Invitation to submit

Advances in Optical Fibers for Fiber Sensors
Guest Editor: Hani J. Kbashi
Deadline: 17 June 2024

Section Collection Series: Recent Advances in Optoelectronics from Lab to Industry
Guest Editors: Elias Stathatos and Spyros N. Yannopoulos
Deadline: 20 June 2024

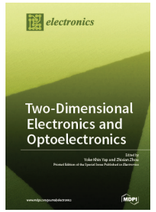
Antennas for IoT Devices
Guest Editors: Nikolay Todorov Atanasov, Maria Seimeni-Tsumani and Hussain Al-Rizzo
Deadline: 30 June 2024

Emerging Photovoltaic Technologies, a Step before Commercialization
Guest Editors: Elias Stathatos, Polycarpos Falaras and Bidikoudi Maria
Deadline: 15 July 2024

Optical Fiber and Optical Communication
Guest Editors: Khan Ihtesham and Paulo Monteiro
Deadline: 15 August 2024

Special Issue Book

Two-Dimensional Electronics and Optoelectronics



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Section Editor-in-Chief

Prof. Dr. Elias Stathatos

Nanotechnology and Advanced Materials Laboratory, Electrical and Computer Engineering Department, University of the Peloponnese, Patras, Greece

Section Information

This section of "Optoelectronics" addresses the following topics and considers mostly experimental work or theoretical/simulation work, either directly linked to or supporting the following fields:

- Nanoelectronic and photonic devices and their fabrication
- Microsystems, microdevices (e.g., sensors and nanoenergy devices) and their fabrication

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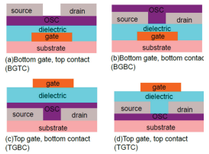
Featured Papers

DOI:10.3390/electronics11030316

A Review on Solution-Processed Organic Phototransistors and Their Recent Developments

Authors: Aybuke Tavasli, Betul Gurunlu, Dilara Gunturkun, Recep Isci and Sheida Faraji

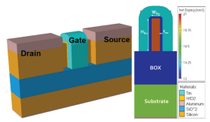


Abstract: Today, more disciplines are intercepting each other, giving rise to "cross-disciplinary" research. Technological advancements in material science and device structure and production have paved the way towards development of new classes of multi-purpose sensory devices. Organic phototransistors (OPTs) are photo-activated sensors based on organic field-effect transistors that convert incident light signals into electrical signals. The organic semiconductor (OSC) layer and three-electrode structure of an OPT offer great advantages for light detection compared to conventional photodetectors and photodiodes, due to their signal amplification and noise reduction characteristics. Solution processing of the active layer enables mass production of OPT devices at significantly reduced cost. The chemical structure of OSCs can be modified accordingly to fulfil detection at various wavelengths for different purposes. Organic phototransistors have attracted substantial interest in a variety of fields, namely biomedical, medical diagnostics, healthcare, energy, security, and environmental monitoring. Lightweight and mechanically flexible and wearable OPTs are suitable alternatives not only at clinical levels but also for point-of-care and home-assisted usage. In this review, we aim to explain different types, working mechanism and figures of merit of organic phototransistors and highlight the recent advances from the literature on development and implementation of OPTs for a broad range of research and real-life applications.

DOI:10.3390/electronics11010091

Effects of Varying the Fin Width, Fin Height, Gate Dielectric Material, and Gate Length on the DC and RF Performance of a 14-nm SOI FinFET Structure

Authors: Nour El I. Boukortt, Trupti Ranjan Lenka, Salvatore Patanè and Giovanni Crupi

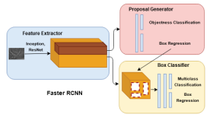


Abstract: The FinFET architecture has attracted growing attention over the last two decades since its invention, owing to the good control of the gate electrode over the conductive channel leading to a high immunity from short-channel effects (SCEs). In order to contribute to the advancement of this rapidly expanding technology, a 3D 14-nm SOI n-FinFET is performed and calibrated to the experimental data from IBM by using Silvaco TCAD tools. The calibrated TCAD model is then investigated to analyze the impact of changing the fin width, fin height, gate dielectric material, and gate length on the DC and RF parameters. The achieved results allow gaining a better understanding and a deeper insight into the effects of varying the physical dimensions and materials on the device performance, thereby enabling the fabrication of a device tailored to the given constraints and requirements. After analyzing the optimal values from different changes, a new device configuration is proposed, which shows a good improvement in electrical characteristics.

DOI:10.3390/electronics11071151

Human Detection in Aerial Thermal Images Using Faster R-CNN and SSD Algorithms

Authors: K. R. Akshatha, A. Kotegar Karunakar, Satish B. Shenoy, Abhilash K. Pai, Nikhil Hunjanal Nagaraj and Sambhav Singh Rohatgi

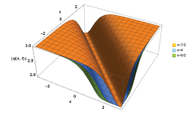


Abstract: The automatic detection of humans in aerial thermal imagery plays a significant role in various real-time applications, such as surveillance, search and rescue and border monitoring. Small target size, low resolution, occlusion, pose, and scale variations are the significant challenges in aerial thermal images that cause poor performance for various state-of-the-art object detection algorithms. Though many deep-learning-based object detection algorithms have shown impressive performance for generic object detection tasks, their ability to detect smaller objects in the aerial thermal images is analyzed through this study. This work carried out the performance evaluation of Faster R-CNN and single-shot multi-box detector (SSD) algorithms with different backbone networks to detect human targets in aerial view thermal images. For this purpose, two standard aerial thermal datasets having human objects of varying scale are considered with different backbone networks, such as ResNet50, Inception-v^2, and MobileNet-v1. The evaluation results demonstrate that the Faster R-CNN model trained with the ResNet50 network architecture out-performed in terms of detection accuracy, with a mean average precision (mAP at 0.5 IoU) of 100% and 55.7% for the test data of the OSU thermal dataset and AAU PD T datasets, respectively. SSD with MobileNet-v1 achieved the highest detection speed of 44 frames per second (FPS) on the NVIDIA GeForce GTX 1080 GPU. Fine-tuning the anchor parameters of the Faster R-CNN ResNet50 and SSD Inception-v^2 algorithms caused remarkable improvement in mAP by 10% and 3.5%, respectively, for the challenging AAU PD T dataset. The experimental results demonstrated the application of Faster R-CNN and SSD algorithms for human detection in aerial view thermal images, and the impact of varying backbone network and anchor parameters on the performance improvement of these algorithms.

DOI:10.3390/electronics12020352

Dark and Singular Highly Dispersive Optical Solitons with Kudryashov's Sextic Power-Law of Nonlinear Refractive Index in the Absence of Inter-Modal Dispersion

Authors: Ahmed M. Elsherbeny, Ahmed H. Arnous, Anjan Biswas, Yakup Yıldırım, Luminita Moraru, Simona Moldovanu, Catalina Iticescu and Hashim M. Alshehri



Abstract: The current paper studies highly dispersive optical solitons with the aid of Kudryashov's integration algorithm. The governing model employs Kudryashov's sextic power law of nonlinear refractive index. The inter-modal dispersion term is absent from the model. The integration scheme retrieves dark and singular solitons to the model.