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Cambridge Illustrated Handbook of Optoelectronics and Photonics

A one-of-a-kind illustrated encyclopedic handbook of important terms in photonics and optoelectronics, covering a wealth of material from fundamental concepts to cutting-edge applications.

Self-contained descriptions of common tools and phenomena are provided for undergraduate and graduate students, scientists, engineers and technicians in industry and laboratories.

The book strikes a balance between materials and devices-related coverage and systems-level terms, and captures key nomenclature used in the field. Equations are used where necessary, but lengthy derivations are avoided. Over 600 illustrations help to convey key concepts, creating an attractive, easy-to-use reference.

Safa Kasap is a Professor and Canada Research Chair in the Department of Electrical and Computer Engineering at the University of Saskatchewan, Canada, and has been making original research contributions to electronic and photonic materials and devices, and their applications in optical communications and x-ray imaging, for over 20 years.

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Preface

The present work is an illustrated encyclopedic handbook of important terms and effects from fundamental concepts to applications in optoelectronics and photonics, including optical communications. We tried to define and describe terms from materials to devices to systems, as photonics is still in its early stages of evolution compared with microelectronics and today's billion-transistor chips, and systems on chips. It is *not* meant to be a comprehensive encyclopedia or a dictionary in this field but rather a self-contained semiquantitative description of terms and effects that frequently turn up in optoelectronics and photonics courses at the undergraduate and graduate levels. There is nothing worse than a dry reference book with no illustrations. We prepared numerous illustrations to convey the message as clearly as possible. There is an old Chinese adage that a good diagram is worth a thousand words but a bad diagram takes a thousand words to explain. Nearly all the illustrations have been prepared almost from scratch to be as self-explanatory and as clear as possible. In writing such an *encyclopedic handbook* we had to choose between short and quick definitions and definitions that encompass an extensive explanation; the choice was based on whether a term can be defined simply and still be useful, e.g. the acceptance cone of a fiber, or whether the term needs at least one page of explanations to be fair to the term and the reader, e.g. photonic crystals. In addition, we had to draw a distinction between an optics handbook and what we had in mind as a useful encyclopedic handbook for optoelectronics and photonics. We have missed many terms but we have also described many, through, undoubtedly, our own biased selection. In our own view there is not a huge difference between optoelectronics and photonics, except that in the latter there may not be any electronics involved. Today, photonics is a more fashionable term than the old optoelectronics term which usually conjures images of LEDs, solar cells, optoisolators, etc., whereas photonics is closely associated with optical communications and optical signal processing. True photonics is supposed to be a subject based on photons, or electromagnetic radiation, only; but, in practice, it is impossible to avoid electrons when photons have to be generated or detected.

"After a year's research one realises that it could have been done in a week"

Sir William Henry Bragg (1862–1942)