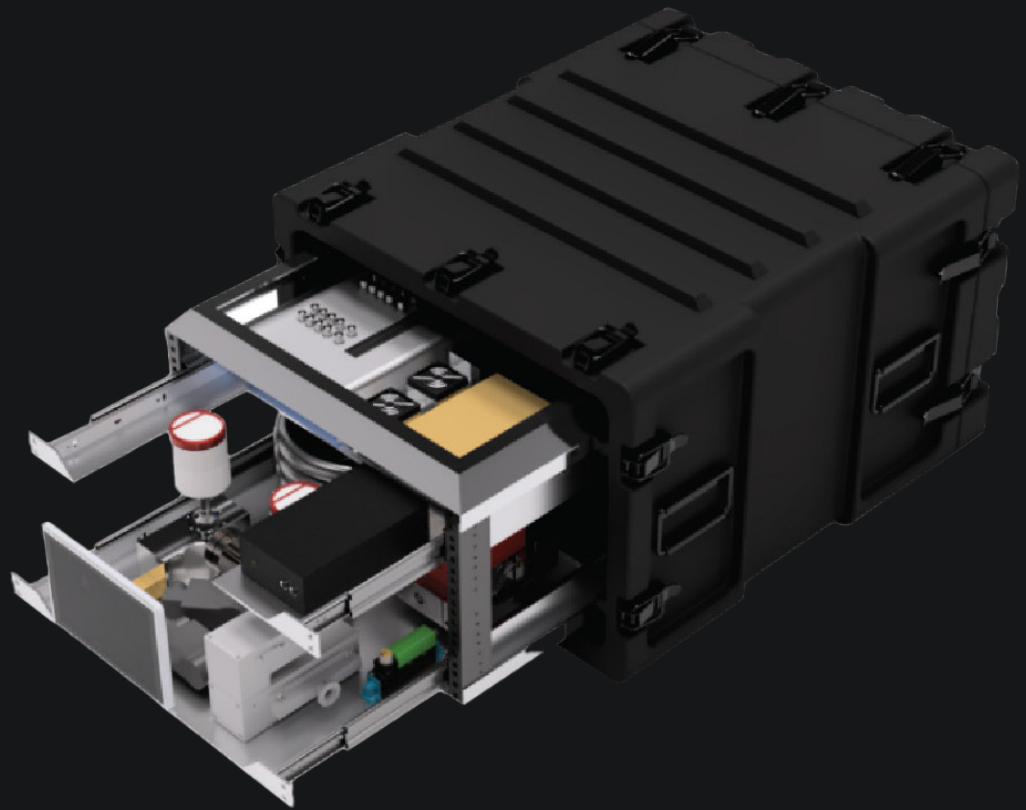


ChemiSens™ SENSORS FOR IDENTIFYING & QUANTIFYING TOXIC GASES



Common gas analytes/toxins, volatile organic compounds (VOCs) and toxic permanent gases (e.g. CO, NO_x) are ubiquitous, with some being hazardous at low levels (ppb) while others are acceptable at high levels (>100 ppm). THz spectroscopy can create unique quantized spectra of gas molecules. ChemiSens™ THz gas analyzers can both identify and quantitate hazardous compounds with little to no user-training.

In a smaller form factor, ChemiSens MoS₂ gas sensor arrays use crystalline material with polymeric/biopolymeric coatings. Gas sensor arrays are semi-selective, can profile gases, and be combined with COTS solutions for monitoring atmospheric conditions (temperature, humidity, etc.).

[THZ SPECTROSCOPY FOR IDENTIFYING AND QUANTIFYING TOXIC GASES]

_Key Features

Rapid, highly accurate method to identify and quantify gas analytes in both breath and in the environment

- > Unique spectral features from THz spectroscopy eliminates false positives
- > Units designed to be transportable (2'x2'x1') and deployed autonomously and continuously
- > Potential to modify to identify chemical aerosols, including pharmacological agents
- > C-SWAP optimization

_Use Cases

Transportable gas analyzer for rapid assessment of occupational hazards

- > Autonomous chemical surveillance for DoD applications
- > Ruggedized unit can be placed in remote locations or can be used on vehicles to enable surveillance
- > Chemical surveillance for workplace hazards and air quality monitoring

_Technical Specifications

| [COMPOUND] | [PEL (ppm)] | [Est. LOD (ppm)] |
|-------------------|-------------|------------------|
| ACROLEIN | .100 | 0.0696 |
| ACRYLONITRILE | 1 | 0.0144 |
| DICHLOROETHANE | 1 | 0.0259 |
| DICHLOROPROPENE | 1 | 0.3824 |
| DIFLUOROMETHANE | 10 | 0.0099 |
| ETHYLENE OXIDE | .100 | 0.0080 |
| FORMALDEHYDE | 0.01 | 0.0048 |
| NITROGEN DIOXIDE | 1 | 0.0138 |
| SULFUR DIOXIDE | 2 | 0.0054 |
| TETRACHLOROETHANE | 1 | 0.5603 |
| TRICHLOROMETHANE | 2 | 0.05672 |
| VINYL CHLORIDE | 1 | 0.00292 |

[GAS SENSOR ARRAYS FOR PROFILING GAS PHASE ANALYTES AND TOXICS]

_Gas Sensor Arrays Key Features

Can be deployed in flexible/wearable/drone and low-profile formats:

- > Personalized gas monitoring/chemical agent detection for occupational/operational monitoring
- > Flexible sensor arrays using nanomaterials are possible.
- > C-SWAP optimizable

_Gas Sensor Use Cases

Custom gas sensor arrays leveraging 2D materials with polymeric barriers to optimize sensitivity and selectivity:

- > Designed for seamless integration with commercial

_Our Targets Include

Packaged sensors capable of monitoring biometrics and airborne contaminants in a wearable form-factor (total volume of 200 cc).

- > Software/firmware solution capable of collecting and aggregating sensor data-streams in near real-time.
- > A rapid analysis platform driven by AI/ML to enable identification, geolocation, and profiling of occupational exposures by airborne hazards.
- > Future products will incorporate biomarker data indicative of occupational exposure as technologies become available.

OCCUPATIONAL HEALTH MONITORING SYSTEM (OHMS) FOR OPERATIONAL AIRBORNE EXPOSURES

We propose to develop and test an advanced, wearable OHMS that combines biometric sensors, a novel toxic gas sensor array, and commercial off-the-shelf (COTS) volatile organic compounds (VOC)/particulate sensors to identify occupational exposures for warfighters and support personnel. A geotracking module will also be included in OHMS as an optional capability to track location.

OHMS Will:

- > Protect the health of service members both during and after their military service.
- > Document exposures in time and space.
- > Help veterans obtain benefits.
- > Provide exposure data to clinicians that can improve treatment and health outcomes.