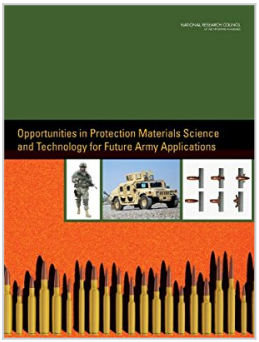

Opportunities in Protection Materials Science and Technology for Future Army Applications

By National Research Council, Division on Engineering and Physical Sciences, Board on Army Science and Technology, National Materials Advisory Board, Committee on Opportunities in Protection Materials Science and Technology for Future Army Applications

Opportunities in Protection Materials Science and Technology for Future Army Applications By National Research Council, Division on Engineering and Physical Sciences, Board on Army Science and Technology, National Materials Advisory Board, Committee on Opportunities in Protection Materials Science and Technology for Future Army Applications

Armor plays a significant role in the protection of warriors. During the course of history, the introduction of new materials and improvements in the materials already used to construct armor has led to better protection and a reduction in the weight of the armor. But even with such advances in materials, the weight of the armor required to manage threats of ever-increasing destructive capability presents a huge challenge.

Opportunities in Protection Materials Science and Technology for Future Army Applications explores the current theoretical and experimental understanding of the key issues surrounding protection materials, identifies the major challenges and technical gaps for developing the future generation of lightweight protection materials, and recommends a path forward for their development. It examines multiscale shockwave energy transfer mechanisms and experimental approaches for their characterization over short timescales, as well as multiscale modeling techniques to predict mechanisms for dissipating energy. The report also considers exemplary threats and design philosophy for the three key applications of armor systems: (1) personnel protection, including body armor and helmets, (2) vehicle armor, and (3) transparent armor.

Opportunities in Protection Materials Science and Technology for Future Army Applications recommends that the Department of Defense (DoD) establish a defense initiative for protection materials by design (PMD), with associated funding lines for basic and applied research. The PMD initiative should include a combination of computational, experimental, and materials testing, characterization, and processing research conducted by government, industry, and academia.

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