**GENERAL DESCRIPTION:**
A miniature low burden (240g; adds < 2 dBA noise) personal exposure monitor for sized aerosols that is worn near the breathing zone to capture particles on a Teflon filter for post analyses and simultaneously provides estimates of real-time mass concentration using nephelometry. Sizing for either PM2.5 (deep lung) or PM10 (thoracic) fractions are possible. Enhanced power management allows the unit to operate continuously for up to 40 hrs on a set of 3 AA alkaline batteries, or cycle ON/OFF to extend the sampling period to up to 1 week. Post analyses for the filter collections provide referee particle mass (PM), black carbon, and SHS levels, plus a wide range of chemical and biological species. An extremely wide aerosol concentration response range extends to 10,000 micrograms/cubic meter, with a detection limit of < 5 micrograms/cubic meter. An on-board accelerometer provides both wearing compliance and estimated ventilation rate from which potential dose is computed. QC data needed to validate the filter and real-time data is stored on-board and downloaded simultaneously with the aerosol data. A low turbulence flow system design results in minimal internal deposition, providing extended optical bench performance with long servicing intervals (30+ days). Very low face velocity filtration provides minimal loss of volatiles prior to post analyses. Robust user interface software and self-contained operation allows simple setup and deployments by modestly trained personnel to provide high data capture rates. A smaller, cellphone-like version is under development for demanding personal applications.

**TECHNICAL DESCRIPTION:**
Aerosol sizing is by dual-sequential impaction onto oil wicking surface to provide sharp EPA-comparable cut points for extended sampling with minimal servicing. Real-time aerosol detection in the model v3.2 is by light scattering (side-only) at 780 nm (laser diode), with sensing by a tiny high-sensitivity Optidiode photometer that includes its own pre-amplifier to minimize the possibility of stray signal interferences. A new v4.0 version currently under development will add a UV laser wavelength plus forward scattering to better sense black carbon and biological aerosol content.

**CONTACT INFORMATION**
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**COST**
- $1,990/system
- N/A/analysis
System scores are compared across the four scenarios and ranked from highest to lowest.

**Evaluation Criteria**

**Throughput:**
- Detection is instantaneous
- 1 sample, >10 tests/sample per run
- System is continuous and provides real time analysis with no defined tests/samples
- The system or device is currently semi-automated
- Device or system is intended for multiple detection assays
- 0-1 solutions, buffer, eluents, and/or reagents
- 1 component
- Less than 5 minutes is required for set-up
- 3-5 steps are required for detection

**Logistics:**
- Very brief (minutes-hours) training and minimal technical skills
- Approximately the size of a soda can
- Less than 1 kg
- This system is not capable of transmitting data
- System or device uses batteries
- 4-8 hours battery life

**Operations:**
- Can be used from 4°C to 41°C
- Components must be stored at 4°C
- Device or system has peak performance at normal relative humidity conditions
- Between 1 to 6 months shelf life
- 3-5 years expected life
- Results cannot be viewed in real-time
- The system or device is currently fully autonomous
- The system software is open but modification requires licensing
- The system hardware is open but modification requires licensing

**Detection:**
- Possible the system could receive 510K clearance, no current efforts at this time
- Possible the system could receive FDA approval, no current efforts at this time
- This system does not test liquids
- Good specificity. System has a consistently low level of false alarms (2-5%)
- Manual kit not integrated with the system handles spore lysis
- System currently can identify aerosolized chemical agent
- System is used for personnel detection