Testimony of Elizabeth Rogan
CEO
The Optical Society
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Good morning, Chairman Wolf and Ranking Member Fattah. My name is Elizabeth Rogan, CEO of the Optical Society of America (OSA). I appreciate the opportunity to comment on the proposed Fiscal Year 2013 budgets for the National Science Foundation (NSF) and National Institute of Standards and Technology (NIST), both of which are vital to our nation's scientists and engineers. I would like to thank you and the subcommittee members for your stewardship in providing sustained investments in these two critical agencies.

OSA unites more than 130,000 professionals from 175 countries and brings together the global optics community through our programs and initiatives. Since 1916 OSA has advanced the common interests of the scientists, engineers and business leaders in the field of optics and photonics. Optics is a highly specialized branch of physics known as the "science of light," which makes possible everything from medical imaging and solar energy to high-speed computers, LEDs, and laser cutting for manufacturing.

Mr. Chairman, OSA strongly supports the President's FY2013 budget requests of $7.3 billion for NSF and $857 million NIST for three fundamental reasons.

First, these federal investments in research and development (R&D) are vital to ensuring our country's long-term economic prosperity and competitiveness. Work being done in labs and classrooms today leads to the businesses, innovations and jobs of tomorrow. America's leadership in science and technology is largely due to the investment in long-term, basic and applied research in the decades following World War II. In recent decades however, federal

funding as a percent of GDP has declined in the US, while funding has continued to increase in countries such as Germany, China, Japan and Korea.

Second, they will help re-energize and re-establish U.S. leadership in advanced manufacturing, creating countless new inventions and products, hundreds of thousands of jobs and ensuring national security. Our nation's leadership in manufacturing has been declining, with 28 percent of high technology manufacturing jobs lost over the last decade. The FY13 proposed budgets for NSF and NIST make advanced manufacturing a top priority, with robust investments in key areas that will heighten the speed and efficiency of manufacturing processes, produce new state of the art cyber and communications technologies and improve automation and reliability.

Third, researchers need the certainty of sustained funding in order to deliver results from long-term projects. Major scientific breakthroughs, new discoveries and the cutting edge new technologies that fuel our economy typically take many years to come to fruition, requiring sustained efforts and funding over multiple years.

Now let me give you some concrete examples of the direct benefits sustained federal R&D investments have had:

1. Consider the laser, which celebrated its 50th anniversary in 2010. Using federal funding, Theodore Maiman developed the first ruby red laser at Hughes Research Labs in 1960. At the time of its creation, the laser had few known applications. It was known as the "solution looking for a problem." Today, the laser touches virtually all aspects of daily life from bar code scanners to fiber optics that provide high-speed Internet to life-enhancing medical technologies such as the three dimensional images of human tissues and laser eye surgery. Lasers also play a key role in our national security efforts from the ground to the air. For example, lasers are used in airport scanners to detect potentially dangerous devices being carried on board airplanes. They are used on

military aircraft to detect and fight off enemy missiles. In short, the federal funding used to create the laser was an investment made a half century ago that is still creating thousands of jobs and providing billions of dollars in economic activity today.

2. NSF funded research at the University of California-Davis has transformed the i-Phone into a medical-quality imaging and a chemical detection device. The enhanced i-Phone could help doctors and nurses diagnose blood diseases in remote areas, the military field and developing nations, where hospitals and rural clinics have limited or no access to laboratory equipment.

3. A team of high-energy physicists, computer scientists, and network engineers from CalTech, University of Michigan and other universities recently set a new world record for data transfer, helping to usher in the next generation of high speed network technology. The achievement, funded by NSF, will help establish new ways to globally transport increasingly large quantities of data, allowing individuals, governments and agencies to share information faster and more reliably.

4. NIST research helped fuel the creation of everything from mammograms to semiconductors which power computers as well as laser tracker measurement systems used in the aerospace and automotive industries, among others. Recently, a team from the University of Colorado Boulder and Pennsylvania State University collaborated on compact laser frequency comb. Laser frequency combs are extraordinarily precise tools for measuring frequencies (or colors) of light. The new comb could enable new applications in astronomical searches for Earth-like planets, high-capacity telecommunications, and potentially portable versions of the most advanced atomic clocks.

5. NIST research is currently focused on promoting energy-efficiency and alternative energy sources, both of which save money and decrease our dependence on foreign oil. NIST's Spectrally Tunable Lighting Facility will allow researchers to fine-tune light-emitting diodes (LEDs) and ensure standards and measurement method are adequate for LEDs. The current standards are designed for traditional incandescent bulbs. Additionally, a team of scientists from NIST and the US Naval Research Laboratory (NRL) are working to optimize organic solar cells. Solar cells made from organic materials cost less to produce than silicon cells, can cover larger areas and can be recycled easier.

6. NSF is supporting transformative research in advanced-technology manufacturing by investing in research that makes manufacturing processes faster, cheaper and more efficient. The investments in the Cyber-enabled Materials, Manufacturing, and Smart Systems (CEMMSS) program will be focused on areas of national importance such as advanced semiconductor and advanced optical device design; cyber- physical systems and advanced robotics research and; materials processing and manufacturing, with the goal of investing in emerging technologies that promise to create high quality manufacturing jobs here in the US and enhance our global competitiveness.

Revitalizing the U.S. economy through R&D

Nearly 15 years ago the National Academies produced an extraordinary report called "Harnessing Light: Optical Science and Engineering for the 21st Century" that made the compelling case that investments in R&D and specifically in the areas of optics and photonics have been critical in developing many of the cutting edge technologies we depend on in health care, energy and medicine. The NAS is now in the process of updating this report and plans its release this spring. We believe it will provide a positive roadmap and framework for how the U.S. can wisely invest in the technologies that will win the future.

Mr. Chairman, these may be difficult economic times but through continued, sustained investments in R&D programs at NSF and NIST will help revitalize U.S. manufacturing, create hundreds of thousands of new jobs and spur innovations that will lead to a better quality of life for millions of people in the U.S. and around the globe.

Once again, we greatly appreciate this committee's leadership and look forward to working with you as you move forward with the FY13 budget process.