Nanotechnology Special Report:

"Nanotechnology- How to Make $500,000 or More on This Disruptive Technology"
By Tim Fields

Nanotechnology has the potential to change everything we've ever known. It is expected to be a trillion dollar industry by 2015.

Realizing the potential here on so many levels, the U.S is on the forefront of this revolution, spending around $3 billion on research and development annually, which accounts for roughly a third of the total public and private investments worldwide each year.

Its applications are far and in between, with everything from science to technology, nanotech is miniaturizing the world and enhancing existing applications in every way, shape and form imaginable.

The great investors of our time always seek what is best termed as "disruptive technology." The idea is not to reinvent the wheel, but make the old version obsolete. And that is exactly what nanotech does, forging a new class of millionaires with every breakthrough.

Some consider it science fiction, however, with billions being spent by investors, scientists and scholars on R&D, it is quickly becoming a reality, and has already marched into the consumer and government marketplaces with much excitement and endless possibilities.

A quick background, nanotechnology in itself is essentially the ability to measure, see, manipulate and manufacture things usually between 1 and 100 nanometers- a nanometer is one-billionth of a meter.

To put that in perspective, if you were to take a single strand of hair from your body and measure it, it would be around 100,000 nanometers wide. Taking that into account, you can understand the potential here.

We could go on for hundreds and hundreds of pages on the countless applications, but this report will be tailored towards one specific nanotech marketplace- defense.

Which leads us to the important question:

How Can You Profit From This?

Companies are moving from the private sector to the public sector, enticed by the lucrative marketplace for it, and enormous government and private grants and contracts out there.

In short, there are thousands of applications that could become profitable within this broad industry.

In this report we will focus primarily on military and aerospace applications, and the one company we believe can lead the charge all the way to a conservative $60.15.

Military and aerospace applications are not only paramount to our national security and global supremacy, but they are also some of the most lucrative contracts for public companies to receive.

It is estimated that the world spends 1,000 billion dollars on the military. This is not just a domestic phenomenon, as most of the military powers in the world are racing to incorporate nanotechnology into their systems to get an edge over their adversaries.

This new "arms race" is spawning a quite revolution, and investors in the early stages will be on the front lines- profiting from the growing competition.

More over, as the race heats up, governments will be increasing their R&D expenditures on nanotech, creating an even greater opportunity than exists today for enormous contracts to go to little nano companies, who work hand in hand with the government and top defense contractors.

The key is when top defense contractors, like a Lockheed Martin, receives multi million dollar contracts it has little influence on their balance sheet, whereas a small cap company, like Advanced Photonix (more on them in a couple minutes), get even a portion- their shares react!

Think of it this way, a company with a market cap of $40 billion versus $40 million, changes the impact of a multi-million dollar contract in significantly different ways. Giving the ultimate edge to the small cap growth company, whose revenues will drastically be influenced by some of these contracts, especially when they equate to 25% of their market cap, using an example of a $10 million contract, which is not uncommon.

This is where the true explosive earnings power lies…in small cap stocks that receive big government contracts, or are hired to work on a significant opportunity for a top defense company.

Of these blossoming companies, we have isolated one, in particular, that is working with the military to bring nanotech to our brave man and women of the armed services, to ensure that we remain the world's superpower, and more importantly, that our soldiers are protected to a greater degree than at any time in history.

More on them in a minute, but first, a little industry background…

Military and Nanotechnology

What is impressive about nanotech is the massive amounts of money that the government and most importantly the military is pouring into R&D. The National Science Foundation and the Department of Defense are jointly investing, roughly, $710 million.

Another very important initiative comes from the Institute for Soldier Nanotechnologies (ISN) at MIT, which is an interdepartmental research center founded in 2002 by a $50 million, five-year contract with the U.S. Army Research Office. In addition to that, private business is also contributing up to $40 million.

The 3 core competencies are:

- Force protection
- Mobility
- Ability

Essentially, the goal of the program is to protect our soldiers without losing mobility.

There are 5 strategic areas of study encompassing some 45 research projects:

- Lightweight, multifunctional nanostructure fibers and materials
- Battle suit medicine
- Blast and ballistic protection
- Chemical and biological materials science- detection and protection.
- Nanosystems integration

They provide two intriguing examples of their future systems, which are all incorporated into a single, lightweight, battle suit, that can do everything from protect against ballistics to detect and administer treatment for wounds and chemical/bio agents.

In one example a soldier is hit by a blast from a mortar, the blast knocks him down and causes heart failure.

The soldier's suit automatically checks his vitals and realizes in a matter of a millisecond that his heart has stopped- the suit then contracts and performs CPR, reviving the soldier. All the while his fellow soldiers and commanders are seeing this unfold in real time, thanks to systems integration.

In the other example, two soldiers are doing a little reconnaissance, when a blast goes off overhead, a cloud showers down on them- it is a chemical attack.

One of the soldiers doesn't have his protective visor down, he drops to the ground…immediately, the soldier's suit detects a chemical agent and administers a vaccination- his life is saved.

Whereas today, there is little technology available to the individual soldier to be able to accurately detect what the agent was. He would have to be contained and a Hazmat team would have to come in and run test to determine what it was…anthrax…mustard gas?

The point is the minutes to hours wasted costs lives- he would stand little chance of surviving without the instant vaccination.

Both of these circumstances are possible, thanks to smart nano censors on their battle suits and will save countless lives as a result.

Possibilities Are Only Limited By Ones Own Imagination!

In the war on terror, one of the biggest obstacles the military faces is actionable intelligence. This is complicated due in part that after 6 years of war, the enemy is starting to understand our strategies and capabilities…until now.

They are getting pretty good at picking up UAV's and satellite rotations, and now, thanks in part to our media, are no longer using conventional communications.

How Do We Find Bin Laden?

Flying cameras the size of bees! What terrorist would ever suspect that bees had cameras and were tracking their every movement? Now the rugged and unforgiving terrain of Afghanistan and Pakistan are rendered defenseless, we can spot these wimps, wherever they are, in any condition.

Take this surveillance to the ground. While we currently have hundreds of robots in service, they are easy to spot because they are loud and relatively big- compared to ants…that's right…. ants!

Now, ants can follow the enemy without ever being detected. This will save thousands of troops. Think of the battle for Fallujah, Iraq, when we invaded a city booby trapped at every corner and house.

Instead of breaking down doors and rushing into houses, ants can go in first, undetected, and survey the building to determine if anyone or any device is inside. This will be the future, and it will save lives.

One thing is certain in any military conflict; waterways are of strategic importance. Currently, in the Middle East, we are patrolling a significant water mass, protecting our fleet and critical infrastructure can be daunting…but not after submarines the size of minnows patrol the perimeter for us, and extend our reach to the open water.

A terrorist vessel approaches, in response; this undetected little nano sub blows a hole in it, destroying it before it ever gets close and we avoid another USS Cole. This nano sub can also detect mines, freeing up valuable time for our forces.

Another alarming situation happened a little while back when China successfully test fired a laser, destroying an old weather satellite. This event, obviously, put U.S command on full alert and has raised perhaps the most critical test to our national security since the cold war.

If China were able to find and destroy our satellites, which are absolutely imperative to our missions domestically and abroad, then we could be blind on the battlefields.

What's more is they have also announced plans to place systems on some of their submarines. Now our space domination is at jeopardy and we have to do something about it…

The answer is satellites the size of grain. Guess what China? You can't shoot down what you can't find, and like that, we are back in control of space and our forces have unimpeded access to the most sophisticated communications and technology arsenal the world has ever seen…thanks to nanotech- we remain the most feared military in the world.

Other Notable Applications:

Obviously terrorism is the paramount concern to our national safety. How do we protect ourselves?

The situation: somehow a terrorist smuggles a bomb on a plane that has a timer set for 1 hour after takeoff. The terrorist sits nervously, praying, preparing to kill innocent men, women and children…hell awaits the terrorist…the clock hits, all of a sudden a large thump, the plane shakes for a second and than all normal…what happened?

Bomb resistant containers protected the luggage and saved hundreds of innocent lives. The container was made of nano materials, kind of like the new soldier uniforms, and what bomb squad members currently sport. It absorbs the blast and neutralizes the threat, and the plane is safe.

Another scenario: terrorists smuggle a nuclear weapon on our soil- it is designed to be the greatest terror attack in history, killing tens of thousands. Their plan, drive a truck to downtown New York and park it in front of Madison Square Garden when it is packed with tens of thousands of innocent fans, then lights out…

What they didn't account for was, on the way, hundreds of tiny nano detectors scan the city for any sign of radiation. Bing, a censor goes off, followed by another, then another, authorities know something is wrong and they can now track the route…

Switching to cameras on the street they can now visually track the truck. We get in closer with hand held devices that confirm the radiation, and Special Forces on the scene take the terrorist out before they can trigger the device.

Another disaster is avoided- all thanks to nano tech!

I think you can now begin to see the implications here on how nano tech can help win the war on terror, and keep our citizens safe in the case these lunatics try to carry out another attack.

That is why the government is spending billions on nanotechnology and that number is only going to get bigger, and savvy investors are only going to get richer and richer from this relentless war against terror.

More than that, our military can now perform more tasks with better, more precise weaponry with fewer assets (soldiers, vehicles), and win the battle as silently and lethally as ever.

Nanotech is essentially transforming our military into one massive Special Forces Army, and there won't be a military in the world that will stand a chance.

This leads us to the small cap nano company on the front lines, protecting America and our troops!

On The Front Lines In The War On Terror!

Advanced Photonix (AMEX: API) has over a decade of experience working with different branches of our military, as well as NASA, the Pentagon, the TSA (Transportation Security Administration), Department of Homeland Security (DHS), U.S Customs and Borders Patrol, and many different major defense contractors, like Lockheed Martin.

They have collaborated on many different applications including:

- Missile Guidance and Tracking
- Navigational Gyroscopes
- Heads-up Displays
- Satellite Positioning
- Laser Training Systems
- Fire Sensing and Suppression
- Laser Range Finders

With their products being used on:

- Supersonic Missiles
- TOW Missiles
- Airborne Sensors for underwater mine detection
- Aircraft detection for tracking submarines
- Abrams Tanks
- Bradley Fighting Vehicles

- Humvees
- Apache Helicopters
- Night Vision systems
- Continuous-wave THz imaging for antiterrorism/force protection
- Nondestructive-testing (NDT)
    - Laser based equipment for imaging such as:
        - People Screening
            - Remote explosive detection
        - Portal screening
        - Baggage screening used at:
            - Airports
            - Borders with Canada and Mexico
- New line of document authentication: used to read US government issued documents, such as passports and drivers licenses.
- Smart sensors for increased battlefield surveillance and smart munitions guidance
- Large Area Avalanche Photodiodes (LAAPDs) used as an infrared enhanced detector of choice for identifying military planes, helicopters, tanks, transports and naval vessels as friendly

Advanced Photonix is a diverse company, working in the Military, Homeland Security Telecommunications, medical and industrial/NDT (Nondestructive-testing) markets.

They develop and manufacture three product platforms: high-speed optical receivers, custom opticaelectronic receivers, and Terahertz sensors and instrumentation.

We will be focusing on their military and homeland security segments and applications for this report.

With the military segment expected to be flat in 2007 due to the current cycle of contracts, API will look for homeland security to be a growing force, and that business segment is expected to be a $30 million dollar market for them next year.

Military Applications:

The military has a high demand for smart sensors for a number of different applications. API, through their optoelectronic solutions, which is a $150 million market worldwide, works with them to help increase battlefield surveillance with satellite positioning.

Other military market opportunities that API works with are smart munitions guidance and laser range finders. Their custom LED (Light Emitting Diode) assembly system was used in the Apache Helicopter's missile guidance system.

Not only do they work with the military directly, but often, their services are in demand from top defense contractors, like Lockheed Martin.

In one such case, API doesn't name the company, probably for security reasons, but they were approached by one of the largest U.S manufactures for tactical missiles in a request to build a sensor that essentially would be used as an optical proximity fuse for a supersonic, light weight, quick reaction missile, basically a fire and forget concept.

API and their customer's engineering team worked hand in hand to meet the stringent mission readiness requirements of the U.S Navy, and in the initial test, the proximity fuse worked perfectly.

This led to their customer being rewarded a multi year, multi million-dollar contract for the missile system, which they in turn continued to use API as the sole supplier. This contract proved API's ability to integrate their technologies with other companies to create important end products and reliable service.

In another case, a major defense contractor ran into some problems with the company they were working with, basically cutting off the supply of the product they needed.

This is where API stepped in…

The contractor needed API to develop a detector that was part of a magnetic sensing assembly for an aircraft used in the detection of and tracking of submarines.

Under time constraints, API was able to design, develop and manufacture the detector in just three months, resulting in them being the sole supplier for the program.

In a similar million dollar project sponsored by the Naval Air Warfare Center and the Advanced Research Project Agency of the Pentagon, they where contracted to develop an airborne sensor for underwater mine detection.

Another success story was when a major military contractor hired them for a two year, $2 million project dealing with the TOW missile platform. API supplied photodetector assemblies used in the guidance system of the missile.

This was just a walk in the park for API, as for more than 10 years they have been supplying military contractors with assorted modules of the TOW system, the Improved Bradley Acquisition System (IBAS), the Improved Target Acquisition System (ITAS) and the TOW visual Module.

Their most recent million-dollar contract was for their LED system to be deployed over the next nine months for the use in the military's night vision systems. To date, their night vision enhanced systems have been deployed in thousands of actual combat situations, used by Abrams Tanks, Bradley Fighting Vehicles, Humvees and Apache Helicopters in the war on terror in Iraq and Afghanistan.

NDT Military Contracts:

Outside of weapons systems, Advanced Photonix works in the realm of NDT testing, which is utilized by the military for a wide array of applications, but more importantly, is becoming an imperative tool in the war against terror (more on that in a minute).

API was contracted by the Office of Naval Research for R&D on the feasibility of developing a field portable, passive, continuous-wave THz imaging product for antiterrorism/friendly force protection by detecting enemy threats from a far away distance. This could potentially be used in applications for NASA and TSA the company says.

In another project for the Air force, their THz systems were wanted to test advanced composite materials designed to protect radar systems. This contract, has subsequently, moved into phase II, which will focus on design and development.

The Air Force, initially, contracted them to improve upon their radar systems. The goal was to test the randomes, which are geometric structures used to protect radars from elements, such as water and sand.

The result, a more accurate method for preventative maintenance to help ensure the radars are working properly.

Homeland Security Applications- A surging Market

Over the last 3 years, $4.5 billion has been spent on the DHS market for equipment used in air cargo, and passenger and baggage screening. According to Advanced Photonix, in that three-year time, that includes:

- 429 commercial and 5,000 public airports
- 350 seaports
- 55 land borders with Canada and Mexico
- 27,867 U.S Post offices- including 300 sorting offices
- 3k government owned/operated facilities
    - 460 skyscrapers
    - 5,800 historic buildings

As you can see from those numbers alone, this is a surging marketplace. With the war on terror, a battle we'll be fighting for generations to come, technology companies like API will be mission critical in protecting Americans and our infrastructure from terrorists.

In this battle, airports, seaports and borders are essential buffer zones, and it is important to have the best technology available, while taking into consideration sensitive issues, such as personal safety and privacy.

This is where API's Tarahertz system comes into play. Terahertz radiation can be used to image through materials yielding high spatial resolution and has the ability to resolve both time and amplitude information. It is safe for humans and can provide spectroscopic information, as well as produce images.

Let's say a terrorist is walking through a security checkpoint at the airport, and they try to smuggle bomb-making material in their briefcase. Now, thanks to API, the terrorists are caught before they can enter the secure terminals.

Tarahertz allows screeners better X-ray capabilities, similar to that of a human eye, and moreover, the non-invasive chemical composition is not harmful to the inspector or material. Its applications include baggage scanners and people scanners, which include explosives detection.

NDT and process control markets was estimated to be $4.9 billion in 2006, with a projected growth rate of 5.1% annually.

API's systems have been utilized:

A publicly traded company came to API with a contract that needed to be fulfilled in a 10-week timeframe. The company needed a large multi-element array for laser-based equipment for imaging.

The parts developed by API exceeded expectations, that they were rewarded a second contract for an even higher resolution device.

In another case, API was contracted to design a new line of document authentication products for another publicly traded company.

The need was for a government reader of passports and drivers licenses, based off of a DHS initiative for border controls document validation. The results were upbeat, with a 40% increase in accuracy over previous designs.

In their latest contract, the DHS awarded them a $1 million phase II Small Business Innovation Research contract to develop a prototype for a flexible terahertz instrument that can be marketed to customers currently utilizing nuclear source gauges.

As you can imagine, this is a prestigious contract, because it is protecting us from the worst possible scenario imaginable, a nuclear attack. This system helps to safely test packages and cargo; also it requires no shielding and no nuclear waste disposal.

Working With NASA To Prevent Another Disaster

In wake of the space shuttle *Columbia* disaster, which was determined to be a result of the sprayed-on foam insulation (SOFI) on the external fuel tank having caused pieces to break off and damage the leading edge of the left wing at lift-off, API is working with NASA to prevent another disaster.

As part of the Return-to-Flight program instituted by NASA after the disaster, API has supplied multiple terahertz QA1000 systems to NASA for non-destructive evaluation and quality control of the space shuttle's external fuel tanks.
The QA1000 system has been validated by NASA as a critical pre-flight quality control inspection system for the external fuel tanks on the space shuttle

Financials

In the beginning of September API announced that they just completed a private placement with insiders and institutions.

Here is an insert from the press release *"2,432,000 shares of common stock, with institutional investors purchasing 2,300,000 shares at $1.50 per share and management purchasing 132,000 shares at $1.83 per share, the closing price of the stock on the day the placement was consummated. Investors in the private placement also received 608,000 warrants to purchase common stock exercisable at $1.85 per share through September 2012. The gross proceeds of $3,691,560 will be used for debt restructuring, working capital and other general corporate uses."*

The underlined part of that statement is encouraging, as it means API is looking towards the future and restructuring capital in order to meet any future financial obligations.

Furthermore, API insiders and institutions are decidedly bullish on the stock, as evident from the private placement, but also from their historical buying trend on the shares, which is typically a sign of a strong outlook.

Of the 12.30% owned by institutions and the 18.10% by insiders, the fact that only 108k of the outstanding shares are short exemplifies their bullish forecasting.

Q1 net sales were up 8% to $6.1 million from Q1 last year, and their fully diluted EPS widened by $0.03 in the same period.

Revenues for their medical business where the strongest, improving by 74% to $1.1 million, while their telecom segment jumped 69% to $1,258,000, and industrial sensing/NDT was up to $2.1 million, a 21% increase.