

## MITIGATION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL HAZARD MITIGATION

### Threat Agnostic Fenton Decon

Hunter Vibbert JHU/APL   Danielle Nachman JHU/APL   Kelly Van Houten JHU/APL

Current methods for CWA destruction mainly rely on nucleophilic attack which can be effective but also can produce significant toxic side products. An alternative approach could rely on a photochemical oxidation strategy using earth abundant and non-toxic reagents, which would be both beneficial to the warfighter and the local environment. The Fenton reaction is a widely applicable and environmentally benign, catalytic reaction that can produce reactive oxygen species to degrade many different types of small molecules, including those molecules containing P-X, R-X, and R-H bonds. Here, we describe initial work in characterizing the reactivity and destruction ability of a photochemically catalyzed broad-based decontamination reaction with only magnetite ( $\text{Fe}_3\text{O}_4$ ), oxidant, and light as input. The efficiency, destruction scope, and byproducts for a series of organophosphates have been characterized and its potential application to biological systems will be discussed.