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# Topics in Applied Physics

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Kong-Thon Tsen (Ed.)

# Ultrafast Dynamical Processes in Semiconductors

With 190 Figures



Springer

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## Preface

This book is made up of recent new developments in the field of ultrafast dynamics in semiconductors with particular emphasis on its applications. It consists of eight chapters. The Chapter by *Jie Shan* and *Tony F. Heinz* reviews the different schemes for generating THz radiation using photoconductive emitters excited by femtosecond lasers. The Chapter by *Dzmitry A. Yarotski* and *Antoinette J. Taylor* deals with principles and applications of ultrafast scanning tunneling microscopy. The Chapter by *Han Htoon* and *Chih-Kang Shih* is devoted to the studies of ultrafast coherent dynamics in semiconductor quantum dots. The Chapter by *Karsten Hannewald*, *Stephan Glutsch* and *Friedhelm Bechstedt* reviews recent progress in the theoretical description of ultrafast phenomena in the spontaneous emission of ultrashort laser-pulse-excited semiconductors. The Chapter by *Kong-Thon Tsen* discusses transient electron and hole transport phenomena as well as electric-field-induced optical phonon instability in semiconductor nanostructures. The Chapter by *Hongxing Jiang* and *Jingyu Lin* demonstrates the use of time-resolved photoluminescence in the studies of ultrafast carrier dynamics in III-nitrides. The Chapter by *Andrea Cavalleri* and *Robert W. Schoenlein* deals with ultrafast structural dynamics in condensed matter studied by femtosecond X-rays. The Chapter by *Gia-Wei Chern*, *Chi-Kuang Sun*, *Gary D. Sanders* and *Christopher J. Stanton* presents theoretical and experimental results on generation of coherent acoustic phonons in nitride-based semiconductor nanostructures.

The editing of a book with eight different chapters involving authors in several countries is not an easy task. The editor would like to thank all the authors for their patience and cooperation. I would also like to thank Drs Claus Ascheron and Werner Skolaut of Springer-Verlag (Heidelberg) for help in many different aspects of this book. Last but not least, I wish to express my appreciation to my wife Shu-Chen and children, David and Diana, for their encouragement, understanding, and support.

Tempe, Arizona, November 2003

*Kong-Thon Tsen*



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