

## Introduction

### The physics of solids

The present course is intended above all for higher technical schools with an extended syllabus in physics. The course contains materials to provide the fundamental training of specialists and is the base for mastering the future applied courses of engineering.

The course includes the classical sections of physics of solids: the crystalline structure, dynamics of lattice, band theory of solids, dynamics of motion of electrons through a lattice; conductors, insulators and semiconductors; the defects in crystals, the theory of diffusion, mechanical and electrical properties of materials.

Nowadays in engineering, the theoretical and experimental investigation of non-crystalline matters is being deeply studied that is due to the improving modification methods. Some properties of non-crystalline matter are discussed: first of all the structure and features and behavior of electrons inside them.

The education method of the course is based on the fact that the 'Physics of Solids' is an experimental science developing on conceptions of quantum and atomic physics. The course is based on the experimental data, which define logic of its structure. Consistent analysis of microscopic mechanisms of physics phenomena in solids and modern methods of theoretical physics build the basis needed for specialists to make progress in science and to solve a plenty of engineering and technology problems.

We have made the theoretical aspects of the course as strict as possible and give the conception details in full measure dismissing deductions, which do not give additional physics information concerning the problems under investigation. The reader can use the vast list of literature applied.

The course is the result of ten year's work in the Department of Theoretical and Experimental Physics of the Tomsk Polytechnic University. We are grateful to our colleagues and friends for their helpful discussions, criticism, and advise in the course of the preparation of the book.