MALDI OA-TOF: DEVELOPMENT OF A NEW INSTRUMENT, AND CHARACTERISATION OF ION KINETIC ENERGY IN THE MALDI PLUME

DAVID S. SELBY, VICTOR V. MLYNSKI AND MICHAEL GUILHAUS

School of Chemistry, University of New South Wales, Sydney 2052, Australia

Matrix assisted laser desorption ionisation time of flight mass spectrometry (MALDI TOFMS) has been used to analyse many large and labile molecules. Unfortunately, energy-spread (and hence forward-velocity-spread) given to analyte molecules during the desorption and ionisation processes reduces the resolution and mass accuracy in the resulting spectra. The use of ion mirrors, delayed extraction, internal calibration and correction functions have all been used to improve results. Orthogonal acceleration time of flight (oaTOF) mass analysis avoids many of these problems, since the geometry ensures ions have little velocity spread, zero-velocity centred in the oa axis. Instead, most of the velocity spread is in the desorption axis, requiring larger detectors, but not influencing resolution or mass accuracy. On a prototype *linear* MALDI oaTOF instrument our group found that mass calibration was very stable, regardless of the desorption velocities and was able to achieve resolution of 3000 - 4000.[1]

In MALDI oaTOF there is a delay between formation of ions by the laser pulse and sampling of ions for mass analysis, based upon the velocity of the ions in the desorption axis. Thus the field free desorption velocity can be determined from the delay time and the distance between target and oa. Additionally, the geometry of our apparatus allows us to determine whether or not the MALDI plume retains characteristics indicative of its point source, by investigating the effects of changing the potentials of grid electrodes on resolution at different analyte masses. This is important in determining whether or not the technique has the potential to retain high resolving power over a wide mass range.

Our new MALDI oaTOF instrument (Figure 1) incorporates an ion mirror. An increased accelerating potential and design modifications allow us to analyse higher masses. Initial results will be presented, together with conclusions related to initial velocities and the nature of the MALDI plume.

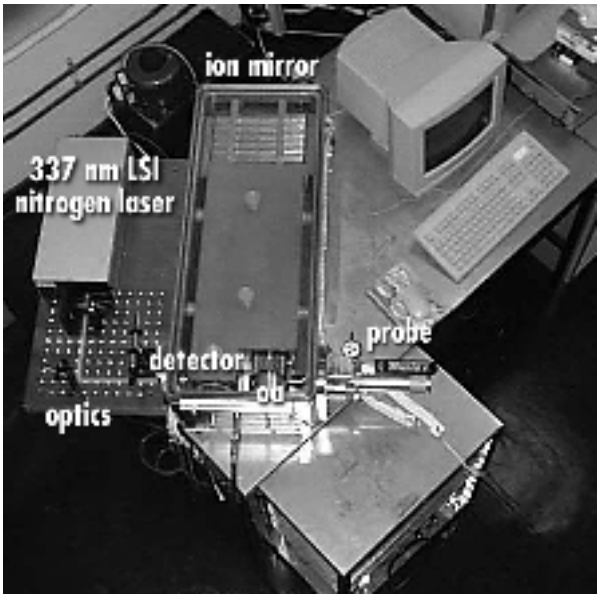

Figure 1

1. Mlynski, V. and Guilhaus, M., Rapid Comm. Mass Spectrom., 1996, 10, 1524

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