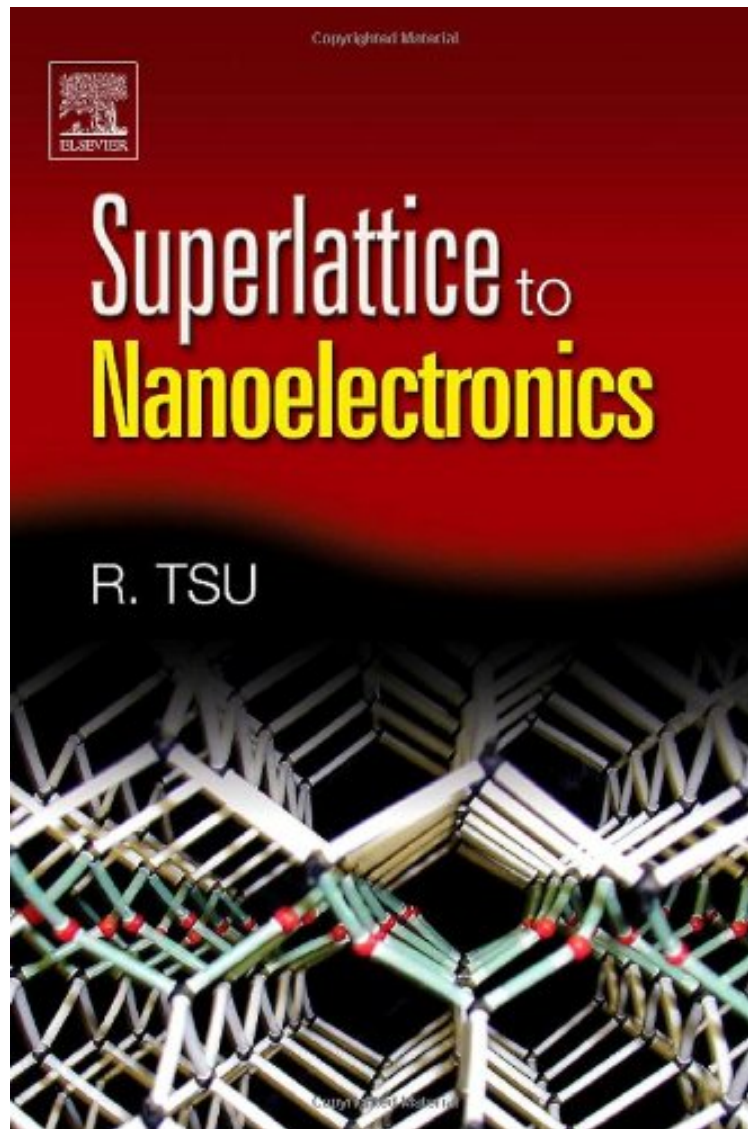


Superlattice to Nanoelectronics

Raphael Tsu

*ebooks / Download PDF / *ePub / DOC / audiobook*



DOWNLOAD



READ ONLINE

#7303160 in Books 2005-06-02Original language:EnglishPDF # 1 9.21 x .81 x 6.14l, 1.10 #File Name: 008044377X325 pages | File size: 30.Mb

Raphael Tsu : Superlattice to Nanoelectronics before purchasing it in order to gage whether or not it would be worth my time, and all praised Superlattice to Nanoelectronics:

2 of 2 people found the following review helpful. making a material atom by atomBy W BoudvilleAs a graduate student in the 80s, we dealt with semiconductors and specifically with superlattices. This was the then cutting edge concept of making new materials by depositing layer by layer atoms onto a substrate. Making a compound with designable properties like a desired transmission profile as a function of wavelength. Tsu's book shows hows the concept segued from superlattices to nanoelectronics in some 25 years.Part of this is simply a change in terminology.

The prefix nano became trendy in several areas, with a wider following than superlattices. Hence at some level there was a rebranding. However the book is also good at explaining the basic quantum mechanics of how you tailor a material when you can (try to) control its deposition atom by atom. The background needed for the text is two years of undergraduate quantum mechanics, with some thermodynamics and electromagnetism. One consideration is that the next edition of this book is already out. Much work in the field, and if you are going for research, get that edition.

Superlattice to Nanoelectronics provides a historical overview of the early work performed by Tsu and Esaki, to orient those who want to enter into this nanoscience. It describes the fundamental concepts and goes on to answer many questions about today's 'Nanoelectronics'. It covers the applications and types of devices which have been produced, many of which are still in use today. This historical perspective is important as a guide to what and how technology and new fundamental ideas are introduced and developed. The author communicates a basic understanding of the physics involved from first principles, whilst adding new depth, using simple mathematics and explanation of the background essentials. Topics covered include * Introductory materials * Superlattice, Bloch oscillations and transport * Tunneling in QWs to QDs * Optical properties: optical transitions, size dependent dielectric constant, capacitance and doping * Quantum devices: New approaches without doping and heterojunctions - quantum confinement via geometry and multipole electrodes. Issues of robustness, redundancy and I/O. Researchers, course students and research establishments should read this book, written by the leading expert in nanoelectronics and superlattices. * The Author is one of the founders of the field of superlattices* The FIRST historical overview of the field* Provides a basic understanding of the physics involved from first principles, whilst adding new depth, using simple mathematics and explanation of the background essentials

"Tsu follows the development of superlattices and quantum wells from their inception in 1969. He expects readers to have working knowledge in basic mathematics such as complex variables and partial differential equations; some skill in computer programming; and intermediate to advanced courses in electromagnetics, quantum mechanics, and solid-state and semiconductor physics. Starting with superlattices, he progresses through resonant tunneling with artificial quantum well states; optical properties and Raman scattering in artificial quantum systems; dielectric function and doping of a superlattice; quantum step and activation energy; semiconductor atomic superlattices; silicon quantum dots; capacitance, dielectric constant, and doping quantum dots; porous silicon; some novel devices; the quantum impedance of a electrons; and why super and why nano."--Reference and Research Book News "This book is an update of a volume by the same name first published in 2005. It does form one of the most definitive descriptions of the physics underlying these new materials. It is also more than that, because it gives readers a lot of fresh insight to the behaviour of electrons in crystalline solids. Much of this book is ideal for assisting lecturers and tutors in putting across some of the more difficult concepts to advanced students Overall some of the new additions make fascinating reading because Tsu relates to the reader in a very personal style."--Contemporary Physics About the Author Dr. R. Tsu started his professional career at the Bell Telephone Laboratories, Murray Hill, NJ, 1961, working on the theory and experiments related to electron-phonon interaction in piezoelectric solids. He became a close collaborator of Leo Esaki (Nobel Laureate in 1973) at IBM T.J. Watson Research Center where he joined in 1966, working on theory and experiments of optical- and transport-properties, band structures, in solids, and material characterization. A man-made semiconductor superlattice and modulation doping were conceived jointly with Esaki, in 1969, which led to a rapid development of man-made quantum materials and quantum structures eventually evolved into the present day quantum dots. His original formulation of tunneling through multiple man-made heterojunctions is widely accepted in nearly all aspects of resonant tunneling devices reaching Tera-Hertz, thus far being the fastest device to date. The theory and experiments of man-made superlattices and resonant tunneling through a quantum well led to his outstanding contribution award from IBM Research in 1975 and later in 1985, to sharing the International New Materials Prize of the American Physical Society with Esaki and Chang. In 1979, he became the head of Materials Research at Energy Conversion Devices, Inc., in charge of the study on the formation and structure of amorphous silicon. His major contributions involve the determination of bond angle distribution from Raman scattering and optical absorption measurements and experimental determination of conductivity percolation. In 1985, he became the head of the amorphous silicon research group at the Solar Energy Research Institute (now NREL) as a principal scientist, working on amorphous Si/Ge and Si/C alloys, showing that the famous Tauc's plot may be theoretically derived without adjustable parameters. In 1975, as the recipient of the Alexander von Humboldt award, he took a year sabbatical at Max Planck Institute for Solid State Physics in