



DEFENSE TECHNOLOGY MONITOR

The American Foreign Policy Council's Review of
Developments in Defense Technology

Defense Technology Monitor No. 46

December 2, 2019 **Richard M. Harrison, Jacob Thompson**

Related Categories: Cybersecurity and Cyberwarfare; Democracy and Governance; Military Innovation; Science and Technology; China

NEUTRAL PARTICLE BEAM GETS NEUTERED

The Pentagon has long sought non-kinetic options to address long-range, high-speed missile threats. However, it looks like the Defense Department will need to keep searching for a while longer. Back in 2018, Undersecretary of Defense Michael Griffin publicly acknowledged that the DoD was looking to place a neutral-particle-beam generator in space, where it would function very much like a ray gun and disrupt the electronics of adversary missiles while they were in flight.

Military leaders had hoped that the system could be tested by 2023, but these hopes have been dashed by Congress, which recently moved to defund the program. Congressional opponents of the initiative cited prohibitively high costs and the potentially destabilizing effects of a space-based defense system as grounds for termination of the project. The Pentagon has now done so, formally cancelling the effort and reallocating funds to other weapon systems, including ground-based directed energy systems. (*Defense One*, September 4, 2019)

NEW CRYSTALS ADVANCE LASER WEAPONS

The promise of lasers has led to high-energy weapons increasingly being incorporated into various platforms across the length and breadth of the U.S. military as well as those of other countries. Nevertheless, to date, a number of limitations to laser technology have helped to temper expectations. One particularly challenging issue is the provision of enough power to increase the energy level of a laser - something to which Chinese researchers may now have found the solution. Scientists at the Fujian Institute of Research have developed a new inorganic crystal, caesium bismuth germanate (CBGO), which has the ability to make lasers 13 times more efficient. The researchers caution that there is no certainty that CBGO can be easily produced and practically incorporated into military use, but the goal is to utilize the laser on an anti-submarine warfare satellite with a beam that can penetrate a depth of 500 meters and identify a target. (*South China Morning Post*, September 4, 2019; *Popular Mechanics*, September 4, 2019)

PEARL PROTECTION

Mother Nature often offers inspiration for solutions to vexing military challenges. Researchers at the University of Buffalo have developed a material based on the outer layer of pearls that they claim could be the key to saving the lives of soldiers. The scientists developed an ultrahigh molecular weight polyethylene (UHMWPE) that attempts to replicate a pearl's outer coating (known as nacre). The material is 14 times stronger than steel and ultra-thin, measuring as little as half-a-centimeter in size. The development is significant; in contrast to steel or ceramic armor, Army officials say, "UHMWPE could be easier to cast or mold into complex shapes, providing versatile protection for soldiers, vehicles, and other Army assets." (University of Buffalo, September 16, 2019)

PRC SONIC WEAPON CAN SCATTER PROTESTORS

Ever since the 1989 Tiananmen Square protests, China's government has invested heavily in the development of nonlethal crowd dispersal programs. Three decades on, those investments have paid major dividends. Most recently, researchers at the Chinese Academy of Sciences have developed a rifle-sized sonic weapon for both military and law enforcement needs. The weapon, which is said to be ready for mass production, is reportedly capable of using low frequency sound to send vibrations through several organs, including the brain, eyes, and stomach, causing severe pain. And unlike some bigger sonic weapons that require a large electrical power cell, the new technology in question heats an inert gas that vibrates and produces the low frequency sound wave. It is not clear how quickly the device will be put into use by the Chinese government, however, or whether it will end up be used to quell the ongoing unrest in Hong Kong. (*South China Morning Post*, September 19, 2019)

AI HELPS IDENTIFY SPECIAL OPERATORS

Officials with the U.S. Special Operations Command are interested in updating their recruitment methods, and are turning to artificial intelligence for assistance. Rather than simply urging interested soldiers to apply to be special operators, the Marine Corps has now set up a method to track a wide-array of data collected from soldiers currently going through the grueling selection process. Once the top soldiers are selected, the plan is to use AI to determine patterns or commonalities that could serve as indicators of the best candidates in the future. If successful, the endeavor could provide a large cost savings to the military. As David Spirk, SOCOM's chief data officer, states: "If I can bring more people in who are likely to pass the assessment and selection process, I don't have to generate the level of individuals to go through training, so every time we take a turn, we save money by using these technologies." (Military.com, September 26, 2019)