

Preface

Very exciting developments have taken place in the past several years which are revolutionizing the world of materials. The discoveries of high temperature superconducting oxides, nanocrystalline materials and the scanning tunneling microscope with its many variations, to mention a few, have not only stirred material scientists and engineers, but their impact is being felt in all fields of science and technology. For the first time, the traditional limits on electrical conductivity, size of crystallites and atomic resolution have been surpassed and new frontiers have opened for research and applications. In this context, one finds that diffusion of atoms is one of the few areas of materials science which pervades all these developments. It is an established science, but in view of its ubiquitous nature its implications are required to be continually examined as novel materials are discovered and are put to new and stringent applications in modern industry. Therefore, we felt that it was an opportune time to bring together a group of involved scientists and technologists in a symposium to discuss the diffusion problems in new and complex materials. The response from the various laboratories was overwhelming the world over and the symposium truly had an international character.

This volume is the proceedings of the symposium on Atomic Migration and Defects in Materials sponsored by the ASM-MSD Atomic Transport Activity Committee held at Indianapolis, Indiana, on October 2 and 3, 1989. Over several decades of its existence, the Committee has focussed attention on various aspects of diffusion, such as its fundamental nature in condensed systems, methodology of experimental and analytical techniques, and implications in modern technology. Nine presentations were made in the area of superconducting and general oxides, which is remarkable in view of only two years that had elapsed between the discovery of this class of materials and when the call for papers went out. The symposium consisted of an additional 14 presentations on diffusion topics related to nanocrystalline materials, grain boundaries, multicomponent systems, crystalline semiconductors, amorphous metallic and semiconducting systems, etc.

The organizers wish to thank all the authors for diligence in preparing their talks and manuscripts and the staff of Trans Tech Publications for their assistance in publication of these proceedings.

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June 1990

