

E1-55: The effect of field leakage on the kinetic energy measurements of ions emitted in a Plasma Desorption Mass Spectrometer

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The initial kick-off energy of ions emitted in Plasma Desorption Mass Spectrometers can provide useful information on the ion desorption process which is as yet not fully understood. A few groups have reported absolute as well as relative kinetic energy measurements. The spectrometer parameters and instrumentation effects play a dominant role in the accuracy of these results.

This study was carried out by modelling the linear type time-of-flight mass spectrometer at the Dept of Physics, University of Colombo. The sample deposited on a thin aluminium film is bombarded with the fission fragments of a ^{252}Cf source. The molecular ions after the desorption are first accelerated by an electric field applied between the sample holder and a wire grid. Then they enter into a field free region. Before detection the ions undergo another acceleration by an electric field applied between a wire grid and an ion detector.

We have concentrated on the effect of the field leakage in the vicinity of the wire grids which can influence the kinetic energy measurements of the ions. A Monte-Carlo program was developed by calculating the electrostatic potentials and tracking the ions through the flight tube. The program calculates the exact time-of-flight of ions including the electric field leakage effects. Our results show that the kinetic energy measurements strongly depend on the type of the wire grids used in the time-of-flight spectrometers. Previously reported measurements which come from various spectrometers can only be compared after correcting for the field leakage effects.