Micro Gas Analyzer
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The US Department of Defense is currently interested in developing the technology to sense, in real time, deployable agents used in chemical warfare. The Micro Gas Analyzer Project (MGA) is the result of this interest, and aims to develop a portable sensor of wide range and robustness. Current state-of-the-art technology involves bulky equipment (not portable), high power consumption due to the use of thermionic sources and impact ionization mechanisms, high voltage (in the kilovolt range), and long processing times. Thus, the project has a number of key technological challenges, such as the enhancement of the state-of-the-art sensitivity and specificity capabilities, power consumption reduction, and portability, while keeping the processing time below two seconds.

The MGA is composed of an ionizer (a CNT field ionization array / CNT field emission array), a mass filter (a micro quadrupole mass spectrometer -µQMS), an ion counter/multiplier, an electrometer/mass detector, and a pumping system (passive – absorption pump/active – piezoelectric pump). A schematic of the MGA system is shown in Figure 1. The goal is to make low vacuum (in the millitor range), ionize the species inside the gas using the CNT arrays, filter them with the quadrupole, and then, sense them with the electrometer. The project team is composed of MIT (Ionizer, µQMS, µPump, Valves), University of Texas (Ionization, µPump), Cambridge University (Ion Counter), and Raytheon/CET (System Integration).

Figure 1: Schematic of the Micro Gas Analyzer