

Instrumental Developments in MALDI Time-of-Flight Mass Spectrometry

C. K. G. Piyadasa¹, P. Håkansson², T. R. Ariyaratne¹ and D. F. Barofsky³

¹ *Department of Physics, University of Colombo, Colombo 03, Sri Lanka.*, ² *Division of Ion Physics, Ångström Laboratory, Box 534, Uppsala, Sweden.*, ³ *Department of Chemistry, Oregon State University, Corvallis, Oregon, USA.*

Two new instrumental developments in matrix assisted laserdesorption/ionization (MALDI) time-of-flight (TOF) mass spectrometry is reviewed in this paper. In the first development, a high resolving power time-of-flight mass spectrometer was designed and constructed using two electrostatic mirrors, mounted symmetrically on the same optical axis facing each other. The ions produced in the MALDI source are pulsed into the region between the two mirrors using delayed extraction technique and trapped by successive reflections of opposite electric fields in the mirrors. The extension of the flight path due to the number of reflections is used to increase the mass resolving power in time-of-flight spectra. Mass resolutions of 55,000 for an organic compound called substance-P was obtained for single laser shot spectra. The stability of protonated, sodiated and potassiated substance-P ions was also investigated.

In the second development, an electrostatic deflector has been designed and constructed that can be used in a reflecting MALDI time-of-flight mass spectrometer to select ions of a particular mass. The deflector consists of an interleaved set of parallel deflection electrodes. Thin metal ribbons instead of wires or plates are used for the deflection electrodes as a new concept. Properly timed reversing electric field was used for the operation of the device. With the new deflector, a resolving power of ~ 5200 (FWHM) was obtained for an isotopomer of PEG 6000 ($m/z \sim 6000$) which is far better than that could be obtained from presently available commercial instruments.