

<<纳米结构>>

图书基本信息

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前言

This book is an introduction to the theory of nanostructures . Its main objectives are twofold : to provide basic concepts for the physics of nano-objects and to review theoretical methods allowing the predictive simulation of nano-devices . It covers many important features of nanostructures : electronic structure , dielectric properties , optical transitions and electronic transport . Each topic is accompanied by a review of important experimental results in this field . we have tried to make the book accessible to inexperienced readers and it only requires basic knowledge in quantum mechanics and in solid state physics . Whenever possible , each concept is introduced on the basis of simple models giving rise to analytical results . But we also provide the reader with the more elaborate theoretical tools required for simulations on computers . Therefore , this book is intended not only for the students beginning in this field but also for more experienced researchers . The context of the book is the rapid expansion of nano-technologies resulting from important research efforts in a wide range of disciplines such as physics , biology and chemistry . If much work is presently focusing on the elaboration , the manipulation and the study of individual nano-objects , a major challenge for nano . science is to assemble these objects to make new materials and new devices , opening the door to new technologies . In this context , as the systems become more and more complex , and because probing the matter at the nanoscale remains a challenge , theory and simulation play an essential role in the development of these technologies.

A large number of simulation tools are already available in science and technology but most of them are not adapted to the nano-world because , at this scale , quantum mechanical descriptions are usually necessary , and atomistic approaches become increasingly important . Thus , one main objective of the book is to review recent progress in this domain . We show that ab initio approaches provide accurate methods to study small systems ($\approx 100-1000$) .

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内容概要

纳米科学的进展正在越来越依赖计算与模拟。

这取决于三个因素的结合：减小纳米物质的尺寸、增强计算机的能力、发展新的理论。

本书主要介绍了纳米结构体系中电子结构、介电性质、光学转换、电学输运的基本物理概念、理论方法、重要实验结果及其理论分析与模拟计算，是一本较为系统的、有使用价值的理论专著。

本书对从事纳米科技多学科交叉领域的高年级本科生、研究生及相关的科研教学人员具有重要的参考价值。

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作者简介

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