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Thermally activated conductivity of Si hybrid structure based on ZnPc thin film

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APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING

Volume: 122 Issue: 10

Article Number: 921

DOI: 10.1007/s00339-016-0450-8

Published: OCT 2016

[View Journal Impact](#)

Abstract

In this study, an analysis of temperature-dependent electrical characteristics of ZnPc/p-Si structure has been presented. Conduction mechanisms that are accounted for the organic/inorganic devices are evaluated. At low forward voltage, current-voltage (I-V) characteristics show ohmic behavior, limiting extraction of holes from p-Si over the ZnPc/p-Si heterojunction. Thermally activated conduction mechanism appears to be space-charge-limited conduction mechanism, taking into account the presence of an exponential trap distribution with total concentration of traps, N_t of $5.77 \times 10^{25} \text{ m}^{-3}$. The series resistance is found to be temperature dependent. There is a critical point on the regime of series resistance at 200 K. The capacitance varies with temperature at different rates below and above room temperature, indicating a variation in the dielectric constant.

Keywords

Keywords Plus: SCHOTTKY-BARRIER DIODES; CARRIER TRANSPORT MECHANISMS; INORGANIC CONTACT BARRIERS; ELECTRICAL-PROPERTIES; ZINC PHTHALOCYANINE; SERIES RESISTANCE; SOLAR-CELL; PHOTOVOLTAIC PROPERTIES; PHOTODYNAMIC THERAPY; LOW-TEMPERATURES

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Publisher

SPRINGER, 233 SPRING ST, NEW YORK, NY 10013 USA

Categories / Classification

Research Areas: Materials Science; Physics

Web of Science Categories: Materials Science, Multidisciplinary; Physics, Applied

Document Information

Document Type: Article

Language: English

Accession Number: WOS:000384753800051

ISSN: 0947-8396

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