

SEMICONDUCTORS AND SEMIMETALS

VOLUME 17 PART 1A

## Advances in Infrared Photodetectors

Edited by

Suresh D. Gunapala, David R. Hager  
and Chinnappa Jayachandran

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# Semiconductors And Semimetals Volume 5 Infrared Detectors

**Leah Bergman, Jeanne L. McHale**



## **Semiconductors And Semimetals Volume 5 Infrared Detectors:**

Infrared Detectors Antonio Rogalski, 2010-11-15 Completely revised and reorganized while retaining the approachable style of the first edition *Infrared Detectors* Second Edition addresses the latest developments in the science and technology of infrared IR detection Antoni Rogalski an internationally recognized pioneer in the field covers the comprehensive range of subjects necessary to understand *Semiconductors and Semimetals*, 1982-03-18 *Semiconductors and Semimetals The Story of Semiconductors* John W. Orton, 2008-12-11 The book provides an overview of the fascinating spectrum of semiconductor physics devices and applications presented from a historical perspective It covers the development of the subject from its inception in the early nineteenth century to the recent millennium Written in a lively informal style it emphasizes the interaction between pure scientific push and commercial pull on the one hand and between basic physics materials and devices on the other It also sets the various device developments in the context of systems requirements and explains how such developments met wide ranging consumer demands It is written so as to appeal to students at all levels in physics electrical engineering and materials science to teachers lecturers and professionals working in the field as well as to a non specialist scientific readership **Infrared and Terahertz Detectors, Third Edition** Antoni Rogalski, 2019-01-10 This new edition of *Infrared and Terahertz Detectors* provides a comprehensive overview of infrared and terahertz detector technology from fundamental science to materials and fabrication techniques It contains a complete overhaul of the contents including several new chapters and a new section on terahertz detectors and systems It includes a new tutorial introduction to technical aspects that are fundamental for basic understanding The other dedicated sections focus on thermal detectors photon detectors and focal plane arrays **Physics of Photonic Devices** Shun Lien Chuang, 2012-11-07 The most up to date book available on the physics of photonic devices This new edition of *Physics of Photonic Devices* incorporates significant advancements in the field of photonics that have occurred since publication of the first edition *Physics of Optoelectronic Devices* New topics covered include a brief history of the invention of semiconductor lasers the Lorentz dipole method and metal plasmas matrix optics surface plasma waveguides optical ring resonators integrated electroabsorption modulator lasers and solar cells It also introduces exciting new fields of research such as surface plasmonics and micro ring resonators the theory of optical gain and absorption in quantum dots and quantum wires and their applications in semiconductor lasers and novel microcavity and photonic crystal lasers quantum cascade lasers and GaN blue green lasers within the context of advanced semiconductor lasers *Physics of Photonic Devices* Second Edition presents novel information that is not yet available in book form elsewhere Many problem sets have been updated the answers to which are available in an all new Solutions Manual for instructors Comprehensive timely and practical *Physics of Photonic Devices* is an invaluable textbook for advanced undergraduate and graduate courses in photonics and an indispensable tool for researchers working in this rapidly growing field **Physical Optics and Light Measurements**, 1989-02-01 *Physical Optics and Light*

Measurements      *Handbook of Luminescent Semiconductor Materials* Leah Bergman, Jeanne L. McHale, 2016-04-19

Photoluminescence spectroscopy is an important approach for examining the optical interactions in semiconductors and optical devices with the goal of gaining insight into material properties. With contributions from researchers at the forefront of this field, *Handbook of Luminescent Semiconductor Materials* explores the use of this technique to study      *The Infrared Handbook* Environmental Research Institute of Michigan. Infrared Information and Analysis Center, United States. Office of Naval Research, 1978      **Handbook of Infrared Detection Technologies** M. Henini, M. Razeghi, 2002-12-11 Introduction Comparison of Photon and Thermal Detectors Performance GaAs AlGaAs Based Quantum Well Infrared Photodetector Focal Plane Arrays GaInAs P Based Qwips on GaAs InP and Si Substrates for Focal Plane Arrays InAs GaIn Sb Superlattices A Promising Material System for Infrared Detection GaSb InAs Superlattices for Infrared FPAs MCT Properties Growth Methods and Characterization HgCdTe 2D Arrays Technology and Performance Limits Status of HgCdTe MBE Technology Silicon Infrared Focal Plane Arrays PolySiGe Uncooled Microbolometers for Thermal Infrared Detection Infrared Silicon Germanium Detectors Fundamentals of Spin Filtering in Ferromagnetic Metals with Application to Spin Sensors

*Photodetectors* P.N.J. Dennis, 2012-12-06 This book has been written as part of a new series of scientific text books being published by Plenum Publishing Company Limited. The scope of the series is to review a chosen topic in each volume and in addition to present abstracts of the most important references cited in the text. Thus allowing the reader to supplement the information contained within this book without having to refer to many additional publications. This volume is devoted to the subject of Radiation Detectors known as Photodetectors and particular emphasis has been placed on devices operating in the infrared region of the electromagnetic spectrum. Although some detectors which are sensitive at ultraviolet and visible wavelengths are also described, the existence of the infrared region of the spectrum has been known for almost two hundred years but the development of detectors specifically for these wavelengths was limited for a long time due to technology limitations and difficulties in understanding and explaining the phenomena involved. Significant advances were made during World War II when the potential military applications of being able to see in the dark were demonstrated and this progress has been maintained during the last forty years when many major advances have been achieved such that the use of

photodetectors for both civil and military applications is now relatively common and can be inexpensive      **Quantum Well Intersubband Transition Physics and Devices** Hui C. Liu, Barry F. Levine, Jan Y. Andersson, 2012-12-06 Intersubband transitions in quantum wells have attracted tremendous attention in recent years mainly due to the promise of applications in the mid and far infrared regions 2-20  $\mu\text{m}$ . Many of the papers presented in *Quantum Well Intersubband Transition Physics and Devices* are on the basic linear intersubband transition processes, detector physics and detector application reflecting the current state of understanding and detector applications where highly uniform large focal plane arrays have been demonstrated. Other areas are still in their early stages including infrared modulation, harmonic generation and emission.

**Narrow-gap Semiconductor Photodiodes** Antoni Rogalski, Krzysztof Adamiec, Jaroslaw Rutkowski, 2000 In this monograph investigations of the performance of narrow gap semiconductor photodiodes are presented and recent progress in different IR photodiode technologies is discussed HgCdTe photodiodes InSb photodiodes alternatives to HgCdTe III V and II VI ternary alloy photodiodes lead chalcogenide photodiodes and a new class of photodiodes based on two dimensional solids Investigations of the performance of photodiodes operated in different spectral regions are presented **Mercury Cadmium Telluride** Peter Capper, James Garland, 2011-06-20 Mercury cadmium telluride MCT is the third most well regarded semiconductor after silicon and gallium arsenide and is the material of choice for use in infrared sensing and imaging The reason for this is that MCT can be tuned to the desired IR wavelength by varying the cadmium concentration Mercury Cadmium Telluride Growth Properties and Applications provides both an introduction for newcomers and a comprehensive review of this fascinating material Part One discusses the history and current status of both bulk and epitaxial growth techniques Part Two is concerned with the wide range of properties of MCT and Part Three covers the various device types that have been developed using MCT Each chapter opens with some historical background and theory before presenting current research Coverage includes Bulk growth and properties of MCT and CdZnTe for MCT epitaxial growth Liquid phase epitaxy LPE growth Metal organic vapour phase epitaxy MOVPE Molecular beam epitaxy MBE Alternative substrates Mechanical thermal and optical properties of MCT Defects diffusion doping and annealing Dry device processing Photoconductive and photovoltaic detectors Avalanche photodiode detectors Room temperature IR detectors

Semiconductors T. F. Connolly, 2012-12-06 And often on request from the issuing installation USAEC reports are also available from International Atomic Energy Agency Kaerntnerring A 1010 Vienna Austria National Lending Library Boston Spa England Monographs and reports of the National Bureau 01 Standards are for sale by Superintendent of Documents U S Government Printing Office Washington D C 20402 Theses listed as Dissertation Abstracts number are available in North and South America from University Microfilms Dissertation Copies P O Box 1764 Ann Arbor Michigan 48106 and elsewhere from University Microfilms Ltd St John s Road Tylers Green Penn Buckinghamshire England Conlenls Addendum xiii 1 Information Centers and Other Services 1 2 Journals 3 3 Methods of Crystal Growth Books and Reviews 5 4 Semiconductors General Reviews and Bibliographies 11 5 1 V VI Compounds 21 6 li IV V2 Compounds 23 7 II V Compounds 29 a General Reviews and Bibliographies 29 b Zinc Compounds 30 1 Zn3P2 30 2 ZnAs 30 3 ZnSb 30 4 Zn Mixed Systems 31 c Cadmium Compounds 31 31 1 Cd3P2 2 Cd3As2 31 3 CdSb Cd3Sb2 33 37 8 li VI Compounds a General Reviews and Bibliographies 37 b Zinc Compounds 39 1 ZnO 39 Preparation and Properties 39 Electrical Properties 41 Optical Properties 45 Physical Properties and Structure 47 2 ZnS 49 3 ZnSe 52 4 ZnTe 54 5 Zn Mixed Systems 55 55 c Cadmium Compounds 55 1 CdS 2 CdSe 60 3 CdTe 61 4 CdTernaries 62 d Mercury Compounds 64 *Physics of Nonmetallic Thin Films* C. H. S. Dupuy, A. Cachard, 2012-12-06 For several years now the intense development in the field of microelectronics the interest in coating

materials and activity in integrated optics have produced many advances in the field of thin solid film. The research activity has become so intensive and so broad that it is necessary to divide the field into metallic and non-metallic thin films. A summer school in the area of non-metallic thin films appeared to be a very fruitful concept and hence in October 1973 A S I M S made a proposal to N A T O to hold this second summer school in Corsica in September 1974. The basic idea behind this summer school was essentially to stress and synthesize physical properties and structure of non-metallic thin films. The main reason for this was the feeling that many laboratories are very specialized and that few engage in both physical and structural analysis of these films. The program included a large section on physical studies: electrical transport, interface effects, switching, mechanical and optical. There was also a large section on characterization: crystal structure, chemical composition, stoichiometry. It is always a difficult problem bonding and electronic structure.

*High Pressure Semiconductor Physics I*, 1998-09-09. Since its inception in 1966 the series of numbered volumes known as Semiconductors and Semimetals has distinguished itself through the careful selection of well-known authors, editors and contributors. The Willardson and Beer Series as it is widely known has succeeded in publishing numerous landmark volumes and chapters. Not only did many of these volumes make an impact at the time of their publication but they continue to be well-cited years after their original release. Recently Professor Eicke R. Weber of the University of California at Berkeley joined as a co-editor of the series. Professor Weber, a well-known expert in the field of semiconductor materials, will further contribute to continuing the series tradition of publishing timely, highly relevant and long impacting volumes. Some of the recent volumes such as Hydrogen in Semiconductors, Imperfections in III-V Materials, Epitaxial Microstructures, High Speed Heterostructure Devices, Oxygen in Silicon and others promise indeed that this tradition will be maintained and even expanded. Reflecting the truly interdisciplinary nature of the field that the series covers the volumes in Semiconductors and Semimetals have been and will continue to be of great interest to physicists, chemists, materials scientists and device engineers in modern industry. Volumes 54 and 55 present contributions by leading researchers in the field of high pressure semiconductors. Edited by T. Suski and W. Paul, these volumes continue the tradition of well-known but outdated publications such as Brigman's *The Physics of High Pressure* 1931 and 1949 and *High Pressure Physics and Chemistry* edited by Bradley. Volumes 54 and 55 reflect the industrially important recent developments in research and applications of semiconductor properties and behavior under desirable, risk-free conditions at high pressures. These developments include the advent of the diamond anvil cell technique and the availability of commercial piston-cylinder apparatus operating at high hydrostatic pressures. These much-needed books will be useful to both researchers and practitioners in applied physics, materials science and engineering.

Perspectives in Optoelectronics Sudhanshu Shekhar Jha, 1995. Optoelectronics is a rapidly expanding field of research and development. In years to come it is destined to play a primary role in the growing information industry. The basic philosophy behind the science and technology of optoelectronics is to create and develop photonic devices in which optical

photons light waves instead of electronic carriers are manipulated for the conventional task performed by microelectronics Thanks to the availability of large bandwidth at optical frequencies the development of cost effective low loss low dispersion silica fibers for optical transmission and the possibility of ultra fast two dimensional processing the field of present day microelectronics is moving steadily towards this new technology of optoelectronics and photonics This volume presents reviews of different areas of optoelectronics written by international experts in the field covering most of the topics of recent importance It includes detailed discussions on semiconductor lasers and optical amplifiers optical fiber transmission photodetectors optoelectronic and photonic integrated circuits light wave telecommunications optical signal and image processing optical computing nonlinear and integrated optics space time Fourier optics optical metrology and sensing and optical interconnects All chapters are written in the style of a textbook containing tutorial sections which should be of great use to graduate students The volume should serve as an excellent book for graduate level course on optoelectronics modern optical engineering and optical communications

**October 16** Görlich,2022-01-19 No detailed description available for October 16

*International Conference on Infrared Physics (CIRP)* T.S. Moss,2013-10-22 International Conference on Infrared Physics CIRP is a collection of papers from the proceedings of a conference held in Zurich on August 11 15 1975 The book reviews the study of thermal radiation with emphasis on the spectral energy density of small blackbody cavities The text also deals with the concept of density of states of quantum size effects in statistical mechanics of finite non interacting systems One paper discusses the interaction of radiation with matter while another presentation reviews the theory of cavity radiation based on multiple reflections within the cavity The book then presents developments in infrared detectors particularly the performance of photon and thermal detectors in the heterodyne mode One paper examines the materials that can be used for making filters in the far infrared region using a Michelson interferometer to determine the region of spectra and a germanium bolometer as the detector The book then cites an example where a high resolution Michelson interferometer is used on a NASA C141 infrared airborne telescope where scientists study the far infrared emission lines from the HII regions The collection will prove useful to nuclear physicists and scientists academicians and researchers whose works are concerned with infrared physics and engineering

**2D Materials for Infrared and Terahertz Detectors** Antoni Rogalski,2020-10-25 2D Materials for Infrared and Terahertz Detectors provides an overview of the performance of emerging detector materials while also offering for the first time a comparison with traditional materials used in the fabrication of infrared and terahertz detectors Since the discovery of graphene its applications to electronic and optoelectronic devices have been intensively researched The extraordinary electronic and optical properties allow graphene and other 2D materials to be promising candidates for infrared IR and terahertz THz photodetectors and yet it appears that the development of new detectors using these materials is still secondary to those using traditional materials This book explores this phenomenon as well as the advantages and disadvantages of using 2D materials Special attention is directed

toward the identification of the most effective hybrid 2D materials in infrared and terahertz detectors as well as future trends. Written by one of the world's leading researchers in the field of IR optoelectronics, this book will be a must read for researchers and graduate students in photodetectors and related fields. Features: Offers a comprehensive overview of the different types of 2D materials used in fabrication of IR and THz detectors and includes their advantages/disadvantages. The first book to compare new detectors to a wide family of common commercially available detectors that use traditional materials.



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