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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 motes 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 motes 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.