Burn Lin began his love of optics thinking big. When he was 13, Lin and a friend converted a 6 x 9 camera into an enlarger by building a housing around the camera and replacing the back with a film holder. His fascination with making things bigger didn’t last long, though. Now highly respected in the field of microlithography, Lin is the first winner of the Frits Zernike Award for Microlithography, given for fundamental achievements in the theory, practice, and extension of optical lithography.

A Step Ahead

One thing that distinguishes Lin is his ability to constantly push the limit of lithography. While at IBM (Armonk, NY) and currently at Taiwan Semiconductor Manufacturing Co. (Hsin-Chu, Taiwan), he has always seemed to be at least one step ahead of the current technology. In fact, his first paper in microlithography, which focused on deep-UV lithography, reported his first breakthrough.

“Wayne Moreau (at IBM) introduced me to his PMMA exposure technology that I adopted to build a deep-UV proximity printing system to make 0.5-µm magnetic bubble circuits,” explains Lin. “That was in 1975, when the world was happy with making 5-µm integrated circuits using near-UV proximity printing.”

This was just the beginning. He developed the first computer program to simulate partially coherent projected images from arbitrary 2-D patterns, which led to a bevy of breakthroughs, including the invention of the exposure-defocus diagrams, and he wrote the first article on diffraction with exposure-gap diagrams in x-ray lithography.

The firsts in Lin’s career are too many to list here. Suffice it to say that with his work he is responsible for much of the nomenclature in microlithography. “In a very literal sense, Burn Lin has defined the field of lithography,” says SPIE Fellow Timothy Brunner of IBM.

“In the ’80s when I projected that the limit of optical lithography was 130 nm, many people disbelieved. Today, I am glad that people take me seriously when I project optical lithography for the 32-nm node,” says Lin.

He has consistently proved and disproved concepts of lithography through the years, giving him strong credibility. This is a significant reason why immersion lithography has taken off and been taken seriously in recent years.

Lithography Immersed

Although the concept of immersion lithography has been around since the early 1980s, it wasn’t well developed or considered viable for integrated circuit production until recently. In 2002, most companies were fixated on 157-nm lithography, and there was a sense that extreme UV (EUV) was the solution to the demand for shorter wavelengths and finer resolution.

“I was less trusting of the 157-nm technology and very concerned about EUV lithography,” says Lin. At Microlithography 2002, he proposed immersion lithography as a possible alternative.

“In July 2002, in an invited paper at the SEMATECH-organized 157-nm workshop, I took the courage to tell the 200-plus attendees that 193-nm water-immersion has a better chance to succeed and a greater potential to reach for future technology nodes than 157-nm dry systems,” says Lin. “The audience responded with enthusiasm, constructive concerns, and actions.”

In SEMATECH workshops, immersion lithography was more actively explored. Lin took an integral role in examining the technical hurdles of immersion imaging. “Another
Society. Along with his involvement in the Microlithography symposia, he is a short course instructor, and most notably a member of the Publications Committee and the editor-in-chief of SPIE’s Journal of Microlithography, Microlithography, and Microsystems (JM³). The journal debuted at Microlithography 2002 with eight articles; now only two years later, the January issue features 23 papers with 13 in the special section alone. (See www.spiedl.org.) The topic of this special section is, you guessed it, immersion lithography. Lin says one of the challenges of the journal now is convincing more authors from the industrial micro community to submit their work to JM³.

With 34 years in the lithography field, Lin hasn’t just affected the science of lithography, he’s also had a big effect on the people. “He has guided many younger engineers, and was always approachable for technical discussions,” says Brunner. “He has inspired many more lithography workers via his presentations and papers.”

SPIE Calls on Congress

SPIE members traveled to Washington, D.C., 3–4 March for the Ninth Annual Science-Engineering-Technology Congressional Visits Day (SET-CVD). There they teamed up with volunteers from the Optical Society of America to express the need for increased and balanced U.S. government investment in research and development to Congress.

Team members Robert Breault, John Gonglewski, James Harrington, Leo Irakliotis, Richard Linke, Silvia Mioc, Richard Powell, David Rossi, Theodore Saito, and Keri Then joined with more than 200 scientists, engineers, and business leaders who made visits on Capitol Hill.

First time participant Keri Then of the University of California/Riverside says, “the trip was a wonderful example of grass roots democracy and represented a very important means of being able to meet with my state’s representatives in the House and Senate and express my views about causes important to the Society. As a member of the Society’s Education Committee, I also think CVDs are critical to those interested in ensuring support for federal funding of math-science programs in general and more importantly that the programs are kept under the National Science Foundation to ensure grant money remains competitive.”

While visiting congressional offices, participants discussed the importance of the nation’s broad portfolio of investments in science, engineering, and technology to promoting national security, prosperity, and innovation. Most importantly, they provided a constituent perspective on the local and national impact of these programs and their significance to optics and photonics. More than 50% of all industrial innovation and growth in the United States since World War II can be attributed to advances pioneered through scientific research, with publicly funded R&D.

“Beyond the issue of securing our own borders, many of us in the scientific community recognize the serious challenges in global sustainability and in improving the quality of life for all,” says Eugene Arthurs, SPIE executive director. “CVD is an important opportunity for the Society representatives to convey a sense of how vital optics and photonics is in enabling science, medicine, and industry, for national and global benefit.”

Resources and additional information concerning the CVD can be found at www.setcvd.org.

Affecting Society

As a Fellow of SPIE, Lin is very active with the Society. Along with his involvement in the Microlithography symposia, he is a short course instructor, and most notably a member of the Publications Committee and the editor-in-chief of SPIE’s Journal of Microlithography, Microlithography, and Microsystems (JM³). The journal debuted at Microlithography 2002 with eight articles; now only two years later, the January issue features 23 papers with 13 in the special section alone. (See www.spiedl.org.) The topic of this special section is, you guessed it, immersion lithography. Lin says one of the challenges of the journal now is convincing more authors from the industrial micro community to submit their work to JM³.

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MEMBER NEWS AND ANNOUNCEMENTS

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In Memoriam: Mikhail N. Libenson

The scientific world of optics and photonics has lost a major contributor to the subject of laser interaction with matter. Professor Mikhail Libenson, a talented scientist in the field of laser physics and one of the cofounders of the SPIE Russia Chapter, died on 23 February in Zelenograd near Moscow from a heart attack at the age of 63.

He was head of the Surface Photophysics Laboratory at the Vavilov State Optical Institute (St. Petersburg, Russia) and head of optical photophysics and the modern natural sciences chair at the St. Petersburg Institute of Fine Mechanics and Optics. Libenson was also the chairman of the scientific council of the St. Petersburg Association of Scientists and Scholars.

Libenson was a true pioneer in his field who contributed significant works and, furthermore, initiated a series of conferences in 1969 on laser matter interaction. That same year the Optical Materials for High Power Lasers symposium was initiated, with which Libenson was involved as a member of its International Program Committee. His 11th conference in the Russian series was held 30 June through 2 July 2003 in Pushkin outside St. Petersburg.

Libenson authored hundreds of papers, several monographs, and dozens of Invention Certificates. He was a leader of the Russian Scientific School “Basics of Laser Technologies” and a Russian Federation State Prize winner.

Libenson was known for his openness and collaboration with other scientists without being influenced by political considerations. As such, he was a true internationalist. We all are moved and regret his passing, but his work and memories live on in his numerous students who have become major contributors to the field. Always a gracious host, we will all miss his laughter and comradeship.

— Arthur H. Guenther, University of New Mexico, and Edmund Akopov, SPIE Russia Chapter

SPIE Takes Part in Winter College

The Winter College on Interferometry and Applications in Modern Physics took place 2–13 February in Trieste, Italy, and was partially supported by SPIE. The UNESCO-funded Abdus Salam International Centre for Theoretical Physics (ICTP; Trieste, Italy) hosted the event. More than 80 participants from all over the world took part in lectures by international experts, group discussions, laboratory demonstrations, and special seminars and events.

At a special ceremony and reception, the 2004 ICTP-ICO Prize was awarded to Imrana Ashraf Zahid, of Quaid-I-Azam University, Islamabad (Islamabad, Pakistan), and Revati N. Kulkarni, of the International Institute of Information Technology (Pune, India). The two scientists shared the prize in consideration of their research and educational work in their respective institutions.

Zahid was awarded the prize for her theoretical studies on the “Role of Pump-phase Fluctuations in Micromasers,” and Kulkarni was given the prize for her experimental work on “Development Methods and Devices for Adaptive Optics.”

Success at Microlithography 2004

Microolithography 2004 was a roaring success with record attendance numbers across the board and positive feedback all around.

“I am overwhelmed by the success of the recent SPIE Microlithography symposium. The attendance, paper topic and quality, exhibition, and short courses exceeded our expectations,” says symposium chair Marilyn Hoy Bennett, Texas Instruments Inc. (Dallas, TX). “I believe the topics of immersion lithography and nanotechnology pushed us over the top, and I hope this is a real sign of an upturn in the semiconductor industry.”

One of the many highlights of the symposium was the awarding of the first Frits Zernike Award for Microlithography to Burn Lin and the awarding of the Leadership Award for Best Student Paper sponsored by Cymer (San Diego, CA) and given to Yongfa Fan of the Rochester Institute of Technology (Rochester, NY).

To read more about Microlithography 2004, go to www.spie.org/info/ml/2004.html.