

Development of a Loeb-Eiber Mass Filter for Portable Mass Spectrometry

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A novel Loeb-Eiber mass filter is being developed in our group that will allow operation at pressures above 1 Torr, thereby eliminating the need for a turbo or ion-pump and the associated space and power requirements. Another advantage of the Loeb-Eiber design is that only a low amplitude (<10 Vpp) radio frequency (rf) voltage is needed, which eliminates large matching networks or amplifiers. The Loeb-Eiber mass spectrometer therefore has great potential for portable, miniature instruments. We have built and tested several geometries of filters that enable one-pass filtering on flight paths less than 75 μm . The current generation Loeb-Eiber mass filter is produced using a silicon-on-insulator fabrication technique for microelectrical mechanical systems (SOI-MEMS) to precisely fabricate micro-positioned electrodes. Ions from a glow discharge ion source were filtered using amplitude modulation waveforms at 5-10 KHz at a fixed operating frequency between 50-80 MHz, depending on the secondary transformers used. We will present the latest experimental and simulation results from our findings.