

INDUCTIVELY COUPLED PLASMA TIME OF FLIGHT MASS SPECTROMETRY

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Time-of-flight mass spectrometry (TOFMS) is once again an important method of mass analysis. The inductively coupled plasma ion source is perhaps one of the most challenging to couple to TOF mass analysis. However the allure of being able to harness the speed and potential sensitivity of TOF for full elemental analysis at one hundred, or so, spectra per second has recently led to two commercial systems. These target the important emerging market of transient inlet systems such as laser ablation, electrothermal vaporisation and chromatography. It is apparent that these systems provide unrivalled speed and greater sensitivity than scanning instruments in the full element analysis mode. This is a very significant achievement considering that they are the first generation of a new technology that is rapidly advancing. One of the commercial instruments has attracted a prestigious R&D 100 Award which recognises it amongst the top one hundred technological innovations of 1998.

This paper summarises the key principles of TOFMS with particular reference to the recent advances in the optics, the facilitating technologies that have contributed to its revival and the feasibility of the ICP-TOFMS combination. The concepts described include sources of peak broadening, ion gating, duty-factor/sensitivity, signal digitising in the nanosecond regime, linear dynamic range, abundance sensitivity and selective quenching of ion signals in TOFMS. Additionally, the excellent isotope ratio precision of the ICP-TOF-MS configuration will be discussed with a view to new applications of ICP-MS.

The current limitations in the ICP-TOFMS configuration (counts per ppm per isotope) will be discussed along with possible solutions to alleviate this limitation.

*A copy of this presentation is available at:
<http://www.chem.unsw.edu.au/research/AnalyticalMassSpec>*