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Editorial

Lighting technology

For more than 100 years, modern society's diurnal rhythm has been artificially extended with the aid of various illuminants. However, artificial lighting is tampering with human biorhythms and with the biosphere in general. From the economic point of view, additional lighting at night causes enormous costs and is responsible for using up a massive percentage of the world's energy resources. During recent years, development trends in the field of LED technology have paved the way for novel concepts impacting on the subject of light. In this way, the abovementioned issues can be greatly reduced resulting in a better balance between the environment and human needs.

LED technology, however, is not to be taken for granted. A wealth of knowledge has to be poured into developing these lighting systems in order to be able to fully exploit the potentials of LED lighting.

Apart from semiconductor-based direct emitting chips, the LED complex also comprises laser diodes and organic LEDs with multi-faceted properties and fields of application across a wide spectral range.

In the present issue of the journal we read about the mechanisms of generating light through the photoelectric effect and the generation of white light by means of laser diodes, as well as the corresponding advantage of coherence and high luminance. A lighting system is characterized by its illuminants, but its illumination optics are also a decisive factor. Freeform surface modeling is now industrial practice, but there is still enormous potential to be tapped such as optomechatronics, exploring and understanding of complex contexts in mechanics, optics and electronics with a special focus on the temperature field. We are fascinated by new and exciting applications in the field of optical technology such as in-line holographic microscopy or innovations such as backlight illumination as well as the measurement techniques and analysis methods and their further development, which are required in this context.

We hope you enjoy reading this.
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Roland Lachmayer studied Mechanical Engineering and received his diploma and PhD degrees from the Technical University Braunschweig in 1990 and 1996, respectively. He did research on the field of product development methodology. From 1996 to 2007, he worked as a development engineer, Head of department and Vice President for adaptive front lighting systems, research electronics and innovative project management with Hella KgaA, Hueck & Co. From 2007 to 2010 he was a Vice President in Technical Department by AEG Power Solutions AG. In 2010 he was appointed Full Professor and Head of the Institute of Product Development at the Department of Mechanical Engineering at Leibniz Universität Hannover (Germany). Since 2012 he is the Board Director of the Hanover Centre for Optical Technologies (HOT). Currently, Dr. Lachmayer teaches and researches in the field of optomechatronics, computer aided engineering and development methodology. Dr. Lachmayer is a member of the 'Design Society', the German Branch of the European Optical Society (DGaO) and the German Society of Engineers (VDI).

Juan C. Miñano has been a Professor at the Universidad Politécnica de Madrid since 1997. Since 2000 he has also collaborated as a Senior Scientist with LPI Light Prescription Innovators. Professor Miñano has been involved in nonimaging optics research activities since 1982, mainly applied to photovoltaic solar energy, solid state lighting and other optoelectronic areas. He developed the Poisson Bracket nonimaging concentrator design method and, together with Pablo G. Benítez, the SMS design method in its 2D and 3D versions. He has published more than 40 journal papers, given more than 100 congress presentations, invented several dozens patents and written several books one of which is 'NonImaging Optics', coauthored with Roland Winston and Pablo G. Benítez. In 2010 he has was honored with the A.E. Conrady Award (2010) from the SPIE 'in recognition of his exceptional contributions in developing new design methods and devices in nonimaging optics'.