

Statement of Work

Summary:

This effort will focus on evaluation of NRL-developed materials directed at photocatalytic removal of targets, specifically those considered chemical threat agents. This is the first phase of testing in which powdered materials are evaluated. Evaluation of the materials using the approaches and targets utilized in early tests conducted by NRL provide a baseline for comparison of methods. Agent evaluations provide the data set necessary for maturation of the sorbent materials. All procedures and protocols will be developed in collaboration with and require the approval of NRL.

Specific Tasks:

1. Powdered materials evaluated in solution.

Paraoxon will be used to provide baseline comparison of methods and results with those obtained by NRL. Control samples should include evaluation of target concentrations in the stock target solution as well as a control curve for quantitative determinations. Analysis should be completed using a stock solution at 150 parts per million. Samples are prepared in deionized water. Sorbent materials are incubated in clear containers with 5 mL of the target solution either in the dark or under illumination by the NRL-provided source. Sorbent masses ranging from 2.5 to 25 mg (6 in total) should be evaluated. Replicate samples are required. Following incubation for a period of 4 hour either in the dark or light, the target should be extracted from the sorbent using acetonitrile.

2. Agent evaluation in solution.

This evaluation will be completed using VX as the target. The procedure will follow that outline in part 1 above utilizing the same concentrations, sorbent masses, and incubation durations.

3. Long term evaluation in solution.

Based on part 2, a single set of experimental conditions (sorbent mass) will be selected in collaboration with NRL. Multiple vials at this set of conditions will be prepared for incubation under dark and illuminated conditions. These samples will be analyzed as outlined above (#2) using sacrificial sampling at time points (5) ranging from 1 hour to 48 hours.

4. Evaluation under ambient conditions.

This type of evaluation is similar to that described in part 1; however, the targets are applied as neat droplets. Control samples for evaluation of the stock concentrations will be utilized as well as control curve for quantitative analysis. Sorbent materials are incubated in clear containers with 1 μ L of the target solution either in the dark or under illumination by the NRL-provided source. Sorbent masses ranging from 5 to 50 mg (6 in total) should be evaluated. Replicate samples are required. Following incubation for a period of 4 hour either in the dark or light, the target should be extracted from the sorbent.

5. Long term agent evaluation under ambient conditions.

Based on part 4, a single set of experiment conditions (sorbent mass) will be selected in collaboration with NRL. Multiple vials at this set of conditions will be prepared for incubation under dark and illuminated conditions. These samples will be analyzed as outlined above (#4) using sacrificial sampling at time points (5) ranging from 1 hour to 48 hours