

Future Challenges for Chemical and Biological Air Purification

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Future chemical and biological defense protective equipment will have to address a broader spectrum of agents such as non-traditional agents, emerging biological threats and Toxic Industrial Chemicals (TICs). To meet this challenge, the Chemical and Biological Defense Program (CBDP) has focused research on the development of new materials. One of the most exciting areas is *reticular chemistry* which includes a class of these materials known as Metal Organic Frameworks (MOFs). These materials have already exhibited adsorbency potentials that far exceed activated carbon, and are currently being manufactured in commercial quantities. Another promising area has been the development of nanofibers that provide the possibility to produce particulate filters with order-of-magnitude lower pressure drops than standard HEPA media. Other developing technologies will make it possible to assemble these fibers into nanocomposites that will include built-in adsorption, reactive, anti-microbial and sensing capabilities into a thin coating. This could revolutionize protective clothing and produce unconventional and extremely low burden approaches to respiratory protection. Although new materials offer the potential to achieve these results, much development needs to be done to realize this potential and meet the challenges of a field environment.