

# Defense Systems

## NEWS DIGEST

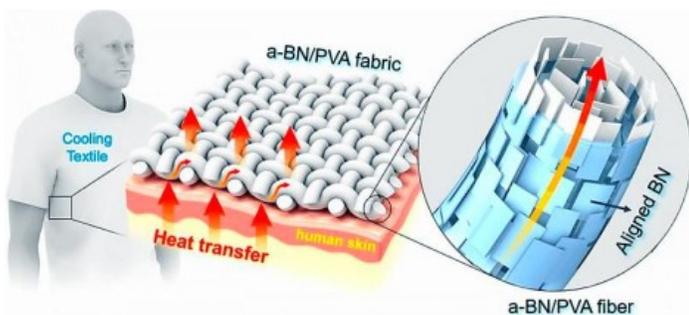
5 December 2017 - THE LATEST IN DEFENSE SYSTEM NEWS



### Tank Warfare: Russia Builds Platform to Rival the Abrams

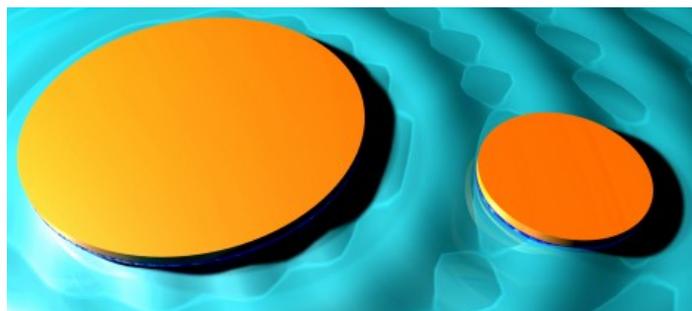
Russia is investing in the T-14 Armata which is being touted as a next-generation battle tank with advanced weapons, protective systems and an unmanned turret. Moscow plans to build 100 platforms by 2020, said Yury Borisov, the country's deputy defense minister, according to a report by the TASS news agency. The tank is currently undergoing operational testing...

### Advanced Materials



### Cool Textiles to Beat the Heat

University of Maryland researchers demonstrate a personal thermal regulated textile using thermally conductive and highly aligned boron nitride (BN)/poly(vinyl alcohol) (PVA) composite (denoted as a-BN/PVA) fibers to improve the thermal transport properties of textiles for personal cooling. The fibers were fabricated using a fast and scalable three-dimensional (3D) printing method...



### Nanoparticle Tuning for Optomechanical Applications

Researchers showed they can selectively alter resonant vibrational frequencies of nanodisks struck by laser light by changing their proximity and configurations. The research points to a new way to convert light energy into mechanical energy and vice versa at the nanoscale for new applications in sensing, secure communications...

## Autonomous Systems



### Taking Back the Sky: Counter-UAV

The security threat posed by the misuse of commercially-available unmanned aerial vehicle (UAV) technology has become a serious concern for the defense and intelligence world. Ever more sophisticated counter-UAV (C-UAV) technologies for wayward UAVs are being developed and matured, with many going a step beyond the conventional jamming-centric techniques that have traditionally lacked sufficient situational control and precision. When a drone is jammed, it may land in place, or it may...



### Alphabet X Solar-Powered Balloons Bringing Internet Service to Puerto Rico

The Federal Communications Commission (FCC) granted Google's parent, Alphabet X, an experimental license to help get Puerto Rico back online after Hurricane Maria decimated the island's infrastructure. The balloons are solar powered, fly at altitudes of over 60,000 feet, and navigate using machine-learning algorithms that direct them to rise and fall to take advantage of wind currents...

## Directed Energy



### Dragonworks Facility to Put UK at Forefront of Laser Weapons Development

Located at Qinetiq's headquarters in Farnborough, the facility will serve as a test bed for all technologies associated with high-energy lasers for military or commercial applications. It includes a clean-room and the UK's only Reflective Hazard Assessment Tool (RHAT), which is designed to examine how laser energy is reflected from different surfaces. Future additions will allow customers to conduct full-scale testing of high-energy lasers...



### 1.3 $\mu\text{m}$ Submilliamp Threshold Quantum Dot Micro-Lasers on Silicon

As a promising integration platform, silicon photonics need on-chip laser sources that dramatically improve capability, while trimming size and power dissipation in a cost-effective way for volume manufacturability. Researchers demonstrate record-small electrically pumped micro-lasers epitaxially grown on industry standard (001) silicon substrates. Thresholds and footprints are orders of magnitude smaller than those previously reported ...

## Energetics



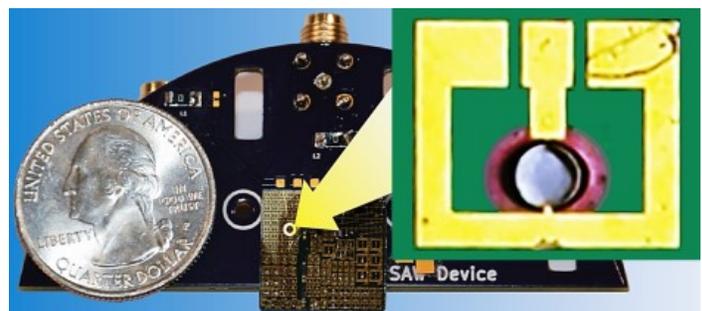
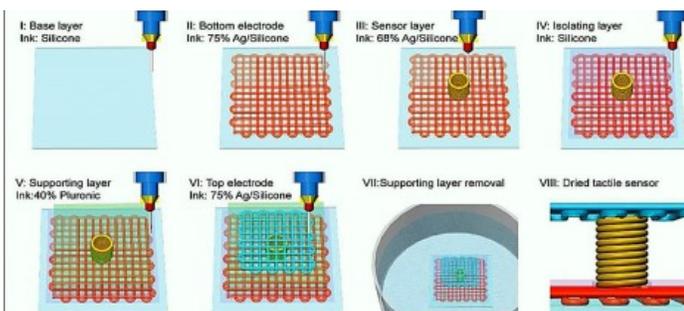
### Scientists Develop Safer, More Durable Li-Ion Battery for Extreme Conditions

A team of scientists at the Johns Hopkins Applied Physics Laboratory has partnered with researchers from the University of Maryland and the Army Research Laboratory to develop a new type of flexible lithium-ion battery that is not hazardous and can operate under extreme conditions including cutting, submersion, and ballistic impact. The work builds upon a novel, highly-concentrated water-based electrolyte called "water-in-salt" that can address...

### Insensitive Munitions: Stopping American Ammo & Munitions from Killing US Troops

For the U.S. military's ammunition and munitions to do their job, they need to be as powerful as possible, but that explosive power can put own troops at risk. Accidental explosions can occur during transport or storage of munitions. Sometimes munitions can catastrophically react when they are shot or exposed to fire. Burning is the least violent of the reactions that can occur. One solution is something called "insensitive munitions"...

## Military Sensing



### Design and Fabrication of 3D-Printed Stretchable Tactile Sensors

Researchers have developed novel inks, which can be cured at room temperature with tunable printability, high flexibility, electrical conductivity, and sensitivity. The printed flexible, stretchable, and sensitive sensors are capable of detecting and differentiating human movements, including radial pulse, and finger pressing and bending. This may open new routes to sensors for prosthetic skins, bionic organs, and human-machine interfaces...

### Small Antennas Could be a Big Deal for the Air Force

Researchers at AFRL and Northeastern University have developed an ultra-compact antenna that uses a different approach in transmitting and receiving signals. The breakthrough could be a big step in the miniaturization of many military and commercial communication systems. This could result in smaller devices including wearable antennas, bio-implantable and bio-injectable antennas, smart phones, and wireless communication systems...

## Non-Lethal Weapons



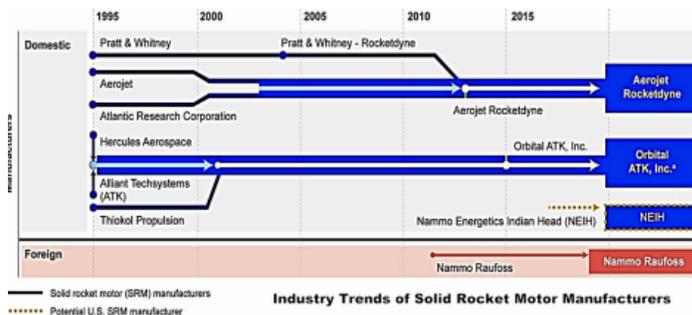
### HPEM Electronic Warfare Tech Would Change Military Operations

US Air Force officials are working with microwave experts to conduct experiments with high power electromagnetic (HPEM) technology. The work has potential to enhance missile defense and electronic warfare (EW) capabilities. The experiments being conducted explore how features such as carrier frequency or pulse repetition frequency can be manipulated to maximize electromagnetic energy that makes it to the enemy target during EW operations...

### Police Commission OKs LAPD 1-Year Drone Pilot Program

The Los Angeles Police Commission gave the LAPD the go-ahead to start a one-year experiment using an unarmed drone. The camera-equipped drone will provide its SWAT team with "situational awareness" when dealing with active shooters, armed barricaded suspects, hostage situations, hazardous materials, natural disasters, explosive devices, search-and-rescue operations, perimeter searches of suspects with superior firepower...

## RMQSI



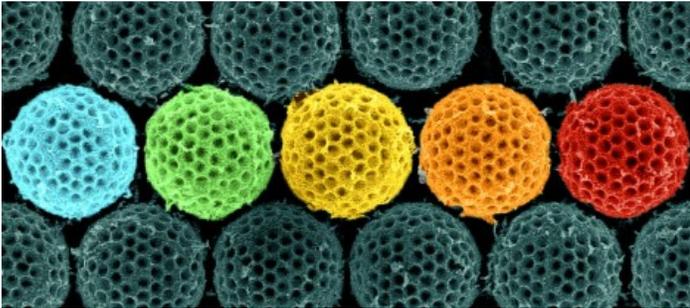
### Army Uses Networked Acoustic Sensors to Detect Aircraft Damage Real-Time

For the first time ever, a team of researchers successfully developed and tested networked acoustic emission sensors that can detect airframe damage on conceptual composite UH-60 Black Hawk rotorcraft. The effort opens up possibilities for new onboard features that could immediately alert flight crew to the state of structural damage like matrix cracking and delamination as they occur, giving the crew greater opportunity to take corrective actions...

### Solid Rocket Motors: GAO Studies Supply Concerns and Challenges

The DOD relies on a multi-tiered supply chain to provide the Solid Rocket Motor (SRM) propulsion systems behind the various missile systems that provide defense capabilities to meet U.S. national security objectives. The GAO was asked to review the state of the U.S. industrial base for SRMs to address (1) SRM industry trends, (2) single source supplier risks, and (3) opportunities for SRM manufacturers' engineering workforce development...

## Survivability & Vulnerability



### Metamaterial for Optical Devices, Energy Harvesting, Signature Management

Penn State bioinspired synthetic microspheres with nanoscale holes can absorb light from all directions across a wide range of frequencies. The production process is scalable to different materials. The product could have application as antireflective coating in optical devices and solar cell coatings to increase light capture at multiple wavelengths. Larger structures could allow absorption of IR wavelengths for sensing and signature management...



### 3M Co. Launches New Combat II Ballistic Helmet

3M introduced a new combat helmet designed to help soldiers survive an expanded number of ballistic threats during combat. It's part of an effort to produce the next level of safety products for soldiers. With enhanced ceramics, the new Combat II Ballistic Helmet L110 can help protect servicemembers from bomb fragmentations, blunt impacts, certain rifle projectiles and more. The upgrades offer the highest ballistic protection from 3M to date...

## Weapon Systems



### Cyber and Space Weapons Are Making Nuclear Deterrence Trickier

Stability was an overriding concern at a recent Senate Foreign Relations Committee hearing on nuclear command authority, the first in four decades. Senators wondered if one individual should have the sole authority to direct a nuclear attack. But, there are other challenges to nuclear stability that deserve attention. Advances in cyberweapons and counter-space capabilities are creating new pressures on concepts of nuclear deterrence...



### MDA Surveying Industry for Missile Simulations to Enhance Missile Defense

U.S. missile defense experts are surveying industry to find companies able to develop computer simulations of enemy missiles and missile-related observables to help government and industry improve better ballistic missile defense systems and enabling technologies. MDA officials are most interested in missile simulations to help develop threat specifications, threat models, characterizations, scenarios, and trajectory data...

## Announcements & Events



### AIAA SciTech Forum

This Science & Technology Forum focuses on traditional aerospace technologies and those further up the “product chain,” in process execution and mission applications as well as integration and systems with a goal of increasing communication among the different “groups” involved in the aerospace development chain to increase innovative outcomes.

DATE: January 8-12, 2018



### HIGH TEMPLE Workshop 2018

The High Temperature Polymeric Laminate (HIGH TEMPLE aka High Temple) Workshop was initiated in 1982 by a Tri-Service/NASA steering group. The workshop provides opportunities for the high temperature composites community to learn, evaluate and review current advances impacting the community.

DATE: January 29-February 1, 2018



### Military Additive Manufacturing Summit

This summit serves as an educational and training “Town Hall” forum for thought leaders and policy-makers across military services, Defense agencies, and civilian organizations to conduct actionable discussions and debate on technology and innovation to develop additive manufacturing and level of capability that delivers greater flexibility to the Warfighter in.

DATE: February 1-2, 2018

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