

FOREWORD

Physicists have their own way of looking at things. They like to understand what is inside, or behind, what they see. This is not an easy goal to achieve with materials of technological importance, which in most cases have complicated structures and uncommon behaviors. Nevertheless, the modern society needs advanced materials, and the challenge cannot be refused. All over the world physicists apply advanced experimental techniques and sophisticated theoretical methods to the continuing effort of penetrating deeper in the secrets of new materials. This book offers examples of works in progress during 1990, taken from the invited papers presented at the Annual Meeting of the "Settore Metalli e Basse Temperature del Gruppo Nazionale di Struttura della Materia" (Milano, Jan. 17-19, 1990) by distinguished experts coming from Italy and from other European countries.

The choice of the subjects discussed at the Meeting was dictated by the need of exchanging information on some specific research projects in progress in Italy. The disadvantage of this restricted choice is compensated, we hope, by the effort, requested to all contributors of this book, to combine the high scientific level with a style of presentation suitable for readers not familiar with the subject, and to introduce the information on their newest results with a glance on the state-of-the-art in the field.

The book is organized in five chapters, repeating the order of presentation at the Meeting (to our regret, however, some interesting talks have not been converted in written form). Martensitic transformations giving shape memory effects are discussed in the four papers of the first chapter. Chapter 2 includes five papers dealing with different aspects of thermodynamics and structural properties of metastable systems. The theoretical and experimental study of the electronic structure of metallic and ceramic materials is the subject of two papers in chapter 3; special attention is given to the analysis of momentum distributions obtained via 2D angular correlation of the positron annihilation radiation. Chapter 4, formed by three papers, is devoted to interfaces and defects, studied by different experimental techniques (Mössbauer effect, neutron diffraction and thermal effects). Chapter 5 addresses high- T_c superconductors, with four papers dealing in particular with magnetic properties, effects of grain structures, defects produced by fast neutron irradiation, and thin film preparation.

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