

The background of the entire page is a dark, almost black, space filled with a complex, abstract pattern of glowing green and yellow lines. These lines vary in thickness and opacity, creating a sense of depth and movement. Some lines are straight, while others are curved or tangled, resembling a network or a microscopic structure. The overall effect is futuristic and technological.

4 – 7 November

NanoTechnology 2013

for Defense Conference

Hilton El Conquistador • Tucson, Arizona

CALL FOR ABSTRACTS

NanoTechnology 2013

for Defense Conference

PARTICIPATE

We invite you to participate in the 11th Annual NanoTechnology for Defense Conference (NT4D), 4 – 7 November 2013, at the Hilton El Conquistador in Tucson, AZ. This event was initiated and is supported by the Air Force Research Laboratory, Army Research Laboratory, the Office of Naval Research, the Defense Threat Reduction Agency, and the Defense Advanced Research Projects Agency. NT4D is the premier event addressing emerging nano technologies for defense.

Many national programs on science and nanotechnology are providing research discoveries that hold considerable promise for both evolutionary and disruptive technology innovation. NT4D focuses on accelerating the rate of transition from discovery to technology, and is committed to providing a fertile and stimulating forum for discussion on recent nanotechnology innovations in order to maximize their impact on defense and dual-use technologies. This focused conference brings together technical representatives from industry, academia, and government to discuss defense technology needs, identify exciting nano advances primed for technology development, forge connections to facilitate and accelerate the development process, identify obstacles to the accelerated transition of nanotechnology and emerging technology innovations, and address the most critical issues in real and emerging needs for defense. Collaboration and opportunities for innovation are a primary focus for this event.

There are a variety of opportunities for you to participate through attending, presenting, exhibiting, and sponsoring. We look forward to seeing you in November!

Present

We are soliciting abstracts for both oral presentations and the poster session that address key topic areas addressed under the session topic section of this announcement. This is a great opportunity to present your research or program to your colleagues!

Exhibit

Join those on the leading edge of your industry and showcase your organization or technology! According to a survey of Fortune 1,000 Chief Marketing Officers, meetings and events provide the highest return on investment of any marketing channel. The 2013 NT4D participants include key decision makers, engineers, research scientists, and program managers in the nano and emerging technology arena. Participation in this event gives you quick and easy access to these key players. To register for an exhibit booth, visit www.usasymposium.com/nano.

Sponsor

Join the leaders in the industry as a sponsor of the NT4D. Participating as a sponsor:

- Creates brand awareness and increases brand loyalty among a targeted audience in the industry
- Gives you the opportunity to introduce a new product/service/program to a captive group of decision makers
- Drives sales by reinforcing your brand messaging and effectively leveraging your exhibit space
- Differentiates your company and brand from your competition
- Benefits you by highlighting your commitment to furthering excellence in engineering and engineering technology education in the broad nanotechnology community.

A variety of sponsorship packages are available for all budgets. For more information, contact Michelle Williams at mkw@blue52productions.com or 937-554-4632.

Network

Networking and continuing education are key elements to staying current, promoting your research, developing a strong career, or building a successful business. We have complementary meeting space available for registered attendees during the event to encourage collaboration and networking. To reserve this space, contact Amy Voisard at avoisard@blue52productions.com. To register to attend the conference, visit www.usasymposium.com/nano.

Topic 1: Nano & Bio Print Devices/Nano Manufacturing for R2R Devices

At the core of current defense capabilities is high performance – high cost semiconductor devices. However, system performance relies on the ability to package these devices and other multi-functional components into specific forms with extreme reliability. Emerging flexible (compliant) packaging technology will substantially expand the form-fit-function design-trades for components, but even more importantly will usher new technologies and modularity to provide mission tailorability and reconfigurability. The early stage of development of compliant packaging / flexible electronics technologies affords an unprecedented opportunity to develop fabrication, control and design rules that anticipate recent material and processing innovations in nano-patterning, nano-inks, nanostructured materials, bio-recognition elements, and use of biotechnology.

This topic area will focus on recent developments at the intersection of flexible electronics, printing, embossing and transfer processing techniques with nanomaterials, self-assembly, biomaterials, natural substrates and biorecognition elements toward the goal of lower cost, integrated function devices for defense applications, such as structurally integrated energy, conformal aperture communication, interconnects for extreme mechanical loading, non-destructive inspection for sustainment, portable x-ray detectors for IEDs, and human performance monitoring. Discussion will focus on how the material and supply chain can overcome major hurdles toward transition.

Topic 2: Nano Structural Composites

Exploitation of nanotechnology is seen as providing a step enhancement in aerospace systems performance by developing multifunctional nano structural composites that permit a synergistic combination of properties. Recent property measurements on nanoparticles suggest that nano structural composites can be developed with exceptional mechanical and transport properties that have the potential to revolutionize designs for future aerospace vehicles. However, there are a number of technical and processing challenges that must be overcome before nanofilled composites can achieve their predicted performance of weight savings, fatigue resistance, toughness, and transport properties.

This topic area will focus on the development and implementation of nanoparticles and design concepts for the production of multifunctional enabled structural composites and systems. We are seeking discussions on the challenges in pioneering nanostructures into future aerospace applications and examples of the successful translation of laboratory breakthroughs to robust, cost effective, and manufactured-proven components.

Topic 3: Ultra-high, Ultra-lightweight Strength

The military has a need for new materials that provide ultra-high strength, ultra-low weight, or both properties combined, particularly for new armor and structural materials. Such materials would impact a broad spectrum of military operations and capabilities, ranging from the mundane to the critical. For example, ultra-lightweight armor materials would increase the quantity of vital supplies carried by the Warfighter, enable the rapid delivery of ground vehicles around the world, reduce the demanding logistics of providing fuel and water to the theater, reduce the overall environmental footprint of deployment, and reduce the cost of military

operations. The civilian sector would also see disruptive advances in many areas, including energy, oil and gas exploration and production, civil aviation and space, transportation, and construction.

Nanomaterials have offered the promise of ultra-high strength and ultra-light weight, but have yet to deliver on the surrounding hyperbole (e.g. the space elevator), and the nanomaterials research community as a whole has suffered from comparison to such goals. However, nanomaterials' extremely low weight remains coupled with the very high strength of the carbon-carbon bond and efforts to utilize this benefit now extend from carbon nanotubes into the realm of graphene and hybrids. The goal of this topic area is to explore new research in developing this combination of high strength and low weight into transitionable materials, with a particular emphasis on structural and armor applications, including not only experimental efforts but also theoretical and computational modeling.

Topic 4: Nanotechnology for Applied Energy Storage, Generation, & Conservation

The Department of Defense is a major consumer of energy. It also must deliver that energy to inhospitable locations, in highly integrated performance systems, and as warfighter transportable loads. This topic area addresses the improvements in power generation, storage and conservation required by DoD applications. As examples, the storage and generation of electrical energy involves electron transfer across interfaces. The nanoscale provides means to improve both power and energy density in the batteries, fuel cells and ultracapacitors that are needed for mobile energy storage/delivery. New nanoscale concepts in solar energy conversion – photons to electricity or synfuels – may provide more effective local sources of energy and power. Thermoelectric and piezoelectric phenomena utilizing nano-enabled technology may also provide opportunities for local power. Conversely, methods to minimize energy wastage through friction/wear reduction or to more efficiently convert fuel to power will also require nanoscale technologies.

Topic 5: Optics & Photonics

Optical systems are widely utilized in DoD products to sense and collect information on the surroundings of the warfighter. The intent of this topic area is to focus on improvements in the optical discipline due to research and developments at the nanoscale. Size, weight, and power (SWaP) improvements are a high priority and are focus areas for DoD applications. This topic area includes: improvements in signal-to-noise ratio from optical systems, reduction in size, weight and power requirements of optical systems from the incorporation of nanoscale physics, improvements in thermal performance of optical components, basic material developments for improved optical performance (e.g. powders and nanotubes for optical materials), improved coatings based on work at the nanoscale, optical components, and active & passive photonic devices created by nanostructures (meta devices).

Topic 6: Nanotechnology for Biological Sensing & Biomedical Drug Delivery

Biological sensors and delivery devices are essential components needed to perform chemical and biological (CB) defense, medical diagnostics, and therapeutics. This topic area explores innovative nanotechnology-enabled methods for detection, diagnosis and delivery with

SESSION TOPICS

potential applications in CB defense and battlefield medicines. Examples of interests include, but are not limited to, design and fabrication of enabling novel nano-structures, nano-scale approaches for biological sensing and diagnosis, and nano-enabled drug delivery systems. Commercially transferable, prototype nano-sensing, and delivery devices and systems are of particular interest.

Topic 7: Materials Synthesis & Scale-up of Nanomaterials to Industrial Scale

Nanomaterials and nano-enabled macro materials have significant potential for improving U.S. national defense capabilities in such diverse areas as improving the hardness and reducing the weight of military platforms through improved structural materials, and reducing energy and maintenance costs of military platforms via improved lubricants and coatings. Applications of nanomaterials or nano-enabled macro materials to defense-related uses has multiple steps and typically includes synthesizing new forms of nanomaterials in the lab for initial demonstration, followed later by the development of industrial production methods. This topic area focuses on innovative lab-scale synthesis methods to build demonstration materials, and the development of industrial production methods. Additional areas of special interest include:

- Precision Synthesis of Prescribed Carbon Nanotube Structures (e.g. Specific Chiralities, Single-walled/Double-wall CNTS; Defect Free CNTs)
- Industrial Production of High-Grade CNTs
- Functionalization Methods for Carbon Nanotubes or Graphene
- Novel Synthesis Methods for High-Quality Graphene Platelets
- Efficient Exfoliation of Graphene Platelets
- Manufacture of Large Scale Graphene Sheets
- Efficient Production of High-Quality Nanoscale Ceramic Crystalline Grains
- Manufacture of Nanoenabled Macro-materials and Coatings
- Efficient/Practical Methods to Enable Quality Control and Quality Assurance at the Nanoscale.

Topic 8: Next Generation Electronics

In order to maintain a technological advantage over its adversaries, the U.S. military must continually utilize higher performance electronics technology. Key to achieving this next generation of electronics is the development of high-performance, low-dimensional, electronic materials, quantum-effect device operation, and novel computational architectures. This topic area encompasses both the science and technology of this rapidly advancing field. Areas of interest include:

- Low-dimensional Materials Such as Graphene, etc.
- Highly Correlated Materials (Topological Materials)
- Nanoscale Electronic Devices
- Sensors (Electromagnetic, Chemical, Biological and Radiological)
- NEMS
- Quantum Information
- Novel Architectures
- Bioelectronics

Topic 9: Success Stories

More than a decade after the launch of the National Nanotechnology Initiative and 10 years since the inception of the Nanotechnology for Defense Conference, it is important to focus not just on important research challenges and defense-related motivations for nanotechnology development, but also on examples where nanotechnology has led to key capability enhancements and enabled new technologies. Leaders at all points along the technology research and development pipeline can benefit from hearing examples of successful nanotechnology development. This topic area focuses on the development of new nanotechnology which is either already being used somewhere within DoD or actively under test for incorporation within a defense related system or mission. It will also include discussion of issues encountered during the transition of the technology from the laboratory to the field.

Additional Topics that Will be Considered Include:

- Coatings
- New Materials for Next Generation Sequencing
- Verification & Validation of Computational Modeling
- Nanomaterials Response to Extreme Stimulus
- Nanotechnology Applied to Macromaterials
- Nanomaterials in UAVs
- Multi-functional Materials
- Nanotechnology in Special Ops
- Laser Processing for Materials
- Nanomaterials for Energetics
- EM Effects on and in Nanomaterials
- Nanograined Metals & Ceramics

NT4D Small Business & Innovators Forum

A key element of the NT4D program is the Small Business & Innovators Forum (SBIF). The purpose of the SBIF is to facilitate the interaction of small businesses and universities with larger "prime" contractors. Presentations, opportunities for one-on-one meetings, and access to key technical representatives with the SBIR programs and Prime Defense Contractors will be available to you. If you are a prime contractor and are interested in participating, please contact Michelle Williams at mkw@blue52productions.com, 937-554-4632.

Poster Session

NT4D Poster Session

A very important feature of this conference is the NT4D Poster Session. Some material, especially highly technical material, needs a format more conducive to presenting in-depth details, equations, citations, etc. than the oral presentation format can provide. In 2012 we had over 150 submissions and 100 were selected to present their posters. Accompanying the poster session is a poster session awards program. The awards program will be detailed more on the website in the coming months, but special recognition to the winners will be given at the conference, on the website, and in the conference proceedings. Special areas in the poster session will be set aside for the following specialized posters.

Small Business Innovative Research & Student Posters

We are soliciting abstracts from small businesses engaged in an active SBIR program that can address technology issues related to the aforementioned topics. The SBIR Poster Session will take place in the NT4D exhibit hall and will provide opportunity for direct discussion with representatives from government agencies and industry. Private rooms will be available to continue discussions in a more confidential environment.

NT4D is pleased to announce the return of the student poster session at the 2013 Conference. The student program is intended to encourage student involvement and promote networking among students with industry, academia, and government. Abstract topics should address one of the session topics listed previously. Full-time graduate or undergraduate students in good academic standing are eligible. We look forward to reviewing your application. Keep up the quality research!

Abstract Submission

Abstract Due Date: 5 June 2013

We look forward to receiving your abstract(s) for the 2013 NanoTechnology for Defense Conference. Submitted abstracts should be no more than 300 words long. Please be sure to include the title of your abstract in the body of the submission. In late June 2013, you will be contacted regarding the status of your acceptance. **Final presentations will be due 1 October 2013.** This event is conducted at the International Trafficking in Arms Regulations (ITAR) level with restricted attendance. Presentations and papers should not contain proprietary information and may not be more restrictive than Distribution A. All abstracts should fall into one or more of the topics described earlier. Please note: selection and presentation of an abstract, whether oral or poster, does not waive any applicable registration fees.

Full and open abstracts are preferred, however we will accept ITAR-restricted abstracts. Please note: **ITAR ABSTRACTS MUST BE PASSWORD PROTECTED.** Though abstract submission is done on-line, passwords for the password protected documents should be emailed to mkw@blue52productions.com. For information on how to password protect your document, please visit www.usasymposium.com/nano/cfa.php. Non-ITAR documents do not need to be password protected. For general questions concerning submission of your abstract, please contact Michelle Williams at mkw@blue52productions.com or 937-554-4632.

**To Submit your Abstract, visit
www.usasymposium.com/nano/cfa.php**