

2015: The International Year of Light

Harry A. Atwater, *Editor in Chief*

Welcome to ACS *Photonics*' first issue in the International Year of Light. As proud sponsors of the International Year of Light, in this issue, and during this year, we will join together with other professional societies around the world to celebrate the role of light in science and technology.

The International Year of Light was proclaimed by United Nations resolution in December 2013 to celebrate the role of optical science and technologies in enabling sustainable development in diverse fields including energy, education, agriculture, communications, and health. For ACS *Photonics*' authors and contributors, the power of light is nothing new. In the research that we do every day in our laboratories and with our computational resources, we see the beauty of light and its amazing ability to probe molecular and nanoscale features, to interrogate physical and chemical processes that occur on ultrashort time scales, and to bring forth new technologies from rapid advances in science. The International Year of Light is an opportunity for us to tell the rest of the world about the amazing properties of light and its potential to enrich the human experience.

Historically, the International Year of Light celebrates a millennium of understanding of and knowledge about optics, dating from the publication of the *Book of Optics* in 1015. Written by the Arab scholar Ibn al-Haytham of Basra and Baghdad, known in the West as Alhacen, the *Book of Optics* is a remarkable historical work that developed theories for light, color perception, and vision, laid the foundation for our modern understanding of these phenomena, and influenced later scholars including Kepler, Snell, Huygens, and Descartes. Of course, the emergence of today's modern theory and understanding of photonics and optics depended on many historical events. In the 17th century, the craftwork of lens makers opened new fields of scientific discovery in astronomy and in the microworld by enabling the first microscopes by Robert Hooke and Antonie van Leeuwenhoek and telescopes by Galileo Galilei. For me, a memorable moment was seeing the actual lenses ground by van Leeuwenhoek for use in the first microscopes, which are located at the Boerhaave Museum in Leiden, The Netherlands. These lenses enabled microscopists to see for the first time the world visible beyond the resolution of the unaided human eye and transformed the scientific understanding of both the physical and biological worlds. For example, with the newly invented microscope, it became possible to see what van Leeuwenhoek called "animalcules", or microorganisms, in biological samples, and this led to a transformation of humankind's understanding of the theory of disease, from the belief that disease was a result of a generalized "miasma" to the understanding that disease could be specifically attributed to microscopic organisms. This understanding led to the later promotion of sterile practices in medicine and underscored the need for civil sanitary practices to promote and expand public health. Thus, it is not an exaggeration to say that what we now know as modern

medicine and public health came about largely because of discoveries spurred by advances in optics and microscopy!

On a political and economic level, the International Year of Light is an opportunity to inform policy makers and stakeholders about the importance of photonics in economic development, social welfare, and national security for countries around the world. As photonics researchers, we are well aware of the importance of photonics in, for example, optical communications technology, but many of our fellow citizens do not understand the crucial role that optics play in their everyday lives on the Internet and phone system. As we know, photonic fiber networks form the backbone of long-haul telecommunications systems and link computer servers in data centers, routing lightwave signals between the backplanes of servers to speed our Internet searches and our access to data in the "cloud". However, many of our fellow citizens, including policymakers, are unaware of these elementary ideas about photonics technology.

The award in 2014 of Nobel Prizes in both Physics and Chemistry for photonics advances also reflects the expanding importance of photonics in modern science and society. The Nobels in Chemistry to Betzig, Hell, and ACS *Photonics* Editorial Board member Moerner (congratulations W.E.!) reflected and celebrated their spectacular scientific advances in microscopy beyond the diffraction limit and at the single-molecule level. By contrast, the 2014 Nobel Prize in Physics recognized a stunning and singular achievement in photonics technology through the development of III-nitride semiconductor-based blue and white solid-state lighting devices that are now beginning to revolutionize general lighting technology. These advances have brought to the market and the world solid-state devices with $>5\times$ higher energy efficiency and $>10\times$ greater longevity than the best incandescent light bulbs.

The International Year of Light aims to broaden public awareness of the power and the potential of light, and of the importance of light in modern life, through a year-long series of events. You can read more about it, including public events occurring in countries around the world, at <http://www.light2015.org>. There are so many exciting stories to tell about photonics, and this year is our opportunity to tell the people around us!

■ AUTHOR INFORMATION

Notes

Views expressed in this Editorial are those of the author and not necessarily the views of the ACS.

Received: January 3, 2015

Accepted: January 4, 2015

Published: January 21, 2015