

Building a Low-Cost, Portable Particulate Monitor for the Fireground

BACKGROUND AND MOTIVATIONS

- Exposure to particulate matter (PM) has been linked to many health issues, including respiratory complications, cardiovascular disease, and cancer.
- Firefighters are potentially exposed to PM throughout a fire call.
- While the PM encountered during firefighting is composed of hundreds of chemicals, the types that are most easily inhaled and most dangerous are least visible.
- Firefighters often use the presence of smoke to determine whether they should remove SCBA following fire suppression.
- A low-cost, portable particulate monitor could potentially help firefighters determine when it is safe to go off-air based on evidence rather than subjective assessments.

CHALLENGES

- Size and portability
- Low-temperature tolerance of the current prototype
- Fast saturation (frequent need to change filters) of current prototype
- PM is only one of many dangerous components in air post-suppression.

KEY FINDINGS AND RECOMMENDATIONS

- The current prototype is able to provide real-time imaging of PM along with information about particle size, shape, and concentration.
- Initial testing indicated that the majority of PM captured were volatile particles that evaporated within the first 30 seconds.
- Several improvements in durability, size, and functionality of the current prototype are necessary before it can be widely used in the Fire Service.
- The final device could be used at multiple locations on the fire scene (interior, exterior operations, near apparatus) and in the fire station.

Potential for Chemical Contact

