Optically-isolated logic level interface for full hardware integration or RS232-based link
<i>Comms protocol</i>	ASCII-based command set (ultraFAIMS unit acts as slave). Full details can be provided to our integration partners.

If MS integration is not yet provided, Owlstone supply stand-alone PC software to set up and control FAIMS sweeps. In this case, one external hardware trigger input is available.

Use with Modifier Gases & Vapors

ultraFAIMS has been tested with mixtures of nitrogen/helium, nitrogen/hydrogen, and nitrogen/carbon dioxide, and with solvent vapours including methanol, butanol, isopropanol, acetone and acetonitrile. Modifier gases need to be introduced and mixed homogeneously into the carrier gas flow upstream of the chip. Where possible, our interfaces are designed to allow easy introduction of modifiers.

Safety

ultraFAIMS systems comply with the following safety standards:

- EN/IEC 61010-1:2010
- CAN/CSA C22.2 No. 61010-1-04
- ANSI/UL 61010-1
- AS 61010.1-2003