Electronics
an Open Access Journal by MDPI

Impact Factor 2.6
CiteScore 5.3

Section
Electronic Materials

mdpi.com/
journal/
electronics

MDPI

Section Information

The Section “Electronic Materials” reports on the science, technology, and applications of electronic materials which are used in electrical industries, electronics and microelectronics, and the substances used in construction of integrated circuits, circuit boards, packaging materials, communication cables, optical fibers, displays, and various controlling and monitoring devices.

The main topics of this section include but are not limited to the following:

- Electronic materials science and technology
- Energy storage and conversion materials
- Nanoscale science and technology
- Organic materials and thin-film technology
- Oxide semiconductors and dielectrics
- Wide bandgap semiconductors

Section Editor-in-Chief
Prof. Dr. Qingqing Ke

Author Benefits

Open Access

Unlimited and free access for readers

No Copyright Constraints

Retain copyright of your work and free use of your article

Thorough Peer-Review

2023 Impact Factor: 2.6

(*Journal Citation Reports* - Clarivate, 2024)

No Space Constraints, No Extra Space or Color Charges

No restriction on the maximum length of the papers, number of figures or colors

Coverage by Leading Indexing Services

Scopus, SCIE (Web of Science), CAPlus / SciFinder, Inspec, and other databases

Rapid Publication

A first decision is provided to authors approximately 16.8 days after submission; acceptance to publication is undertaken in 2.6 days (median values for papers published in this journal in the first half of 2024)

Invitation to Submit

Advanced Materials for Intelligent Electronics

Guest Editor: Hyojung Kim
Deadline: 15 October 2024

Advances in GaN-Based Electronic Materials and Devices

Guest Editor: Aristotelis Christou
Deadline: 15 October 2024

Memristors beyond the Limitations: Novel Methods and Materials

Guest Editors: Ivo Marković and Milka Potrebic
Deadline: 15 November 2024

Metal Oxides Based Futuristic Resistive Switching and Triboelectric Energy Harvesting

Guest Editors: Qazi Muhammad Saqib, Mahesh Y. Chougale and Jinho Bae
Deadline: 10 December 2024

Flexible Thin Films and Nanomaterials in Electronic Materials

Guest Editor: Yongfa Cheng
Deadline: 15 December 2024

Feature Papers in Electronic Materials

Guest Editors: Qingqing Ke and Yating Hu
Deadline: 15 January 2025

Selected Papers

Modeling of Conduction Mechanisms in Ultrathin Films of Al_2O_3 Deposited by ALD

Authors: Silvestre Salas-Rodríguez, Joel Molina-Reyes, Jaime Martínez-Castillo, Rosa M. Woo-Garcia, Agustín L. Herrera-May and Francisco López-Huerta

Abstract: We reported the analysis and modeling of some conduction mechanisms in ultrathin aluminum oxide (Al_2O_3) films of 6 nm thickness, which are deposited by atomic layer deposition (ALD). This modeling included current-voltage measurements to metal-insulator-semiconductor (MIS) capacitors with gate electrode areas of 3.6×10^{-5} cm^2 and 6.4×10^{-5} cm^2 at room temperature. The modeling results showed the presence of ohmic conduction, Poole Frenkel emission, Schottky emission, and trap-assisted tunneling mechanisms through the Al_2O_3 layer. Based on extracted results, we measured a dielectric conductivity of 5×10^{-15} S/cm at low electric fields, a barrier height at oxide/semiconductor interface of 2 eV, and an energy trap level into bandgap with respect to the conduction band of 3.11 eV. These results could be affected by defect density related to oxygen vacancies, dangling bonds, fixed charges, or interface traps, which generate conduction mechanisms through and over the dielectric energy barrier. In addition, a current density model is developed by considering the sum of dominant conduction mechanisms and results based on the finite element method for electronic devices, achieving a good match with experimental data.

https://doi.org/10.3390/electronics12040903

Optimal Thickness of Double-Layer Graphene-Polymer Absorber for 5G High-Frequency Bands

Authors: Alessandro Giuseppe D'Aloia, Marcello D'Amore and Maria Sabrina Sarto

Abstract: A new analytical approach to optimize the thicknesses of a two-layer absorbing structure constituted by a graphene-based composite and a polymer dielectric spacer backed by a metallic layer acting as perfect electric conductor (PEC) is proposed. The lossy sheet is made by an epoxy-based vinyl ester resin filled with graphene nanoplatelets (GNPs) characterized by known frequency spectra of the complex permittivity. The optimal thicknesses are computed at the target frequencies of 26, 28, and 39 GHz in order to obtain a –10 dB bandwidth able to cover the 5G frequency bands between 23.8 and 40 GHz. The resulting absorbing structures, having a total thickness lower than 1 mm, are excited by transverse magnetic (TM) or electric (TE) polarized plane waves and the absorption performances are computed in the 5G high frequency range.

https://doi.org/10.3390/electronics12030588

Investigating the Effect of Cross-Conjugation Patterns on the Optoelectronic Properties of 7,7′Isoindigo-Based Materials

Authors: Shiwei Ren, Amirhossein Habibi, Yujie Wang and Abderrahim Yassar

Abstract: Isoindigo (IID) is widely used as a building block for the fabrication of organic semiconductor devices. Understanding the impact of cross-conjugation and linear conjugation on the optoelectronic properties of disubstituted IID is of great importance for the design of improved materials. In this study, phenyl and thienyl groups were substituted at the cross-conjugated 7,7′ position of IID to generate three novel organic semiconductor structures with a donor–acceptor architecture. The optoelectronic properties of this IID derivative were investigated and compared with those of the 6,6′ linearly conjugated IID analogs using UV–Vis spectroscopy and cyclic voltammetry. The experimental results were compared using density functional theory calculations to provide structure–property relationships based on substitution types and attachment sites for IID. The frontier orbital energy levels of the material did not vary dramatically with the position of the substituent, while the type of substituent showed a more significant influence on the HOMO's energy level and oscillator strength. Phenyl-disubstituted 7,7′ IID (7Ph7′Ph) and thienyl-disubstituted 7,7′ IID (7Th7′Th) materials were used as electron transport layers in perovskite solar cells with a power conversion efficiency of 5.70% and 6.07%, respectively. These observations enhance our understanding of the electronic structure and optoelectronic properties of IID, guiding the design of the next generation of IID-based semiconductors.

https://doi.org/10.3390/electronics12153313

Investigation of Contact Surface Changes and Sensor Response of a Pressure-Sensitive Conductive Elastomer

Authors: Takeru Katagiri, Nguyen Chi Trung Ngo, Yuki Togawa, Sogo Kodama, Kotaro Kawahara, Kazuki Umemoto, Takanori Miyoshi and Tadachika Nakayama

Abstract: The pressure-sensing mechanisms of conductive elastomers, such as conductive networks, and tunneling effects within them have been extensively studied. However, it has become apparent that external pressure can significantly impact the contact area of polymeric materials. In this study, we will employ a commercially available conductive elastomer to investigate changes in resistance and contact surface under external pressure. Resistance measurements will be taken with and without applying conductive grease to the surface of the elastomer. This allows us to observe changes in resistance values associated with pressure variations. Furthermore, as pressure is applied to the conductive elastomer, the contact area ratio increases. Such an increase in the contact area and its correlation to changes in conductance values will be assessed.

https://doi.org/10.3390/electronics12214532

Editorial Office
electronics@mdpi.com

MDPI
Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
mdpi.com