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Monitoring/Verification using DMS: TATP Example

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Abstract—Field-rugged and field-programmable differential mobility spectrometry (DMS) networks provide highly selective, universal monitoring of vapors and aerosols at detectable levels from persons or areas involved with illicit chemical/biological/explosives (CBE) production. CBE sensor nodes used in conjunction with automated fast gas chromatography with DMS detection (GC/DMS) verification instrumentation integrated into situational operations-management systems can be readily deployed and optimized for changing application scenarios. The feasibility of developing selective DMS nodes for a “smart dust” sampling approach with guided, highly selective, fast GC/DMS verification analysis is a compelling approach to minimize or prevent the illegal use of explosives or chemical and biological materials.

DMS is currently one of the foremost emerging technologies for field separation and detection of gas-phase chemical species. This is due to trace-level detection limits, high selectivity, and small size. GC is the leading analytical method for the separation of chemical species in complex mixtures. Low-thermal-mass GC columns have led to compact, low-power field systems capable of complete analyses in 15–300 seconds. A collaborative effort optimized a handheld, fast GC/DMS, equipped with a non-rad ionization source, for peroxide-based explosive measurements.