

Differential Mobility Ion Pre-filter for Field - Deployable Atmospheric Pressure Ionization Mass Spectrometers

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Detection of target chemicals in complex environments such as public spaces (for example, administrative buildings, shopping malls and subway systems) is problematic when utilizing atmospheric ionization (API) mass spectrometry (MS). This is mainly due to complex gas phase processes, which lead to the formation of a large number of ionic species and their cross interactions in the ionization region. The presence of numerous interferences in such environments increases the false alarm rates, frequently to unacceptably high levels. An effective method to avoid these challenges is to combine MS with other fast-operating separation methods. This approach enhances the detection accuracy of the system as a result of: (a) selection of targeted ion species before introduction in the MS and (b) providing additional orthogonal chemical information for targeted species.

Planar Differential Mobility Spectrometry (DMS) is a rapid ion separation method, which can operate as a standalone spectrometer which can provide mobility spectra for positive and negative ion species or as a continuous ion filter for targeted ion species. In the latter case, DMS can be tuned for filtration of selected ions of interest and for effective removal of other undesirable interferences ion species prior to analysis by MS.

AB SCIEX recently released their SelexION™ Technology device which provides planar DMS pre-filtering capability to their Triple Quad™ 5500 and QTRAP® 5500 laboratory mass spectrometer systems. The SelexION™ device provides proven improvements in scan speed, tuning stability, separation power (through the use of chemical modifiers), reproducibility and robustness, and chemical noise reduction. In this poster, we will present design concepts and expected benefits of using planar DMS as a pre-filter for miniature MS. The proposed designs are intended to operate with various types of fieldable API-MS systems equipped with capillary inlet sample introduction. Progress towards development of such a system will be presented.