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**PURPOSE:** Surprisingly, little is currently known about the dynamics of permeation, diffusion and transport of low volatility chemical threat agents, in particular VX, across the variety of individual protection materials used in warfighter protective gear. Furthermore the community only recently adapted the Low Volatility Agent Permeation (LVAP), a single CT data point sampling method.

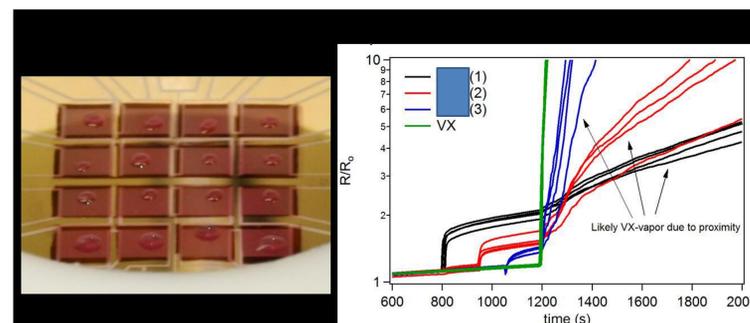
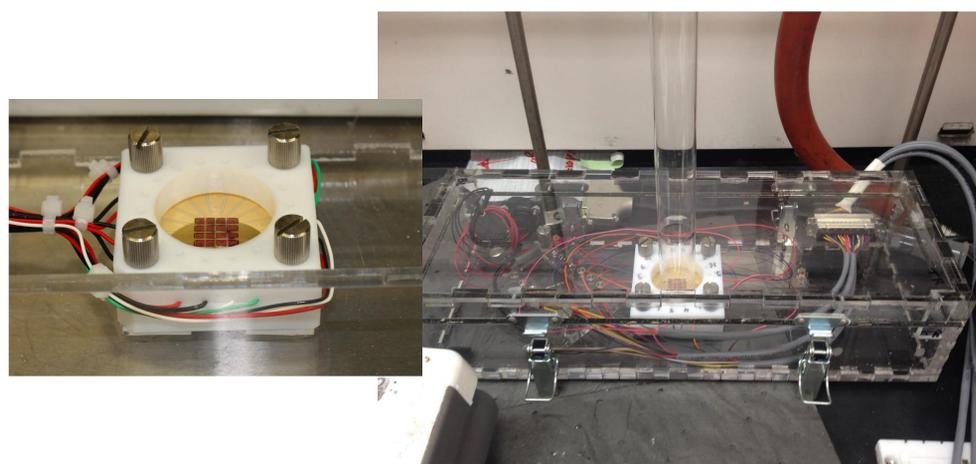
This project proposes to engineer a proven VX sensor technology for use in T&E activities, the real-time measurement of permeation flux through protective materials. In addition, the sensor offers the capability to provide concentration curves as a function of inherent dose response function of the sensor.

These inexpensive dosimetric sensors are constructed from (highly stable) electroactive polymers (EAPs) doped and containing reactive additives (e.g. 2-pralidoxime), whose electrical resistance changes permanently upon exposure to agent. The torsional distortion of the high conjugated polymer backbone when binding to the agent results in an increase in resistance.

## VX Vapor Challenge Experiments

## Direct Liquid Contact

## AVLAG T&E Test Cell



**VX Vapor Challenge Experiments:** VX was delivered to a 4 x 4 sensor array of doped rrP3HT; VX was delivered through a 26.8 mm ID tube with a spacer to control the distance of the gap between tube exit and sensor. In this effort the sensor was calibrated against the pure known concentration VX vapor

**Direct Liquid Contact:** Direct droplets of VX and other contaminants applied onto doped sensor array. Each of the first horizontal rows has a different contaminant; VX drops are on the bottom row. The drops were added sequentially with a small delay between each set. Plot of  $R/R_0$  versus time for all 16 sensor channels.

**AVLAG T&E Test Cell:** Linear sensors were placed under a piece of latex. The results show the rapid breakthrough of VX through the material, more importantly the sensitivity of the sensor and the real-time display of the measurement.