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Hearing on China's Industrial Policy and Its Impact
on U.S. Companies, Workers and the American Economy

I am the President and CEO of the Optoelectronics Industry Development Association (OIDA), an industry association based in Washington, DC. OIDA has over 80 members who research, manufacture, and sell optoelectronics components and systems in applications such as communications, defense, displays, solid-state lighting, sensing, and solar energy.

OIDA is in a unique position to address the issues posed by this Commission. OIDA members include large companies such as General Dynamics, Cisco, Corning, Telcordia, and JDSU, and fast-growing entrepreneurial companies.

In the past five years, the Chinese government has made a concerted effort to transition from a "copy and assemble" economy that relies on low labor and manufacturing costs into an innovation-driven one. It is focusing on higher-value products and is encouraging its companies to move up the value chain. China is seeding a competitive optoelectronics industry by supporting a wide range of R&D activities from materials to devices to manufacturing technology.

"If an optoelectronics effort looks promising, China will support a commercial start-up until it's profitable"

The Chinese government supports optoelectronics through the research, development, and production phases (R&D&P). An example is their new multi-million dollar Wuhan National Laboratory for Optoelectronics (WNLO). It is one of the five national laboratories formed and sponsored by the Chinese Ministry of Science and Technology. The mission of WNLO is to become the innovation base for optoelectronics in China, to promote and lead the complete commercialization system for "Wuhan Optics Valley of China," and to contribute to the growth of optoelectronics industries through technology transfer.

The government also uses consortia such as the Northern Microelectronics R&D Center, which has the Institute of Microelectronics of the Tsinghua University in Beijing as a principle member, to foster academic-industry collaborations.

"U.S. companies are competing with countries not companies"

As part of its industrial policy, the Chinese government encourages foreign companies to establish facilities in China. The subsidies that the Chinese government offers are a major incentive for U.S. companies to shift R&D and production to China. They include tax incentives, building subsidies, free trade zones, and low-cost labor. Many U.S. companies see these incentives as a means to survive in an increasingly competitive global business environment.

Corporate strategies that keep product design in the U.S. while moving manufacturing overseas over time will dilute our ability to innovate. Most innovation is incremental, not revolutionary. It consists of constant small improvements to the product and manufacturing process that result in better performance and lower cost. In optoelectronics, even the slightest change in the yields of manufacturing processes can affect the economic viability of a company. Maintaining the close proximity of R&D to manufacturing is essential for driving process improvement and innovation.

"If you stop manufacturing, you will eventually stop innovating"

Initially, jobs that move overseas to China are not jobs that require a highly skilled workforce. China has a large number of highly educated people and with this resource, Chinese companies can readily move up the value chain. Consequently, highly skilled U.S. jobs often are the next ones to follow.

"R&D usually follows manufacturing; optoelectronics is no different"

Many OIDA member companies have already moved assembly and packaging to China, but have kept the optoelectronics chip fabrication facilities in the U.S. Chip design is complex and the embedded intellectual property provides the competitive edge for the final product. U.S. optoelectronics companies are concerned that if the chip fabrication plants move overseas as well, this market sector will also be lost.

Manufacturing your core technology overseas can be perilous. One OIDA member that transferred chip fabrication to China found that the facility making the chips was also selling them to the member's competitors in China!

The intellectual property in optoelectronics often resides in the skills of people as much as in corporate trade secrets and issued patents. Chinese nationals who train at U.S. universities, work at U.S. companies, and then return to China, lead to a continuous flow of core skills leaving the U.S.

A leading U.S. producer of optoelectronics components recently opened an optoelectronics R&D center in China. When OIDA asked if China had the requisite talent to run and manage the R&D team, the company responded that it had sent U.S. experts to China to bring the Chinese engineering leaders up to speed.

A number of optoelectronics companies have 90% of their employees in Asia and retain only 10% in the United States. Their U.S.-based jobs are increasingly in sales and marketing – not in engineering or manufacturing. We can expect more optoelectronics companies to move R&D and production to China unless the U.S. government takes effective steps to support the domestic industry.

"U.S. optoelectronics companies are increasingly becoming simply marketing outlets for Chinese-manufactured goods"

The United States government needs to fund optoelectronics R&D aggressively. It needs to place an increased emphasis, however, on Development in addition to supporting pure Research. Existing government agencies, which fund research already, have the resources to implement such a shift in focus.

OIDA members believe that direct government support and programs are considerably more effective than indirect support.[1] The impact of direct government support is readily measurable. Focused optoelectronics R&D programs will lead to concrete markets and tangible results. Indirect government support, such as tax credits, are of little value to entrepreneurial start-ups that are far from generating profits that tax credits offset. Even larger corporations will not benefit from tax credits if they are not earning profits.

The U.S. government should increase its time horizon for measuring program success – perhaps two or three times longer than venture capital expects for its investments. A model could be the New Energy and Industrial Technology Development Organization (NEDO), in Japan.[2] NEDO's programs last five to ten years. This gives companies the opportunity to nurture innovative technologies and retain skilled labor.

The government can improve and expand worthwhile existing programs like the Small Business Innovative Research (SBIR). The published SBIR topics are often so narrow, however, that innovative new optoelectronics technologies do not fall within their scope. Broad topics, on the other hand, would allow companies to put forth their concepts and increase the likelihood that these funds will lead to commercial products. OIDA members support recent legislation relaxing Small Business Administration rules that limited participation by venture-backed companies.

In biophotonics, the National Science Foundation (NSF) and National Institutes of Health (NIH) are the primary sources of government funding. Today, the NSF and NIH primarily fund research at academia and not-for-profit research organizations[3]. OIDA members support an expanded role where these agencies fund innovations at businesses as well.

The U.S. has already ceded major sectors of the optoelectronics industry to overseas competitors. Notable examples include displays (South Korea, Japan, Taiwan, China), solar photovoltaic modules (Germany, Japan), image sensors (Japan, Taiwan), and high power lasers (Germany). Notwithstanding this reality, opportunities in optoelectronics still abound. The U.S. government must act aggressively and decisively to help U.S. industry establish dominance in emerging applications domains.

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[1] An example of such an indirect subsidy was the tax incentive for repatriating income of foreign subsidiaries contained the 2004 America Jobs Creation Act, and considered by Congress in the most recent stimulus package. Economists have both supported, (Allen Sinai, "A $545 Billion Private Stimulus Plan; Let's Bring Home Foreign Earnings Without Tax Penalty" Wall Street Journal, January 28, 2009,) and criticized (Chye-Ching Huang, "Proposed Tax Break for Multinationals Would be Poor Stimulus; 'Dividend Repatriation Tax Holiday' Failed in 2004, Unlikely to Work Now" Center on Budget & Policy Priorities, January 30, 2008) this method for stimulating corporate investment. For additional discussion, please see, David L. Brumbaugh, "Tax Exemption for Repatriated Foreign Earnings: Proposals and Analysis" Congressional Research Service, April 27, 2006.

[2] NEDO is a semi governmental organization under the Ministry of International Trade and Industry (MITI) http://www.wtec.org/loyola/scpa/09_11.htm.

[3] At hearings on the 2008 SBIR Reauthorization legislation, Mark Heeson of the National Venture Capital Association stated, "that only 0.4% of extramural grants from NIH went to businesses."

"U.S. needs to act aggressively and decisively now, with focused optoelectronics programs"

Areas where government optoelectronics investment can yield results include:

a) Communications: The implementation of a true high-speed internet infrastructure (1 terabit per second in the core backbone of the network, and 1 gigabit per second to the home) will require government-sponsored programs that help develop the optoelectronics infrastructure of components, modules, subsystems, and fiber.

b) Displays: Although glass-based flat panel manufacturing takes place almost exclusively in Asia, the U.S. can establish a dominant position in roll-to-roll manufacturing of flexible displays based on organic light emitting diode technology. Large companies like Kodak and 3M have the requisite expertise to innovate and manufacture in roll-to-roll processing, but the technical risks are still high. Numerous U.S. start-ups are leaders in this area.

c) Computation: Invest in next-generation communication for computer processors. Future processors and multi-core silicon integrated circuit engines will need optoelectronics to support chip-to-chip and intra chip interconnect technology.

d) Solid State Lighting: Accelerate investment in industry-driven R&D in high brightness light emitting diodes. This includes advanced materials systems, manufacturing equipment infrastructure, and device efficiency. For example, set a goal to advance the state-of-the-art by increasing the wafer size from 2 inches to 8 inches.

e) Optoelectronics Devices: Invest in photonic integrated circuit (PIC) technology based on both silicon and indium phosphide. PIC devices will transform optoelectronics just as the integrated circuit (IC) transformed semiconductor technology 50 years ago. For PICs, Moore's law[4], made famous by the semiconductor industry, is just beginning.

f) Image Sensors: Invest in integrating silicon image sensors with IC technologies, leading to advanced imaging capability for defense and medicine.

g) Biophotonics: Support multi-disciplinary projects that promote better communication and innovation among the optoelectronics, biological, and medical communities. Foster commercial innovation by supporting optoelectronics R&D for medical and healthcare applications.

h) Defense: Optoelectronics technology increasingly provides the performance edge in defense and avionics applications. DoD needs a trusted, U.S.-based source of photonic devices. A photonics foundry that develops modeling tools and validated common processes will ensure viable U.S. sources.

i) Solar Photovoltaics: Like displays, photovoltaic technology will benefit from innovations in roll-to-roll processing. The U.S. can capture leadership in this important and growing market and through it, the alternative energy market.

[4] Moore's law is the empirical observation that the transistor density of integrated circuits doubles every 18 months.

j) "Green" Photonics Technology: Optoelectronics components will drive energy efficiency improvements in a wide range of applications, such as monitoring – sensors in oil wells, automobile engines, wind turbine blades, generation – solar cells and conservation – solid-state lighting. OIDA's market research forecasts that by 2020, green photonics applications will account for 54% of the optoelectronics components market. This inter-disciplinary area is highly appropriate for government-led investment.

In addition to our testimony, I respectfully refer the Commission to the written statement of our member company, Infinera.

In preparing this testimony, many people I contacted stressed the importance of decisive action by the U.S. government and industry now. Optoelectronics sits at the intersection of multiple technical disciplines. U.S. universities and industry are particularly adept at bringing diverse people together to work on complex problems. We have, by the nature of our inherent diversity, an advantage. What for many presents a challenge, for us comes naturally.

Thank you for this opportunity to present our industry's perspective.

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