

Ion funnel interface for a quadrupole instrument

It has been proven in mass spectrometry community that generation of gas phase ions at near atmospheric pressure is quite efficient. However, no matter for ESI, DESI, APCI, or APPI, transmission of these into mass spectrometer is always a challenging. Several research groups have designed and implemented ion funnels in mass spectrometers to improve ion transmission at high pressure region. This research involved in characterization of the energetic of ions generated by ion funnel using surface induced dissociation (SID) as the ion activation method.

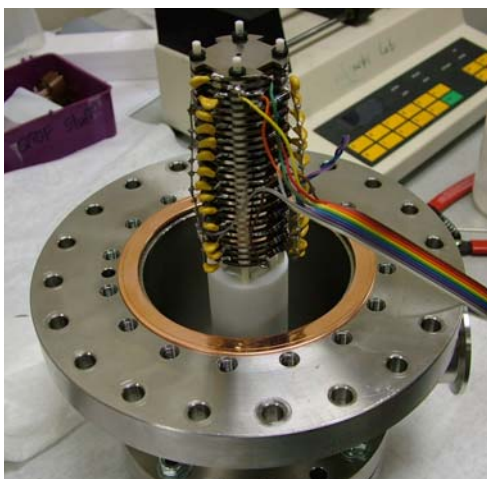


Figure 1: Ion funnel interface for quadrupole instrument

An ion funnel interface for ion transmission at high pressure (0.5~1 torr) was built and implemented in a quadrupole mass spectrometer. The performance of the ion funnel was compared to a traditional capillary/skimmer ion transmission interface by ion current measurements. The ion funnel interface consists of 28 ring electrodes with gradually decreasing inner diameters, and was operated under an optimal DC gradient, RF frequency and RF amplitude. Ion transmission efficiency for selected biomolecules such as YGGFLR, insulin chain B, ubiquitin and cytochrome c in different sample concentration approaches 90%. The ion funnel interface can efficiently transfer analyte ions at high concentration up to 100uM with a factor of 3-7 better ion transmission compared to that with a traditional capillary/skimmer interface, based on the ion current measurement at the entrance of the hexapole ion guide at a lower pressure chamber (10^{-2} torr). The MS/MS spectrums collected from surface induced dissociation mass spectrometry with standard ESI and the ESI with ion funnel were compared and studied with respect to the internal energy distribution with this two different ion source setup.