CBD SOT CONFERENCE TODAY'S INNOVATION, TOMORROW'S WARFIGHTER CAPABILITIES

Advances in Fundamental Materials Research

Chemical Protective Coatings for Warfighter Relevant Applications

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Our ongoing efforts are focused on development of coatings intended to provide protection of the warfighter against primary chemical agent exposure as well as against secondary exposure resulting from contact with contaminated equipment. The current apparatus of the warfighter incorporate a wide range of coatings designed to offer enhanced performance across a range of functions; unfortunately, few of these materials offer broad chemical protection. The effort described here is focused on evaluation of coating technologies that may provide improved decontamination of painted solid surfaces following an exposure event. Penetration of chemical threats into traditional porous surfaces and coatings presents a significant threat as the target can be retained through the decontamination process. Retained target then presents additional, often unexpected, exposure hazards. A number of recently reported approaches offer the potential for decreasing target penetration into a surface with a resulting improvement in decontamination performance. Unfortunately, reported evaluations for many technologies are exclusively based on the surface wetting characteristics: contact angles, target dispersion, etc. This ongoing effort has demonstrated a lack of correlation between wetting behaviors and target retention. In addition, handling considerations during simulated exposure and decontamination can have a significant impact on observed retention behavior.

Here, we have evaluated the benefits of several previously reported coating technologies in decreasing retention of simulants following exposure and decontamination using soapy water. Slippery Liquid-Infused Porous Surface (SLIPS) top coats including those based on textured polymers and those based on porous silicate materials have been evaluated. Wetting, retention, and durability for the surfaces have been evaluated. We have also evaluated a Slippery Omniphobic Covalently Attached Liquid (SOCAL) treatment and the potential for this treatment to improve performance in SLIPS durability. In addition, the effort has investigated the potential of coatings based on the more typical lotus leaf effect and commercially available coating technologies. This effort continues to identify and characterize the potential of additional technologies for improving the outcomes of painted surface decontamination.

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