PROTECTION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL PROTECTION

Transitioning Metal-organic Frameworks To Deployable Solutions For Warfighter Protection

William Morris NuMat Technologies Inc.

Functional materials that adsorb and react with toxic industrial chemicals (TICs) and chemical warfare agents (CWAs) play a critical role in the personal protective equipment used by the modern warfighter. Therefore, developing functional materials with enhanced performance is crucial for producing the next generation of PPE. This talk will focus on the development of a class of functional materials, metal-organic frameworks (MOFs), and how NuMat Technologies (NuMat) is working to deploy these materials in PPE used by the warfighter.

First, a brief history of twenty years of work on MOFs in the field of CBRN research will be presented. This introduction will highlight the performance of MOFs in adsorbing TICs, their ability to degrade CWAs, and MOF use in sensor technologies. Second, NuMat's work to bring these materials to fieldable PPE solutions over the past seven years will be discussed. NuMat has worked on all aspects of MOF deployment, including optimizing MOF performance, forming for targeted applications, and MOF scaling. The multidisciplinary team, facilities, and partnerships to achieve these results will be highlighted. Finally, a future perspective on opportunities for MOFs in this field will be presented.

We would like to thank DTRA, DEVCOM CBC, and Northwestern University for continuing to advance MOF understanding in TIC filtration, CWA decontamination, enzyme stabilization, and other CBRN priorities.

We would further like to thank Army ManTech, JPM-P, and our industrial partners for their ongoing support and feedback on our expanding Sentinel™ product line.