

A Transportable Double-Focusing Mass Spectrometer

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Spatially dispersive, non-scanning mass spectrometers (MS) provide full mass spectra continuously, thus enabling rapid analytical techniques. Miniaturizing a sector-field MS and joining it with a detector array that combines high spatial resolution and fast linear response results in a transportable instrument offering speed and precision. The presented instrument is based on a double-focusing sector-field MS of Mattauch-Herzog geometry. A modified charge coupled device (CCD), sensitive to charged particles (ion-CCD), is mounted in the focal plane to detect the ions. The ion-CCD allows the simultaneous collection of all dispersed ions, recording a complete mass spectrum at a rate of up to 350 mass spectra per second. The 2126 discrete detector elements (pixels) distributed over 5.1 cm as well as the integrated readout circuitry of the detector are well suited for the detection of ion beam currents in the low "Femto-Amps". The pitch of the ion-CCD allows for sub-amu resolution (6-250 amu). The resolution in both mass and time makes the MS a good fit for fast GC applications of volatile organic compounds and gases.