

Discontinuous Atmospheric Pressure Interface for Miniature Mass Spectrometers

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Discontinuous atmospheric pressure interface (DAPI) was developed to couple atmospheric pressure ionization (API) sources to miniature mass spectrometers. Through DAPI, gases carrying ions of interest are pulsed into the ion trap at a high flow rate rather than continuously at a low flow rate, so that API sources can be used with minimally capable pumping systems. A pumping speed as low as 0.35 L/s enables the operation of an ion trap mass spectrometer fitted with a DAPI interface. Various operation methods have been developed to improve analytical capabilities of miniature mass spectrometers. A multiple pulse ion introduction method is developed to accumulate ions before mass analysis, which improves LOD further. In conjunction with the method, a broad-band waveform is used to allow the entire ion trapping capacity to be used for ions of interest. In another experiment, axial CID can be realized by applying a potential to the DAPI capillary. More complete fragmentation spectra were obtained, although parent ion isolation cannot be performed.