

Guest Editorial

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The UN General Assembly has declared 2015 as the International Year of Light and Light-based Technologies (IYL 2015). This is in honor of a number of discoveries and inventions. This includes—(1) 1000 years of a book on “Optics” written by Ibn Al-Haytham in 1015; (2) 200 years of the Fresnel’s concept of light as a wave (1815); (3) 150 years of Maxwell’s electromagnetic theory of light (1865); (4) 100 years of light in cosmology (through Einstein’s theory of general relativity in 1915); (5) 50 years of discovery of the cosmic microwave background (by Penzias and Wilson, 1965) and fiber-optical communication by Kao (1965).

Light based science and technology continue to enrich human civilization. Human beings are using light for illumination, for many centuries. Optical phenomena such as, reflection of light by mirrors (polished metal or other surfaces or surface of water) were used to for lighting up the interior of caves in ancient times. We see through light and we get food through light (photosynthesis). Because of the healing and other useful effects of sunlight, sun is worshipped as a supreme god in many civilizations and many religions. Even the 2014 Nobel prizes in chemistry (single molecule spectroscopy) and Physics (blue light emitting diode) involve light related inventions.

It is heartening to note, Indian contribution in the light related science and technology is quite commendable. The

only Nobel Prize in Science so far from India by CV Raman is an epoch making phenomenon based on scattering of light. Six months after discovering Raman Effect, CV Raman discovered small angle X-ray scattering (SAXS). This fact is largely ignored. Raman and Nath predicted Acousto-Optic effect theoretically in 1935. This is now used in mode-locking for generating ultrashort laser pulses. India surely missed the Nobel which should have been given to J. C. Bose for his pioneering work on microwave communication. IEEE, which recognizes major technological breakthroughs by giving Milestone Plaques have so far given only two such Milestone Plaques—one in honor of J. C. Bose (at Presidency College, 2012) and CV Raman (at IACS, 2012). When Ray Glauber was awarded the Nobel Prize in Physics in 2005 (for his work on coherent state), many scientists felt that this prize should have been shared with ECG Sudarshan who did similar work independently at the same time in 1963. Many protest letters were sent to the Swedish Academy for failing to recognize Sudarshan’s contribution. Another notable omission is S. N. Bose. At least two Nobel prizes were given based on his works (2003 on Bose–Einstein Condensation and 2013 on Higg’s Boson). M. N. Saha’s famous Saha ionization formula is also light related (He related flame test with color and temperature of stars). S. Chandrasekhar’s works on birth and death of stars also deal with many optical (spectroscopic) signature in astrophysics.

There are many living Indian legends working on light. C. K. N. Patel invented carbon dioxide laser, the most powerful among all lasers in 1964. This laser is used in metal welding/cutting, in medical surgery as well as in military. It is gratifying to note that two Indian scientists (G. S. Aagarwal and A. K. Sood) have recently been

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honored by election to the Fellowship of the Royal Society (FRS).

In this special issue, we have collected a few articles on selected topics on light related research. We have attempted to highlight the light related research done in India. In the first article, Govind Swarup summarized the work in the field of Astronomy. Mittal and co-workers scrutinized the status of research on laser induced isotope separation in India. Bagchi outlined the theoretical works which enriched our understanding of ultrafast processes in liquids. Gupta discussed the achievement of scientists at CAT,

Indore in biomedical engineering using light. Chakraborty gave an overview of ultra- high resolution laser spectroscopy in supersonic jet. Palit dealt with ultrafast laser spectroscopy. Maiti reviewed recent works in India in the area of single molecule spectroscopy. Chandra gave an overview of computer simulations in which A. Rahman, an Indian, played a leading role. Panigrahi and co-workers highlighted the work on Bose–Einstein Condensation of atoms and photons.

We hope, this issue would inspire next generation of Indian scientists to make further contribution in this area.