

Statement of

**William Moffitt**

*President & Chief Executive Officer*

**Nanosphere, Inc.**

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## SUMMARY

- The National Nanotechnology Initiative provides crucial funding to revolutionary ideas and enables private enterprise to find and invest in promising technologies and companies.
- These technologies can represent important breakthroughs in crucial industries such as healthcare and defense.
- The market is efficient at funding and commercializing viable technology into useful products, so long as those technologies have sufficient funding to make it through the “valley of death.”
- The National Nanotechnology Initiative is the primary tool that Congress has available to make sure that promising technologies like these make it through the “valley of death” and into the marketplace.
- The National Nanotechnology Initiative is also a direct investment in high-paying, highly-skilled American jobs.
- Companies like Nanosphere can bring their technology to the marketplace relatively quickly – in our case, we went from research laboratory to marketplace in only ten years.
- The U.S. nanotechnology industry faces challenges in the U.S. labor pool as well as other countries’ aggressive investments in nanotechnology, particularly health-based research.
- Nanosphere is committed to the responsible development of nanotechnology, particularly with regard to any environmental, health and safety issues related to the development of this new technology, and will leverage nanotechnology research to solve potential challenges.

Chairman Brooks, Ranking Member Lipinski, and distinguished Members of the committee, thank you for allowing me the opportunity to testify before the House Science, Space and Technology Committee's Subcommittee on Research and Science Education, regarding how the National Nanotechnology Initiative has been crucial to my company's success.

I am the President and CEO of Nanosphere, Inc., which is a member of the NanoBusiness Commercialization Association, on whose behalf I am also testifying. Nanosphere is an eleven-year old company based in Northbrook, Illinois, that is revolutionizing the way diseases are diagnosed and bio-security risks are discovered using nanotechnology. Nanosphere develops, manufactures and markets an advanced molecular diagnostics platform, the Verigene System, for ultra-sensitive protein, human genetic and infectious disease detection. This easy-to-use and cost-effective platform enables simple, low cost, highly sensitive testing on a single platform available to any medical setting anywhere in the world. Nanosphere has also developed mobile bio-security systems that can detect biological agents – such as anthrax, plague and other pathogens – in a local water supply. This system is field-deployable to any potentially threatening hotspot or U.S. embassy anywhere in the world.

Both of these systems rely on nanotechnology to make these breakthroughs possible. For instance, one of the greatest benefits nanotechnology has delivered to the market is speed to diagnose a patient. Our technology, which enables tests to be performed right at the site of patient care as requested by the patient's physician, generates critical diagnostic information when and where it is required. We have eliminated the high cost and complexity of genetic tests for human inherited disease, pharmacogenetics (or personalized medicine) and infectious

diseases through the use of breakthroughs in nanotechnology. Nanotechnology has enabled us to develop a molecular diagnostics platform that operates in a very simple format that eliminates the need for highly specialized labor. Moreover, the underlying cost of the consumable test cartridge is very inexpensive, which allows for pricing that is in line with any number of other routine diagnostic tests. This means that a life-saving test can now cost a patient tens of dollars as opposed to hundreds or even thousands of dollars and these new, more sophisticated molecular diagnostic tests can be easily integrated into mainstream medical care without additional financial burden on our health care system.

Nanotechnology also allows for earlier detection of life-threatening diseases. Harnessing nanotechnology, we have developed a diagnostic procedure that provides advanced detection for human protein biomarkers – or the “fingerprints” of disease – that is simply not possible using other technologies. For example, we have in development a test for cardiovascular disease which has already proven to be far more sensitive in detecting heart attacks and acute coronary syndromes than traditional technology. Recent data also suggest that this assay has great value in monitoring patients with chronic heart failure, allowing doctors to more accurately adjust a patient’s therapy for this life threatening condition. Nanosphere has also developed the ability to detect recurrent prostate cancer following treatment years earlier than tests available without using nanotechnology. Today, the best weapon to fight cancer is early detection. Our products using nanotechnology make early detection possible and affordable.

The National Nanotechnology Initiative is the primary tool that Congress has available to make sure that promising technologies like these make it to the marketplace. This Initiative

provides crucial funding to revolutionary ideas and enables private enterprise to find and invest in promising technologies and companies.

Simply stated, without the National Nanotechnology Initiative, Nanosphere might not exist. Nanosphere is a product of university-based research funded by NSF, NIH, and DARPA, among others. Since its inception the company has received approximately \$5-6 million in government grant funding, which has been leveraged to an additional \$200 million in private and public equity financing, a 40 to 1 investment ratio. Early government funding was critical to the long-term future and success of Nanosphere and the realization of significant advances in medical diagnostics.

The market is efficient at funding and commercializing viable technology into useful products. However, in order for forward-thinking companies with promising technologies such as ours to succeed, the basic technology must be nurtured until it reaches a market-sustainable level. And once federal funds support a technology to the point where it is ready to commercialize, the marketplace provides venture capital to the best products. Our company has raised about forty dollars of private venture capital and public institutional equity investment for every one dollar of public funding to commercialize our molecular diagnostics platform. That one public dollar, though, was provided at a crucial time for any product trying to make it past the so-called “valley of death” for new technology. Venture capitalists are ready to invest in technologies that can get across the “valley of death” and be commercial successes. But economies built on basic research, such as the U.S. technology economy, cannot be sustained without robust government support for promising new technologies.

The National Nanotechnology Initiative is also a direct investment in American jobs. NNI-supported technologies are often commercialized by small businesses that excel at making those technologies useful in the marketplace. These companies employ highly-paid researchers, scientists and technology experts in order to develop their new products. As these companies grow, their workforces expand to include sales professionals and administrative personnel.

We have brought our technology from the university research bench to commercial reality in less than 10 years. As our company continues to grow, we generate incremental jobs. Today we employ over 115 people and expectations are that we will grow to several hundred over the coming years. These are high tech jobs with more than 85% of our employees holding college and advanced degrees. Our average salary exceeds \$85,000. Companies like Nanosphere are a key growth factor in the nation's economy. These high-paying jobs employing professionals here in the U.S. simply would not exist without basic support for nanotechnology being developed in laboratories across America.

In this regard, one of our greatest challenges is the available labor pool. This Committee is well-aware that we face a STEM education crisis. The NNI provides a strategy to help address that crisis and generate the highly skilled workforce that companies like Nanosphere need in order to compete in the global marketplace.

The U.S. nanotechnology industry also faces the challenge of foreign competitors making significant progress in nanotechnology research. Large foreign companies as well as start-up

enterprises are capitalizing on major advances in nanotechnology to create new products and new economic growth opportunities for their respective countries in the health-care arena. We face stiff competition from China, Germany, Korea, and Japan. Competitors in those countries are patenting at a furious rate, and the investments of these four countries in nanotechnology, especially as it applies to human health, exceeds total investment by the U.S. The governments are proactively investing in key areas like nanomaterial-enabled diagnostics and therapeutics because they know these advances have a chance to define their economy for decades to come. In addition, these countries are strategically finding ways to decrease the gap between invention and commercialization. Indeed, they are generating central arteries of development and commercialization by establishing institutes and centers of excellence in key subareas of nanotechnology, including energy, materials, electronics, bio-nanotechnology, and many subareas of medicine. Learning from the best practices of these competing countries could prove valuable to further refining the NNI.

Like the other members of the Nanobusiness Commercialization Association, Nanosphere is committed to the responsible development of nanotechnology, particularly with regard to any environmental, health and safety issues related to the development of this new technology. One of the key components of the National Nanotechnology Initiative is learning how nanoparticles interact with the environment around us. As our company's success with developing new health technologies demonstrates, nanotechnology more often than not provides the *solution* to environmental, health and safety problems. However, as we make these new discoveries, we can learn more about the impact of nanoscience, identify any risks that may develop, and determine solutions accordingly.

Thank you again for the opportunity to address the committee today. I look forward to responding to any questions you may have.