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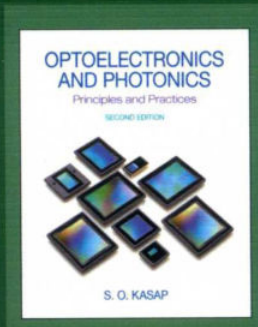
Optoelectronics and Photonics

Principles and Practices, Second Edition



光电子学与光子学

——原理与实践（第二版）

（英文版）

［英］ S. O. Kasap 著

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内容简介

本书是光电子和光子学领域的经典教材，主要内容包括光的波动性、介质波导与光纤、半导体学与发光二极管、受激辐射器件——光放大器和激光器、光电探测器和图像传感器、光的偏振和调制等。每章除基本内容以外，还给出了一些附加专题来适当介绍先进技术和产品化光电子器件的实例，扩大和深化读者对基本内容的理解。本书力求采用尽可能少的数学推导而强调通过物理概念来说明原理，提供了许多例题和习题，使得基本概念与实际器件相联系。已根据采用此经典教材授课的一些教师的反馈意见，对书中内容进行了少量勘误。

本书可作为光电子科学与技术、电子科学与技术、物理电子学专业高年级本科生或研究生的双语教学用书，同时也适合从事相关行业的科技工作者和教师阅读参考。

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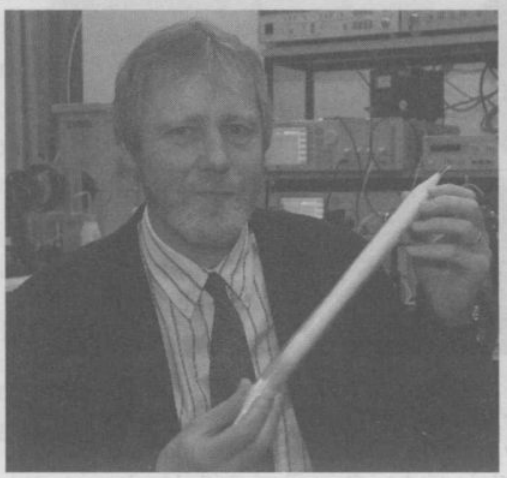
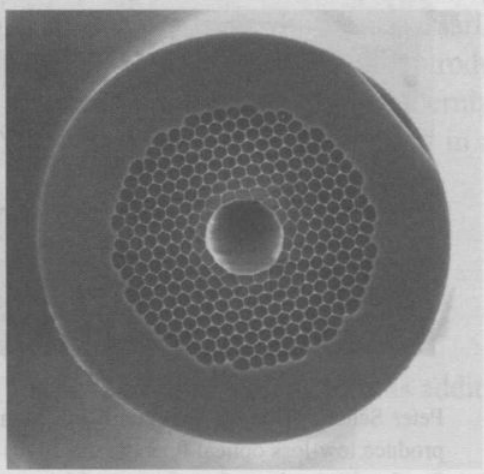
We have a habit in writing articles published in scientific journals to make the work as finished as possible, to cover up all the tracks, to not worry about the blind alleys or describe how you had the wrong idea first, and so on. So there isn't any place to publish, in a dignified manner, what you actually did in order to get to do the work.

—RICHARD P. FEYNMAN
NOBEL LECTURE, 1966





Philip Russell led a team of researchers at the University Bath in the 1990s where photonic crystal fibers were drawn. Thin hollow capillary tubes were stacked together and then fused to make a preform as shown on the left. A photonic crystal fiber was then drawn at a high temperature from this preform. Photonic crystal fibers have the ability to guide light endlessly in a single mode, and have highly desirable nonlinear properties for various photonics applications in the manipulation of light, such as the generation of supercontinuum light. (*Courtesy of Professor Philip Russell.*)

Peter Schultz, Donald Keck, and Bob Maurer (left to right) at Corning were the first to produce low-loss optical fibers in the 1970s by using the outside vapor deposition method for the fabrication of preforms, which were then used to draw fibers with low losses. (*Courtesy of Corning.*)

To Nicolette, *who brightens my every day*
and makes me smile with joy every time I see her.

PREFACE

The first edition of this book was written more than 12 years ago. At the time it was meant as an easy-to-read book for third-year engineering or applied physics undergraduate students; it emphasized qualitative explanations and relied heavily on intuitive derivations. As things turned out, the first edition ended up being used in fourth-year elective classes, and even in graduate courses on optoelectronics. Many of the instructors teaching at that level rightly needed better derivations, more rigor, better explanations, and, of course, many more topics and problems. We have all at one time or another suffered from how wrong some intuitive short-cut derivations can be. The second edition was therefore prepared by essentially rewriting the text almost from scratch with much better rigor and explanations, but without necessarily dwelling on mathematical details. Many new exciting practical examples have been introduced, and numerous new problems have been added. The book also had to be totally modernized given that much had happened in the intervening 12 years that deserved being covered in an undergraduate course.

FEATURES, CHANGES, AND REVISIONS IN THE SECOND EDITION[①]

The second edition represents a total revision of the first edition, with numerous additional features and enhancements.

- All chapters have been totally revised and extended.
- Numerous modern topics in photonics have been added to all the chapters.
- There are Additional Topics that can be covered in more advanced courses, or in courses that run over two semesters.
- There are many more new examples and solved problems within chapters, and many more practical end-of-chapter problems that start from basic concepts and build up onto advanced applications.
- Nearly all the illustrations and artwork in the first edition have been revised and redrawn to better reflect the concepts.
- Numerous new illustrations have been added to convey the concepts as clearly as possible.
- Photographs have been added, where appropriate, to enhance the readability of the book and to illustrate typical modern photonic/optoelectronic devices.
- The previous edition's Chapter 7 on photovoltaics has been incorporated into this edition's Chapter 5 as an Additional Topic, thus allowing more photonics-related topics to be covered.
- Advanced or complicated mathematical derivations are avoided and, instead, the emphasis is placed on concepts and engineering applications.
- Useful and essential equations in photonics are given with explanations and are used in examples and problems to give the student a sense of what typical values are.
- Cross referencing in the second edition has been avoided as much as possible, without too much repetition, to allow various sections and chapters to be skipped as desired by the reader.
- There is greater emphasis on practical or engineering examples; care has been taken to consider various photonics/optoelectronics courses at the undergraduate level across major universities.

① 采用本书作为教材的授课教师，可联系 te_service@phei.com.cn 获取相关教辅资料。