

Preface

Many important properties of materials are determined by their microstructure evolved in the course of prior treatment. Therefore characterisation of structures and understanding of structure changes has always been a central problem in any discipline dealing with materials. There is an extremely broad variety of materials: metals, ceramics, glasses, electronic and magnetic materials, polymers, composites etc., still in the structure changes taking place during manufacturing, processing or using these materials some common features and mechanisms were discovered. The basic mechanisms and phenomena underlying these common features in the overwhelming abundance of materials are the subject of many textbooks and monographs on materials science and solid state physics. Therefore the lecturers of this years Eötvös Graduate School, organised regularly every second year for graduate and postgraduate physics students specialising in Materials Physics, concentrated on some selected and more specific problems and on recent advances in the field of structure characterisation and structure development in materials, topics which are beyond the scope of regular courses in Materials Physics. Nevertheless, in consequence of the rapid progress of investigating methods and because of the inevitable relevance of the phenomena considered many of the topics treated here will become part of standard texts in the future.

As pointed out in the paper of Peter de Châtel if we look at structural changes in terms of energy we encounter very small differences, typically in the order of a few percent or less as compared to cohesive energies. With other words stability of one structure with respect to another one is a question of a delicate balance. Basically this is the reason for the many metastable structures already applied and constantly gaining importance.

The invited papers in this volume were written by the lecturers of the Eötvös Graduate School Summer Course held in Budapest from 24 till 29 August 1996. The lecturers of this series of intensive courses are always front-line specialists who are requested to start at a more fundamental level, but end up with the most recent aspects of their respective topic. In this way I hope that the contributions to this volume will be useful for those, who start to get acquainted with the field as well as for those who are already actively working in it.

During the School a Workshop was organised at which the Ph.D. students got an opportunity to present their results in the form of short oral contributions. The best workshop papers are also included in this volume in the form of short communications. Based on the evaluation of the lecturers of the School Zsolt Tőkey, Ph. D. student of the Kossuth University Debrecen and of the University Aix-Marseille III has won the "Best Student Contribution Award" for his paper on "Diffusion in Fe_3Al ".

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