

## **Paradigm Shifts in Mass Spectroscopy**

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The instrumentation used to conduct Mass Spectroscopy (MS) has undergone many paradigm shifts in its evolution into its present form; beginning with room-sized mass spectrometers coupled with room-sized computers to today's hand held devices. The market for specific applications has driven the development of present day commercial and research instrumentation toward greater sensitivity, smaller size, and a greater degree of operational and environmental robustness. Various technological breakthroughs such as the advent of the personal computer and microcircuit technology have also fueled this evolution of commercial and research instrumentation. As technology matures, the natural factor of competition acts to drive down the cost for these systems, which then also serves to broaden the applications in which they are applied. To satisfy the burgeoning application driven requirements in both research and commercial sectors, numerous mass spectroscopic instrumental approaches are being developed. This instrumentation is based upon Ion Mobility, High Field Asymmetric Waveform, Time of Flight, Ion Trap, Quadrupole and various Tandem techniques. Today, the global war on terrorism is stimulating the development of a new generation of smaller, ruggedized MS instrumentation employing micro electro-mechanical systems (MEMS). At this time, government agencies are funding numerous projects related to homeland security, an example being the Defense Advanced Research Projects Agency (DARPA) sponsored development of a Micro Gas Analyzer (MGA). The impact of MEMS technology promises to provide a major paradigm shift in providing orders of magnitude smaller size and lower cost instrumentation. The integration of MEMS into MS technology will inherently lead to many more opportunities in the development and commercialization of robust MS instrumentation that can be routinely operated in harsh environments.