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Editorial

Featured Articles in the Section of Optoelectronics

Elias Stathatos

Nanotechnology and Advanced Materials Laboratory, Electrical and Computer Engineering Department, University of the Peloponnese, 26334 Patras, Greece; estathatos@uop.gr; Tel.: +30-2610-369242

Optoelectronics, as a rapidly growing field of technology, plays a crucial role in the development of electronic devices that emit or detect light. It encompasses a wide range of applications, including high-energy gamma rays, X-rays, ultraviolet, infrared radiation, and, of course, visible light. Optoelectronic technology involves the theoretical and experimental study, design, and manufacturing of hardware devices that expedite the conversion of electricity into photon signals. This Special Issue (SI) under the title "Feature Papers in the Optoelectronics Section" aims to present some selected high-impact works in the general field of the optoelectronics focusing on specific applications.

In the first paper of the SI, the authors proposed a new passive optical network, that is, a wavelength-division-multiplexing (WDM-PON) system, to facilitate the blended fiber-free space optics (FSO) signal access. In order to provide the fiber and FSO traffic at the same time, the C- and L-band channels were applied to the presented passive optical network, respectively. Furthermore, they tried to avoid the fiber breakpoint in the fiber access traffic; therefore, the proposed WDM access architecture also could provide a self-restored mechanism when a simple fiber routing path was applied. In the second paper, the authors, through their studies, provided measurements on the evaluation of the performance of Bruker sequential micro-positron emission tomography and magnetic resonance imaging scanner by following the standards of the National Electrical Manufacturers Association (NEMA) through the NU 4-2008 protocol. The system was, consisted of an advanced-technology detector based on a high-performance silicon photomultiplier and a continuous lutetium–yttrium oxyorthosilicate crystal. The methods were as follows: A ^{22}Na (sodium-22) point source was utilized to assess the spatial resolution and system sensitivity, and the Micro-PET scatter phantom measurements were conducted to measure count rate measurements and scatter fractions (SFs). A mouse-like Micro-PET image quality (IQ) phantom was utilized as a model to analyze the uniformity, recovery coefficient (RC), and spillover ratio (SOR). In the third work in this SI, the authors presented a quasi-BIC-based high-Q perfect absorber with some unique features. The presented a decoupled relationship between the resonant wavelength and the Q factor such that these two properties could be independently tuned by changing different structure parameters. In addition, both radiative and resistive losses were tunable. Moreover, a simple method was proposed to design a perfect absorber with different resonant wavelengths and different Q factors, and a near-infrared perfect absorber with a Q factor as high as 5.13×10^5 was designed. This work proposes a method to tune the quasi-BIC mode, thereby introducing a new paradigm for the design of a high-Q perfect absorber. In the fourth review paper, the authors trace the evolution of bioamplifiers, through circuits on operational and instrumental amplifiers, while their studies start from circuits on vacuum tubes and discrete transistors. Furthermore, they combined analog–digital solutions on analog front-end integrated circuits. Technical features and specific examples of circuits were provided for each stage of bioamplifier development. Furthermore, the authors gave special emphasis to the review of modern analog front-end solutions for biopotential registration, where they describe their generalized structural diagram and record of some comparative characteristics. A detailed review was presented on analog front-end circuit integration in various practical applications. Examples were

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also provided in the latest achievements in the specific field of electrocardiogram, electroencephalogram, and electromyogram registration. In the fifth paper, an optical chaos communication scheme was proposed and demonstrated with numerical methods that was based on semiconductor lasers. Specifically, the intensity modulation optical injection for the secure transmission of quadrature amplitude modulation messages was provided. According to this, two chaotic sources were proposed and generated with different parameters for the modulation, and these acted as chaotic carriers at the transmitter side. These were subsequently used to drive two receivers into two separate channels. The numerical results, which were obtained by the authors, demonstrated that this scheme allows for the simultaneous encryption of two messages for secure communication for broadband chaos generation and high-quality chaos synchronization. Namely, a 20 GBaud 16-QAM message was recovered correctly with a transmission distance in standard single mode fiber (SMF) over 120 km, while the other 20 GBaud 64-QAM message was limited to a 20 km fiber transmission distance. In the sixth paper, the authors deal with the threshold voltage (V_{TH}) of OFETs. The V_{TH} shift of OFETs has always been an important problem restricting their practical applications. In this work, they observed that the V_{TH} of polymer OFETs with the widely investigated device structure of a SiO_2 bottom-gate dielectric is noticeably shifted by pre-applying a large gate voltage. Such a shift in V_{TH} remains to a large extent, even after modifying the surface of the SiO_2 dielectric using a hexamethyldisilazane (HMDS) self-assembled monolayer. In the seventh paper, the authors present the feasibility of an NIR-CIS through a simulation study investigating an alternative integration strategy, that is, by forming a CQD-Si heterojunction. Simulation results of their study showed that each active pixel made in the photodiode of the CQD-Si heterojunction on the CIS sensitively responds to NIR light. They conclude that generated photocarriers induce changes in electrostatic potentials in the active pixel. To the next two review articles (eighth and ninth), which are also the final papers in the book, the case of a new technology based on perovskite materials is examined. In particular, the authors of the former focus on both the electron transport layer/perovskite and perovskite/hole transport layer interfaces in perovskite solar cells. The work encompasses some of the most promising engineering methodologies that were recently proposed in order to optimize the device architecture. Machine learning approaches have also been used to validate experimental data and predict solar cell parameters with accuracy, further confirming the significance and justifying the application potential of the proposed innovative interface functionalization approaches. In the latter, the authors present the progress has been achieved in visualized investigation of halide segregation, especially the light-induced, by means of spatially resolved imaging techniques. Moreover, they present the current understanding of photoinduced phase separation, which is based on several possible mechanisms, while their results are discussed in detail.

Conflicts of Interest: The author declares no conflict of interest.

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