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Optical Society of America, Rochester Section

June 2013 Newsletter

President's Message

Chris Palmer

As the 2012-13 council year of the Optical Society of America, Rochester Section (OSA-RS) comes to an end, I'd like to summarize our activities for the year.

We started the year with a strategic planning session in September, which examined our mission and explored programs and activities that would support that mission. This session led us to focus the rest of the year on a key phrase in our mission statement, "promote and disseminate knowledge of optics". [Our entire mission statement may be found at the bottom of the first page of every newsletter.]

An initiative to improve communications with our members and the community has led to an improved monthly newsletter as well as to improvements in our website. Hopefully you've found the content in both media to be interesting and relevant!

We explored the value and benefits of individual and corporate memberships, and enhanced both to make membership in our local section more meaningful for today's members, as well as to making membership more attractive to potential members. It's especially gratifying to see such a high rate of renewal amongst our

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Photonics Societies Unite to Announce the National Photonics Initiative

The NPI will work to increase photonics R&D, grow the US economy and improve national security

On May 23rd, the American Physical Society (APS), IEEE Photonics Society, Laser Institute of America (LIA), the Optical Society (OSA) and SPIE, the International Society of Optics and Photonics, announced the launch of the National Photonics Initiative (NPI), a collaborative alliance seeking to unite industry, academia and government experts to identify and advance areas of photonics critical to maintaining U.S. competitiveness and national security.

"Life without photonics is almost unimaginable. From the moment you wake up to the alarm on your smartphone, to swiping your credit card to pay for coffee, to logging into your computer and connecting with the world through the Internet, photonics makes it possible," said OSA CEO Elizabeth Rogan. "The NPI will work to advance photonics in the areas that are most critical to the U.S., like improving the economy, creating jobs, saving lives and sparking innovation for future generations."

Photonics generates, controls and detects light to advance manufacturing, robotics, medical

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Inside

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Optical Society of America Rochester Section 2012-13 Council

President	Chris Palmer
Past President	Julie Bentley
President-Elect	Damon Diehl
Secretary	Dan Christensen
Treasurer	Blair Unger
Education Chair	Steve Jacobs
Program Co-Chairs	Dan Staloff
	Mari de Wit
House Co-Chairs	Yuhong Yao
	Aly Artusio-Glimpse
IT Chair	Pete McCarthy
Councilors	Mishkat Bhattacharya
	Stephanie Bloch
	Cisca Sugiro
	Joe Vornehm
Resident Historian	Mari de Wit

Do you have news of interest to the OSA-RS membership?

Send a note to newsletter@osarochester.org

The purpose of the Rochester Section of the Optical Society of America is to promote and disseminate knowledge of optics and closely related sciences in both its local community and throughout the world by (i) bringing together scientists, engineers, business leaders, educators and students, (ii) providing professionals and students with educational resources for the purpose of improving and developing their abilities, (iii) encouraging the sharing of knowledge and innovation, and (iv) encouraging students to study optics and other sciences.

◇ Upcoming Events ◇

Mark Your Calendars! Upcoming Optics Events

Photonics North
June 3-5, 2013
Ottawa, Ontario, Canada

DAMOP '13: 44th Annual Meeting of the American Physical Society Division of Atomic, Molecular and Optical Physics
June 3-7, 2013
Quebec City, Quebec, Canada

CLEO
June 9-14, 2013
San Jose, California

Coherence and Quantum Optics and Quantum Information and Measurement
June 17-20, 2013
Rochester, New York

Imaging & Applied Optics
June 23-27, 2013
Arlington, Virginia

SPIE Annual Meeting
August 25-29, 2013
San Diego, California

Frontiers in Optics: OSA Annual Meeting
October 5-9, 2013
Orlando, Florida

Optifab
October 15-17, 2013
Rochester, New York

Photonics West
February 1-6, 2014
San Francisco, California

OSA Foundation Receives $250,000 Donation from IPG Photonics for the Siegman International School on Lasers

The OSA Foundation announced in late May that it has received a $250,000 donation from IPG Photonics (IPG) for the Siegman International School on Lasers Endowment. The gift provided by IPG will help permanently establish the program, modeled after the summer school program that first took place in 2011 at the Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP). The donation will go toward providing world-class lecturers, important student travel grants and achievement awards as well as other general programming costs. In recognition of this significant contribution, IPG has been named co-founder of the school.

The program provides an opportunity for graduate students to present their own research to their peers, learn from an international group of accomplished speakers, and network with other students in the field of optics. Each year, the school will take place in a different region of the world, bringing world-class education to students who may not have had access to such resources otherwise. Students interested in attending the school will have their applications reviewed by a program committee for approval.

"The Siegman International School on Lasers will provide students from across the globe with an opportunity to advance their education, foster future collaboration, and promote research and engineering for the optical community," said Michael Morris, OSA Foundation board

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◇ Vignettes ◇

Sarah E. Walters, who was recently awarded a bachelor of science degree in optical engineering from the University of Rochester, has been awarded a National Science Foundation Graduate Research Fellowship. Walters will remain at UR to pursue her PhD.

Two University of Rochester optics faculty have been honored at the commencement ceremonies last month. **Govind P. Agrawal**, professor of optics and physics, has received the William H. Riker University Award for Excellence in Graduate Teaching. **Miguel A. Alonso**, associate professor of optics, has received the Edward Peck Curtis Award for Excellence in Undergraduate Teaching.

Thomas Brown, professor of optics at the University of Rochester, was the keynote speaker at "Trends in Optical Engineering and Applied Optics" in Karachi, Pakistan in mid-May.

Chris Palmer just returned from a week at Montana State University at Bozeman, where he served as a judge at the National Student Solar Spectrograph Competition, sponsored by NASA.

G-S PLASTIC OPTICS, a manufacturer of coated and uncoated injection molded, diamond-turned, and machined polymer optical elements, announced in May that it has become certified to the ISO 9001:2008 quality system standard.

President's Letter

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individual and corporate members.

I'm happy to announce that we established a scholarship this year, focused on students pursuing an associate's degree in optical technology at Monroe Community College. I encourage future OSA-RS councils to consider expanding the number of scholarships offered and the amount of each scholarship, as our local section's finances allow, to take advantage of this unique and meaningful way to implement our local section's mission.

The *Optics Suitcase* program continues to grow, with a considerable boost in funding from the OSA Foundation. About one hundred fifty *Suitcases* were shipped all around the world in the last year. I wish to thank **Steve Jacobs** and **Terri Donlon** for their continued dedication to this important program -- this is the fourteenth year of the program, during which almost six hundred *Suitcases* have been assembled and shipped to thirty-four countries!

Our members were treated to an exceptional program of technical talks, arranged by our program co-chairs **Dan Staloff** and **Mari de Wit**. The breadth of interesting talks covered academic, industrial and historical topics, well-suited to the local optics community.

Last month's Annual Dinner Meeting at the newly-renovated Burgundy Basin Inn was well-attended: about one hundred people came to socialize, have dinner, and then wait patiently through the business meeting to get to the featured talk on optical techniques in the search for exosolar planets by Dr James Breckinridge of NASA's Jet Propulsion Laboratory.

A number of members of the Executive Council will be concluding their service when the 2012-13 term ends on June 30th.

- **Julie Bentley** (past president) will be spending her summer working at her optical design consulting business (Bentley Optical Design), teaching summer classes in lens design for the Institute of Optics and SPIE, and preparing for the OptiFAB conference in October as the technical chair. In the fall, she'll be teaching classes in geometrical optics and advanced lens design at the University of Rochester.
- **Dan Christensen** (secretary) expects to defend his dissertation "Random access multiphoton (RAMP) microscopy for investigation of cerebral blood flow regulation mechanisms" for his PhD in Optics from the University of Rochester by the end of this summer. He is looking forward to a rewarding career in industry that takes advantage of his technical expertise while also allowing him to grow in a leadership capacity, both on the job and in societies like OSA. He is currently soliciting and evaluating post-graduation opportunities. In addition, Dan and his wife are expecting their fourth child in early September.
- In Oct 2012, **Cisca Sugiro** (councilor-at-large) accepted a full-time position as an application specialist at Ametek Power Instruments by the public market in downtown Rochester. During the weekends, she will be busy setting up weddings as this is also her passion. Spring, summer, and fall are the busiest for her. She is also waiting for a teaching position in the physics department at Roberts Wesleyan College. She is always available for advice to OSA-RS and she would love to help out for Family Weekend again at the Institute for Optics.
- **Pete McCarthy** (IT chair) is hoping to finish up his dissertation at the University of Rochester within the next year. His research is on gradient-index materials, design, and metrology for broadband imaging systems. He doesn't have any specific plans after graduation, other than finding a job in industry. He's looking to stay in the Rochester area and continue to be involved in the local optics community.
- **Joe Vornehm** (councilor-at-large) is completing his dissertation at the University of Rochester on applications of slow and fast light, nanophotonic spectrometers, and optical computation for automatic spectrum recognition. He's planning to finish up his dissertation this calendar year, and he's looking for a job in the area north of Boston that will let him use his optics, programming, and electronics skills, preferably with a track towards management. He has greatly enjoyed working on the council and recommends it to anyone who can carve a few hours a month out of his schedule.
- **Stephanie Bloch** (councilor-at-large) is managing a small optical engineering group at QVI, Inc., which is responsible for all the imaging systems for the company. She's working on new lens designs for future machines as well as supporting the old designs (including illuminators). Outside of work, she's the mother of two children who keep her very busy.

I'd like to thank each of these council members for their efforts and contributions this year -- they contributed meaningfully to our accomplishments.

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2013-2014 Congressional Science and Engineering Fellows Announced

Reproduced from the OSA website.

The Optical Society (OSA), SPIE, the international society for optics and photonics, and the Materials Research Society (MRS) announced their 2013-2014 Congressional Science and Engineering Fellows. Carly Robinson, a PhD candidate at the University of Colorado Boulder (CU-Boulder), will serve as the 2013-2014 Arthur H. Guenther Congressional Fellow co-sponsored by OSA and SPIE, and Sydney Kaufman, also a PhD candidate at CU-Boulder, will serve as the OSA/MRS Congressional Fellow. Each will serve a one-year term working as a special legislative assistant on the staff of congressional offices or committees in Washington, DC.

Robinson and Kaufman will formally begin the program in September 2013, starting with a comprehensive training and orientation process facilitated by the American Association for the Advancement of Science (AAAS). AAAS Congressional and Executive Branch Fellows are sponsored by more than two dozen scientific societies. The new Fellows will then go through an interview and selection process with offices of senators, representatives or committees on Capitol Hill before choosing the offices in which they will serve.

The Congressional Fellows program aims to bring technical and scientific backgrounds and perspectives to the decision-making process in Congress and provide scientists with insight into the inner workings of the federal government. Typically, fellows conduct legislative or oversight work, assist in congressional hearings and debates, prepare policy briefs and write speeches.

Each year, following a formal application process, finalists are interviewed and Fellows are selected by a committee comprised of volunteer members from OSA, SPIE, and MRS.

Carly Robinson is studying atmospheric chemistry at CU-Boulder. Her research involves investigating water uptake on atmospherically relevant liquid-liquid separated particles for inclusion in radiative transfer models.

Robinson is also active in CU-Boulder's student government, serving as the student body vice president and other roles. One of her main causes with the graduate student government has been to promote open access to research. Robinson holds an MS in atmospheric chemistry from CU-Boulder and a BS in applied physics and mathematics from Michigan Technological University.

Sydney Kaufman is currently completing her PhD in chemical physics at CU-Boulder. Her research is in photodissociation spectroscopy of transition metal salts. Outside the lab, Kaufman serves as a contributing editor to online publications Novus Light Technologies Today and Solar Novus Today, covering topics such as photonics and solar energy policy, as well as associated environmental, trade, technological and economic issues.

Kaufman is also co-director of the CU-Boulder chapter of the Forum on Science Ethics and Policy (FOSEP), an organization that works to promote dialogue between scientists, policy makers and the public. She holds a BS in chemistry from McGill University.

During her fellowship, Kaufman will work on energy development policy and increasing the participation of underrepresented groups in Science, Technology, Engineering, and Mathematics (STEM) fields. ■

OIDA Releases 2013 Data Center Workshop Report

The Optoelectronics Industry Development Association (OIDA) has released a report called "Future Needs of 'Scale-Out' Data Centers: An OIDA Workshop for Stakeholders," summarizing the output of a workshop co-hosted by OIDA, The Center for Integrated Access Networks (CIAN), and the U.S. National Science Foundation.

The workshop, collocated with OFC/NFOEC 2013, brought together key stakeholders from a number of large technology companies to provide the perspective from end-users, system vendors, and component suppliers on the future of interconnected data centers, distributed switches, disaggregation of servers, and other innovations that will all rely on greater use of optical technologies.

Participants' key findings are presented in the new report, which will be used for planning research requirements, standards-setting, funding decisions, and other industry- and government-wide efforts.

The report includes:

- an updated look at the data center roadmap through the year 2022,
- market and technology trends for data center architectures and components,
- projected rate of growth over the next decade for transceivers, and
- key takeaways from presentations by leaders in the growing market

Additional materials not presented at the workshop have also been included in the report in order to clarify or reinforce discussion topics.

"Through these discussions, we've found data center operators are successfully using standard or derivative optical products and upgrading their architectures on short time scales—months to years—but there is some doubt in the industry whether there is sufficient investment in component manufacturing for longer-range solutions," said workshop organizer Tom Hausken, OSA's senior advisor for engineering and applications, in a prepared statement. "The participants provided us with their candid perspectives on long-term resolutions for the industry, and OIDA is pleased to provide the optics community with this important resource."

Founded in 1991, OIDA is a Washington, D.C.-based organization that promotes the optoelectronics industry. Affiliated with the Optical Society (OSA) since 2011, OIDA members and customers include the leading manufacturers of components and systems enabled by optoelectronics, as well as government labs and research institutions involved in the development of optoelectronic technologies. OIDA serves as the voice of industry to government and academia, acts as liaison with other industry associations worldwide, and provides a network for the exchange of ideas and information within the optoelectronics community. ■

NIH Names UR a Center for AIDS Research

The National Institutes of Health (NIH) has designated the University of Rochester (UR) a Center for AIDS Research (CFAR), which means the university will receive $7.5 million throughout the next five years for HIV/AIDS work. The newest of eighteen CFARs in the country, UR will use the funding to develop and nurture the careers of young HIV/AIDS researchers and to form collaborations that will lead to "high-impact discoveries." One such alliance will link the Department of Neurology at the UR Medical Center (URMC) and the Institute of Optics. To qualify as an NIH CFAR, an institution already must have a specified level of existing funding; the University had $15.3 million in HIV/AIDS funding for 2011.

The Rochester CFAR will have two working groups. The first will focus on the interaction of HIV and the aging brain. More than 45 percent of URMC HIV patients are at least fifty years old. Improved treatment has led to longer survival for HIV-infected patients, but little is known about how HIV affects age-related cognitive decline. Harris A. Gelbard, director of the Center for Neural Development and Disease, noted the working group will benefit from URMC expertise in neurology clinical trials and imaging techniques developed by the Institute of Optics.

The CFAR's second area of emphasis will be understanding the structure and function of HIV RNA to learn more about how the virus replicates. A better understanding could lead to new drugs that can target latent HIV reservoirs, according to David H. Mathews, associate professor in the Department of Biochemistry and Biophysics.

To encourage innovation, the Rochester CFAR will employ a "speed dating" technique that pairs scientists from different disciplines to help them identify complementary areas of interest and spur new thinking. ■

Photonics21 Establishes Legal Entity and Publishes Plan

The stakeholders in Photonics21, the group representing European photonics, have agreed to create a new legal entity that will have the authority and standing to enter into a public-private partnership (PPP) funded by the European Commission's (EC) *Horizon 2020* innovation plan.

In Brussels in late April, the Photonics21 board of stakeholders voted to establish the "Photonics PPP Association", a legal vehicle needed to sign a contract with the EC. Photonics21 president and Jenoptik CEO Michael Mertin announced to attendees at the Photonics21 annual meeting that a majority of the existing board of stakeholders voted to approve the plan.

At the annual meeting, Photonics21 released its strategic roadmap, entitled "Towards 2020 – photonics driving economic growth in Europe".

Addressing the meeting alongside EC vice president Neelie Kroes, Mertin said that the plan outlined in the "Towards 2020" report should serve as one of the foundations for the recovery of the European economy, and that it should also provide an approach for using technological innovation to generate economic growth.

Kroes, regarded as a strong supporter and advocate for photonics in Brussels, stated that the strategic ambition within the roadmap document indicated major progress since she initially proposed the idea of a PPP in 2011.

In the newly published roadmap, Photonics21 repeats its original pledge to spend € 5.6 billion ($7.2 billion) on the PPP, provided that the EC commits €1.4 billion ($1.8 billion) to the plan.

The roadmap document mentions that the PPP mechanism is regarded as the primary way to avoid the fate of publicly-funded technological development that does not translate to direct economic or societal benefit. "For photonics to yield its full potential as an enabling technology, it will be critical that the inherent synergies within the sector are exploited through integrated research aimed towards identified market solutions, rather than towards isolated components or applications," the report says.

Kroes noted that dozens of companies and research institutes had already signed up to the PPP, and that she was looking forward to more doing so. "Hopefully, we will be able to get it up and running right from the launch of Horizon 2020 - it's an investment that will pay off for Europe," she said.

She also emphasized that this is not a plan to subsidize industry, but a "plan to strengthen Europe's innovation potential."

The EC's original proposal of an €80 billion ($103 billion) budget for Horizon 2020 has yet not been accepted by the European Council. A final decision on the Horizon 2020 budget is expected by the end of this year.

Photonics21 is the European Technology Platform for photonics, representing photonics research & innovation priorities at the European level. The organization aims to implement a common photonics strategy for Europe. Photonics21 undertakes to establish Europe as a leader in the development and deployment of Photonics in five industrial areas (Information and Communication, Lighting and Displays, Manufacturing, Life Science and Security) as well as in Education and Training. It presently has over two thousand members. ■

Neelie Kroes, vice-president of the European Commission, speaks to the board of stakeholders of Photonics21 in Brussels on March 28th.

Photograph reproduced from http://blogs.ec.europa.eu/neelie-kroes/

OSA Foundation

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chair, in a prepared statement. "IPG's generosity has made this important initiative a reality and we look forward to our continuing partnership in this endeavor."

The fundraising campaign for the Siegman International School on Lasers, launched in January 2012, is named in honor of Anthony E. Siegman, past president of the Optical Society (OSA) and founding member of the OSA Foundation Board. Siegman passed away in October 2011 at the age of 79.

Anthony Siegman

"IPG is honored to support the Siegman International School on Lasers," said Valentin P. Gapontsev, chairman and chief executive officer of IPG in a prepared statement. "The future of the laser industry depends on tomorrow's scientists and innovators; IPG is happy to provide some of the building blocks for their success."

The first Siegman International Summer School on Lasers will take place in summer 2014. For

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$1M Grant for Portable Retinal Camera Development

In May, Congresswoman Louise Slaughter visited Rochester-based medical device technology firm Lumetrics to announce a $973,000 research and development grant from the National Institutes of Health – National Eye Institute. The NIH grant will fund development of a digital hand-held diagnostic ophthalmic instrument that will dramatically improve access to vision-related healthcare both in the United States and throughout the world. The pen-sized device will provide an effective clinical tool for inspecting the human retina and documenting the findings.

"The benefits that this innovation will provide both here in the U.S. and across the globe are immeasurable. The ability to provide comprehensive diagnostic eye care with a hand-held device is truly groundbreaking and represents a huge step forward in improved healthcare access for previously underserved populations." Slaughter, a degreed microbiologist, said in a prepared statement.

The instrument will aid in the early diagnosis of degenerative eye conditions, which can help patients address risk factors for progression, thereby delaying and possibly preventing long-term visual loss.

Lumetrics, a twenty-person measurement systems company founded in 2003, develops innovative measurement systems. The company currently counts among its customers six of the top eleven medical device manufacturers in the world. This latest development is an extension to a previous grant that demonstrated the feasibility of this technology. This new grant is for the miniaturization and continuation of that project.

"We are extremely pleased that the National Institutes of Health found our idea worthy of such a large and prestigious grant," states Lumetrics' CEO John Hart in a prepared statement. "The collaboration with the University of Rochester and its Flaum Eye Institute is an incredible opportunity for Lumetrics and will lead to new treatments in vision care."

The plan for commercialization is centered on the idea that the proposed device represents a twenty-first century replacement for the direct ophthalmoscope, which has been the routine method of retinal examination for the past one hundred years. The market analysis and the interviews conducted with physicians, specialists, and technicians shows significant need for this new, more sophisticated device.

The development of the new camera is being led by Filipp Ignatovich, PhD, Chief Technology Officer for Lumetrics and David Kleinman, MD, MBA an academic retinal specialist at the Flaum Eye Institute. The functionality of the camera is simplified and automated to minimize the demand on the operator skill. The technology behind the camera is made possible through a key patent invented by Steven Feldon, MD, MBA, Director of the Flaum Eye Institute and Geunyoung Yoon, PhD, of the University of Rochester, both of whom will be assisting on aspects of the project. ■

OSA Foundation

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more information, visit the OSA Foundation website.

The OSA Foundation is a 501(c)(3) non-profit foundation established by the Optical Society (OSA) in 2002 to carry out charitable activities that support OSA's mission of promoting the generation, application, archiving and worldwide dissemination of knowledge in optics and photonics. The Foundation helps cultivate the next generation of leaders and innovators in the optics and photonics community as they move through advanced degree programs and become active members of research and engineering communities around the globe. The Foundation also works to secure OSA Awards and Honors program endowments. To date, the Foundation has awarded more than 800 grants, scholarships, and prizes benefiting thousands of individuals in more than fifty-five countries. Donations to the OSA Foundation are matched dollar-for-dollar by OSA.

Funding for the Siegman International School on Lasers is supported through donations from generous individuals and organizations. Contributions help provide world-class lecturers, important student travel grants and achievement awards as well as offset other general programming costs. Donations to the Siegman International School on Lasers Endowment are accepted at www.osa.org/donate.

IPG Photonics Corporation (NASDAQ: IPGP), headquartered in Oxford, Massachusetts, is a world leader in the design and manufacture of high-power fiber lasers and amplifiers. ■

President's Letter

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Additionally, some members of this year's council are returning to serve next year: **Damon Diehl** assumes the presidency, **Blair Unger** returns for his second year as treasurer, **Mishkat Bhattacharya** returns as councilor-at-large, **Steve Jacobs** returns as education chair, **Dan Staloff** moves from program co-chair to councilor-at-large, **Aly Artusio-Glimpse** returns for a second year as house co-chair, **Yuhong Yao** moves from house co-chair to IT chair, and **Mari de Wit** returns as program co-chair. Mari will also serve again as our resident historian. My thanks go out to these returning council members as well, not only for their contributions during the past year but for their willingness to serve again to provide continuity and perspective to the incoming council.

Since their roles are largely behind-the-scenes, and their efforts and contributions are not always evident to the membership, I'd like to offer special thanks to **Dan Christensen**, our secretary, and **Blair Unger**, our treasurer. Dan maintained minutes and records of our activities and kept our membership well-informed during the year, and Blair managed our financial assets and transactions. Both the secretary and treasurer roles are critical to the smooth operation of an organization like ours, and Blair and Dan made it look easy.

I'll be moving next month into the role of Past President, which I had envisioned would involve looking for a desk to put my feet on, but Julie set an example with her energy and enthusiasm in this role this year, so I suppose I had better prepare to do some actual work.

Optical Society of America Rochester Section

2013-14 Council

President	Damon Diehl
Past President	Chris Palmer
President-Elect	Wade Cook
Secretary	Brandon Zimmerman
Treasurer	Blair Unger
Education Chair	Steve Jacobs
Program Co-Chairs	Jie Qiao
	Mari de Wit
House Co-Chairs	Aly Artusio-Glimpse
	Anthony Visconte
IT Chair	Yuhong Yao
Councilors	Daniel Balonek
	Mishkat Bhattacharya
	Michele Gleber
	Daniel Staloff
Resident Historian	Mari de Wit

It puts the past year in perspective for me to think that our local society is approaching its one hundredth anniversary. Our work this year has built on the solid foundation established by the councils that preceded us, on which many of the giants of Rochester optics history had served. It's humbling to look back on all that they accomplished, as well as to look forward and to speculate on what future councils might do to further "promote and disseminate knowledge of optics".

It's been an honor to serve this year as President of the OSA-RS, and a pleasure to work with such a dedicated and enthusiastic group of professionals. I wish to thank each councilor, and each member of the OSA-RS, for their support, efforts and contributions. ■

Did You Know ...

that John Jacob Bausch built what is thought to be the first power machinery in America for grinding lenses in a building alongside the Genesee River?

Photonics Initiative

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imaging, next-generation displays, defense technologies, biometric security, image processing, communications, astronomy and much more. Photonics forms the backbone of the Internet, guides energy exploration and keeps men and women in uniform safe with night vision and physiological feedback on the battlefield.

In 1998, the National Research Council released a report, "Harnessing Light," which presented a comprehensive overview of the potential impact of photonics on major industry sectors. In response, several worldwide economies moved to advance their already strong photonics industries. The United States, however, did not develop a cohesive strategy. As a result, the U.S. lost its competitive advantage in a number of cutting-edge technologies as well as thousands of U.S. jobs and companies to overseas markets.

"The EU, Germany, Korea, Taiwan and China all recognize the importance of photonics, and have taken action," said SPIE CEO Eugene Arthurs. "The Department of Defense, for example, has long supported photonics, and we have seen the advantage provided to our troops. But now more photonics research is needed to maintain our national security in the face of growing non-traditional threats. The time is now for the U.S. to make the right investments in the crucial capabilities of the future."

In 2012, the National Research Council released "Optics and Photonics: Essential Technologies for our Nation" that called for a national photonics initiative to regain U.S. leadership in key photonic-driven fields. In response to that call, the NPI was established to raise awareness about photonics and the impact of photonics on our everyday lives; increase collaboration and coordination among U.S. industry, government and academia to advance photonics-driven fields; and drive U.S. funding and investment in areas of photonics critical to maintaining U.S. competitiveness and national security.

"The NPI offers an opportunity for us to show how critical it is for federally-funded research to flourish in this country," said Kate Kirby, executive officer of APS. "So many of the technologies that we use every day have come from the results of scientific research in optics and photonics funded by the federal government."

As part of the NPI effort, more than 100 experts from industry, academia, and government collaborated to draft a white paper entitled "Lighting the Path to a Competitive, Secure Future," detailing recommendations to guide funding and investment in five key photonics-driven fields: advanced manufacturing, communications and information technology, defense and national security, health and medicine and energy. New opportunities in these fields such as 3-D printing, more efficient solar power, improved nuclear threat identification, more accurate cancer detection and the growth of Internet speeds and capacity, offer the potential for even greater societal impact in the next few decades.

"There are thousands of companies that have sprung up in the last decade or so that produce the photonics devices and systems that we all depend on now, but there's plenty of room for growth," said Richard Linke, executive director of the IEEE Photonics Society.

In order to capitalize on new opportunities and regain global leadership and economic prosperity, the white paper also provides key recommendations to the United States government that apply across all five of the fields:

- Drive funding and investment in areas of photonics critical to maintaining U.S. competitiveness and national security—advanced manufacturing, defense, energy, health and medicine, information technology and communications;
- Develop federal programs that encourage greater collaboration between U.S. industry and academia to better support the research and development of next-generation photonics technologies;
- Increase investment in education and job training programs to reduce the shortage of technically skilled workers needed to fill the growing number of photonics-based positions;
- Expand federal investments supporting university and industry collaborative research to develop new manufacturing methods that incorporate photonics, such as additive manufacturing and ultra-short-pulse laser material processing; and
- Collaborate with U.S. industry to review international trade practices impeding free trade, and the current U.S. criteria restricting the sale of certain photonic technologies overseas.

The NPI maintains that fulfillment of these recommendations will position the United States as a global leader in photonics research and development, and will grow the U.S. economy and add jobs at home. ■