

# Heteroepitaxial Semiconductors for Electronic Devices

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Springer Science+Business Media, LLC

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Library of Congress Cataloging in Publication Data

Main entry under title:

Heteroepitaxial semiconductors for electronic devices.

1. Semiconductor films—Addresses, essays, lectures. 2. Crystallography—Addresses, essays, lectures. 3. Semiconductors—Addresses, essays, lectures. I. Cullen, Glenn Wherry, 1932– II. Wang, Chih-Chun, 1932–  
TK7871.15.F5H47 621.381'71 77-21749

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© 1978 by Springer Science+Business Media New York  
Originally published by Springer-Verlag New York Inc. in 1978  
Softcover reprint of the hardcover 1st edition 1978

9 8 7 6 5 4 3 2 1

ISBN 978-1-4612-6269-5 ISBN 978-1-4612-6267-1 (eBook)  
DOI 10.1007/978-1-4612-6267-1

*To our management,  
who feel that communication  
with our scientific colleagues  
is part of our job.*

## Preface

Some years ago it was not uncommon for materials scientists, even within the electronics industry, to work relatively independently of device engineers. Neither group had a means to determine whether or not the materials had been optimized for application in specific device structures. This mode of operation is no longer desirable or possible. The introduction of a new material, or a new form of a well known material, now requires a close collaborative effort between individuals who represent the disciplines of materials preparation, materials characterization, device design and processing, and the analysis of the device operation to establish relationships between device performance and the materials properties. The development of devices in heteroepitaxial thin films has advanced to the present state specifically through the unusually close and active interchange among individuals with the appropriate backgrounds. We find no book available which brings together a description of these diverse disciplines needed for the development of such a materials-device technology. Therefore, the authors of this book, who have worked in close collaboration for a number of years, were motivated to collect their experiences in this volume. Over the years there has been a logical flow of activity beginning with heteroepitaxial silicon and progressing through the III-V and II-VI compounds. For each material the early emphasis on material preparation and characterization later shifted to an emphasis on the analysis of the device characteristics specific to the materials involved. It has been an exciting period of experimental activity for us, and we hope that the readers will share our enthusiasm. Some of the materials described are now being used in commercially available device structures. Some of the materials must be further developed in order to be useful for commercial application. It is also the hope of the authors that some readers will see potential in the less well developed heteroepitaxial materials systems, and identify applications which will justify the effort needed for further development.

Many of the authors' colleagues at RCA Laboratories, too numerous to mention, have contributed to this technology. Clearly there have been experimentalists active in other laboratories who have made major contributions, and we have made every effort to identify them in the text. We

would like to recognize the efforts of Professor M. Schieber and Dr. S. Larach for their liaison with the publisher and reviewers. We are very appreciative of the many excellent suggestions offered by reviewers affiliated with other research centers. Prior to the delivery of the manuscript to the publisher, Barbara Kerler worked with the authors in the assembly and layout of the book. Her skill and dedication have been a tremendous help and are much appreciated.

Princeton, N. J.

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C. C. Wang

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