



DEFENSE TECHNOLOGY MONITOR

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

Defense Technology Monitor No. 48

January 9, 2020 **Richard M. Harrison**

Related Categories: Cybersecurity and Cyberwarfare; Science and Technology; SPACE

ADOPTING ANT ARMY MANEUVERS

Can ants help the Army deploy better coordinated drones capable of collaborating with only limited human interaction? Futurists at the Army Research Laboratory think so. They have partnered with Northwestern University and Georgia Tech to study "emergent collective behavior" in miniature robots and apply lessons from nature to modern warfare. According to Dr. Sam Stanton of the Army Combat Capabilities Development Command's Army Research Laboratory, "[a]nts are using coordinated behavior that is staggering. There is no one grand control over the entire colony, rather coordinated collective behavior. We are working to engineer robotics that behave like an ant colony. We have never tried to engineer things like this, which demonstrate the kind of collective behavior we see in nature." One potential future application of the research could be the programming of many small drones to exhibit coordinated "swarming" behavior - for instance, by carrying tiny explosive charges and converging on an adversary in order to create a larger synchronized explosion. (*The National Interest*, November 1, 2019)

IRON MAN SUIT SUBSYSTEMS RESURRECTED

Back in 2013, the U.S. Special Operations Command (USSOCOM) launched a program to develop an "iron man like" suit. That initiative, dubbed the Tactical Assault Light Operator Suit (TALOS), made considerable headway on the technological front, but was ultimately shut down by the Pentagon. Now, military planners are looking to resurrect the initiative - or at least parts of it. Although the idea of whole-body suit of armor for operators was not a success, parts of the TALOS may end up being more valuable individually. For instance, special forces operators are now testing the Lightweight Polyethylene (PE) Armor for Extremity protection subsystem, which offers a 130 percent increase in coverage relative to standard infantry body armor while being 75% lighter than the standard-issue alternative. (Military.com, November 13, 2019)

NANOTECH ENABLES HYPERSONIC WEAPONS DEVELOPMENT

The Pentagon is hard at work on fielding offensive hypersonic systems, but has found one complicating factor to be resourcing materials with high enough heat tolerances to survive the projectiles' flights to target. The Defense Department already has several offensive missiles capable of traveling much faster than the Mach 5+ speeds clocked by hypersonic weapons, but most of those missiles travel outside the Earth's atmosphere, where extreme heat is not nearly as significant a concern. By contrast, hypersonic weapons travel their entire flight path at lower altitudes, causing skin temperatures to reach hundreds or even thousands of degrees Fahrenheit. To mitigate this problem, researchers at Florida State University's High Performance Materials Institute are studying carbon nanotubes - which are "a synthetic material consisting of carbon tubes with a diameter as small as one nanometer" - as a substitute for conventional steel casings on missiles. The choice is logical; carbon nanotubes are stronger than steel, and they are capable of rapid heat dispersal - a key function for hypersonic. (*Popular Mechanics*, November 19, 2019)

A NEW 3D PRINTING TECHNIQUE FOR AEROSPACE COMPONENTS

Applications for additive manufacturing, more commonly known as 3D printing, in military affairs are proliferating. The latest contribution has been made by researchers at EPFL's Laboratory of Thermomechanical Metallurgy, who have developed a new technique that could greatly improve materials used in the aerospace field. Metal components used in aerospace applications often require resistance to high temperatures and stress. Researchers found that, by incorporating a second laser treatment during the 3D printing process, they can remove up to 95% of cracking that occurs in certain superalloys, which can translate into improved manufacturing of critical aircraft components. (Phys.org, November 21, 2019)

ARMY SETS ITS SIGHTS ON TACTICAL GLASSES

A little over a year ago, the U.S. Army teamed with the Microsoft Corporation to develop high-tech glasses to improve warfighter effectiveness on the battlefield (see *Defense Technology Monitor* no. 36). Now, this initiative - known as Integrated Vision Augmentation Systems (IVAS) - has taken yet another step toward deployment. Army Futures Command recently published an article on the glasses that included a critical update on the IVAS project's capabilities. "The final product," according to the article, "will include a variety of features: a color see-through digital display that makes it possible for the user to access information without taking his eye off the battlefield; thermal and low-light sensors that make it possible to see in the dark, literally; rapid target acquisition and aided target identification; augmented reality and artificial intelligence, to name just a few." The IVAS lenses are on track for fielding in 2021. (Military.com, November 20, 2019)