

# Military Applications



## The 2018 National Defense Strategy

The United States 2018 National Defense Strategy (NDS) reinforces the Department of Defense (DoD) mission of providing “combat-credible military forces needed to deter war and protect the security of our nation.” The approach outlined in the Strategy recognizes that America is in a unique position to “challenge our competitors where we possess advantages and they lack strength.” An innovator in material science research and development, BNNano is actively working to support the vision of the NDS and the goals of the DoD through the unique advantages that their materials and products provide.

## Nanotechnology in Military Strategy

The NDS looks to three key areas of activities: refining DoD operations, establishing strong and reliable alliances and partners, and increasing the lethality of combat force. American innovators contribute to combat force objectives by applying their insight in technology development, practical know-how and rapid deployment.

Today, technology provides our warfighters with the edge in personal and battlefield resources across communications, armor, and weapons systems. Nanotechnology is now playing an increasing role in the creation of materials that will improve existing military systems and create novel solutions for military purposes.

## The Role of Boron Nitride Nanotubes

Boron Nitride Nanotubes are like common carbon nanotubes, having similar mechanical properties, but Boron Nitride Nanotubes differ significantly on other properties such as electrical insulation and radiation absorption. BNNano’s very high purity Boron Nitride Nanotubes material accentuates the unique properties of Boron Nitride Nanotubes and



offers the ability to customize this remarkable material for specific needs, including diverse military applications.

## Nanoscience, Nanotechnology & Nanotubes

Simply put, **nanoscience** and **nanotechnology** are the study and application of extremely small things. Today’s materials engineers are designing products at the atomic and molecular level for game-changing results.

**Nanotubes** are small hollow cylinders with diameters of 2 to 20 nanometers and lengths on the order of tens of microns. Individual tubes exhibit extraordinary properties, including high thermal stability and thermal conductivity, electrical resistivity, exceptional strength and stiffness, and super hydrophobicity (resists combining with or dissolving in water).

## Military Applications of BORON NITRIDE NANOTUBES-enhanced Materials

Heat Sinks and Coolants	Reinforced Personal and Vehicle Armor	Improved Radiation Protection
<p>Mechanical heat sinks made with Boron Nitride Nanotube materials provide more efficient cooling for applications from pulsed laser weapons to high-power electronics. Added to liquids like water or glycol, Boron Nitride Nanotubes improve the heat carrying capacity.</p>	<p>Boron Nitride Nanotubes adds lightweight mechanical strength to other materials which can improve the protective properties of personal and vehicle armor.</p>	<p>Due to its capacity to absorb neutrons, NASA has explored the use of Boron Nitride Nanotubes materials for various space applications. Enclosures made with Boron Nitride Nanotubes materials may provide better shielding for sensitive electronics.</p>

Improved Resistance to Corrosion	Textile Durability Enhancement	Lubrication
<p>Boron Nitride Nanotubes are inert in the presence of many other materials. This reduces “Galvanic corrosion” that occurs when dissimilar materials are coupled.</p>	<p>Boron Nitride Nanotubes may be integrated into textiles. Boron Nitride Nanotubes will increase strength, durability, resistance to chemicals and perhaps additional protection from radiation.</p>	<p>Boron Nitride Nanotubes act as an effective dry, high temperature (850C) lubricant. When added to oil Boron Nitride Nanotubes reduce both friction and wear.</p>

