

Summary

ICx Agentase is developing a continuously operating wearable badge that utilizes biocatalytic sensing elements to monitor for the presence of chemical toxins in air. The wearable, low maintenance, self-contained device under development will provide real-time measurements of chemical toxins at the point of contact and will provide wireless communication tools to forward the data to a central data collection station. This project builds upon a development effort supported by DTRA and ARO, aiming for a wearable badge for detection of chemical agents. This effort aims to increase our detection capabilities and improve the existing prototype by making it smaller, lighter, and less expensive, and to allow environmental population studies.

Technical Approach

ICx Agentase's approach to the development of chemical sensors is based on four basic technical capabilities that include: 1) the synthesis of composite enzyme-polyurethane polymers; 2) the use of enzyme-polymers as chemical sensing elements; 3) the ability to produce positive color changes from enzyme inhibition; and 4) the development of easy-to-use constructs to house enzyme-polymer sensors. Each of these areas of technical expertise is protected by U.S. and international patents.

ICx Agentase has ongoing research efforts to adapt enzyme polymers to

Current prototype



devices that can passively sample the environment (air) for the presence of target chemicals. A continuously operating prototype unit capable of detecting chemical agents in air (shown) has proven superior detection performance and resistance to interferences in 3rd party live agent tests. Current prototype specifications include:

- Small size (4.6" x 5.1" x 2.1")
- Proven highly sensitive detection chemistry with very low false positive / interference rates
- GPS positioning and wireless networking

The wearable device operates via periodic cycles that may range from two to ten minutes in length. Air is constantly pulled from the environment through a small column packed with our enzyme-polymer. The unit periodically adds enzyme reagents to the sensing element to check for enzyme activity. The presence of chemical agents causes the inhibition of enzyme activity. An inhibited enzyme polymer does not change color in the presence of reactants. Our signal processor recognizes the absence of a color transition in the data resulting in a flat or negative baseline, and triggers an alarm. Alternatively the presence of target chemicals could trigger enzyme activity causing an electronic signal.

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Timeline

Year 1 -- Pesticide, Ozone, VOC, and Heavy metal detection

- Determine enzyme systems for detection
- Operational/ shelf-life stability
- Started with successful detection of **pesticides** and **ozone**

Year 2/Year 3 – Hardware design/ design of final device

Sensing Principle

