

# Design of Pocket Mass Spectrometer in a Mobile Phone Size

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In sequel to the development of Palm Portable Mass Spectrometer (J. Am. Soc. Mass Spectrom. 2008, 19, 1442–1448), a new design of pocket mass spectrometer in a mobile phone size is proposed. The technologies for shrinking mass spectrometer include miniaturized high vacuum system with sample gas concentration and separation, mass spectrometer control chip, cold electron ionization, and miniaturized DC power supplies, etc. Adsorption and desorption on a surface promises the sample gas concentration of up to 1,000 times, enhancing the detection limit of trace chemicals in the air. Micro-GC with a pulsed gas introduction is expected to separate and concentrate the various gases in the sample. Mass spectrometer control circuits integrated in a microchip certainly will save the battery power, size, and weight. Cold electron source for sample gas ionization is also intriguing. A secondary electron multiplier initiated by photons seems to generate more electron current than a field electron emission. Since an ion trap mass spectrometer requires various voltages for printed circuits, electron gun, electron acceleration, RF high voltage generation, and high voltages for ion detector and ion getter pump, reducing the size of DC/DC converters that supply those voltages from a battery requires another challenge. Instead of ramping RF high voltage for mass scanning in an ion trap, frequency modulation is preferred with low voltage, which would be appropriate for mass spectrometry in a sprite discharge environment. Plausible and available techniques for the design of pocket mass spectrometer and some of the interested potential applications are discussed.