

Battelle Number(s):

11340, 12726, 13183, 13865, 14736,
14793

Patent(s) Issued

Available for licensing in all fields

Awards Won:

FLC Award - 2004

R&D 100 Award - 1999

Available Technologies

Ion Funnel and Related Technology for Improved Sensitivity in Mass Spectrometry

SUMMARY

Most of the available ions in a sample are lost before the ions reach the detector of a mass spectrometer. Much of these losses occur in the interface region between the ion source and the entrance to the high vacuum region of the instrument.

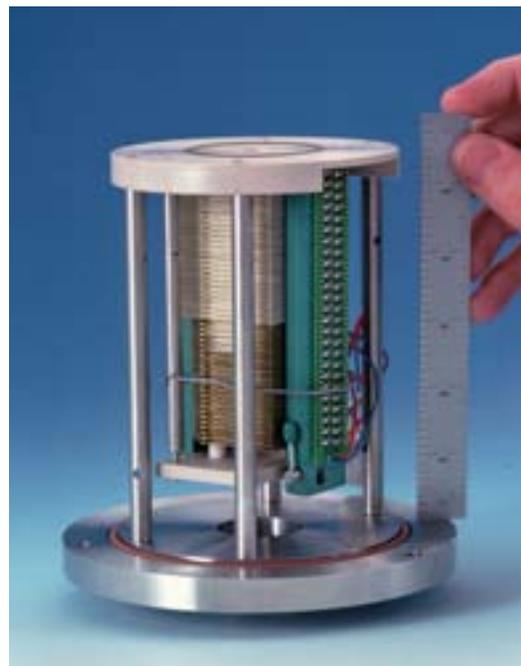
The ion funnel has been shown to reduce these ion losses and improve resultant sensitivity of a mass spectrometer instrument by an average of 6 to 10-fold. Use of related patented technologies in conjunction with the ion funnel, such as the patented jet disturber, has shown to produce significant additional increases in sensitivity.

The ion funnel utilizes a stacked radio frequency (RF) ring electrode arrangement with a funnel shape to focus ions in the presence of a neutral gas. This provides the basis for much higher ion currents for mass spectrometers and other devices that measure ions produced by ion sources having pressures that are too high for effective focusing by magnetic or electric fields.

The base ion funnel technology (patent 6,107,628) and related technologies covered by patent 6,583,408 and 6,831,274 are available for non-exclusive license. Related technologies covered by patents 6,979,816, 7,351,964, 7,514,676 and 7,816,645 are available for either exclusive or non-exclusive licensing.

ADVANTAGES

- * Increased amount of useful signal transmitted to the mass spectrometer and measured at the detector via Rf focusing (base ion funnel); dispersion of the gas molecules within the focusing region (jet disrupter); multiple electrospray sources matched to multiple capillary inlets that cause the sum of the ion signal transmission to be greater than the sum of the individual sources and inlets; a means to simultaneously transmit ions from multiple sources through separate ion funnel channels (multisource ion funnel); and a means to filter low mass ions in



order to reduce background noise.

* Updated versions have substantially reduced fabrication costs and lighter weights, and are capable of operating at substantially higher pressures, which improves the technology's applicability to small, portable mass spectrometry instruments.

RELATED LINKS

» Agilent (Licensee) Ion Funnel Video

<http://www.chem.agilent.com/en-US/Products/Instruments/ms/lc-ms/systems/6410triplequadrupolelcms/Pages/iffunnelvideo.aspx>

» Publication: American Chemical Society 2001

A Multipillar Inlet Jet Disruption Electrodynamical Ion Funnel Interface for Improved Sensitivity

Using Atmospheric Pressure Ion Sources

<http://pubs.acs.org/cgi-bin/abstract.cgi/ancham/2001/73/i17/abs/ac010174e.html>

» Publication: American Chemical Society 2001

Generation of Multiple Electrosprays Using Microfabricated Emitter Arrays for Improved Mass Spectrometric Sensitivity

<http://pubs.acs.org/cgi-bin/abstract.cgi/ancham/2001/73/i08/abs/ac001191r.html>

» Publication: American Chemical Society 2002

Independent Control of Ion Transmission in a Jet Disrupter Dual-Channel Ion Funnel Electrospray Ionization MS Interface

<http://pubs.acs.org/cgi-bin/abstract.cgi/ancham/2002/74/i20/abs/ac0202583.html>

Patents & Intellectual Property

- » Patent #: 6,107,628
- » Patent #: 6,583,408
- » Patent #: 6,831,274
- » Patent #: 6,979,816
- » Patent #: 7,514,676
- » Patent #: 7,351,964

Technology Portfolio(s)

- » Mass Spectrometry Instrumentation

Potential Industry Applications

- » Chemicals
- » Healthcare, Pharma, Biotech & Medical
- » Professional Services
- » Security

Bruce J. Harrer
Pacific Northwest National Laboratory
(509) 375-6958
bruce.harrer@pnnl.gov
<http://availabletechnologies.pnnl.gov>



Proudly Operated by **Battelle** Since 1965