REFRACTORY MATERIALS

A SERIES OF MONOGRAPHS

VOLUME 6-II

PHASE DIAGRAMS

Materials Science and Technology

VOLUME II

The Use of Phase Diagrams in Metal, Refractory, Ceramic, and Cement Technology

REFRACTORY MATERIALS

A SERIES OF MONOGRAPHS

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MATERIALS SCIENCE AND TECHNOLOGY

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VOLUME II

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DEDICATED TO

Professor Wilbur T. Valentine

for his guidance and instruction in geoscience while I was a student at Brooklyn College.

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Foreword

Perhaps no area of science is regarded as basic in so many disciplines as that concerned with phase transitions, phase diagrams, and the phase rule. Geologists, ceramists, physicists, metallurgists, material scientists, chemical engineers, and chemists all make wide use of phase separations and phase diagrams in developing and interpreting their fields. New techniques, new theories, computer methods, and an infinity of new materials have created many problems and opportunities which were not at all obvious to early researchers. Paradoxically, formal courses and modern, authoritative books have not been available to meet their needs.

Since it is the aim of this series to provide a set of modern reference volumes for various aspects of materials technology, and especially for refractory materials, it was logical for Dr. Allen Alper to undertake this new coverage of "Phase Diagrams: Materials Science and Technology" by bringing together research ideas and innovative approaches from diverse fields as presented by active contributors to the research literature. It is my feeling that this extensive and intensive treatment of phase diagrams and related phenomena will call attention to the many techniques and ideas which are available for use in the many materials-oriented disciplines.

JOHN L. MARGRAVE

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Preface

Many recent advances in materials science and technology have been made by scientists, engineers, and technologists who have used phase diagrams to solve materials problems. Several books have been written on the use of phase diagrams in the heat treatment of metals; however, the use of phase diagrams in other areas of materials science and technology has not been previously compiled. Also, there have been numerous advances in this field in the last five years which have not appeared elsewhere than in this volume.

This volume covers the use of phase diagrams in metals, refractories, ceramics, and cements. Each article has been written by an authority in the field. The contents should be extremely useful to all scientists and engineers who are investigating and developing materials and to those who are using materials. It should also help in the education of materials science students.

The editor wishes to thank Professor John L. Margrave of Rice University and Mrs. Thyrza C. Hanson and Dr. John H. Munier of Corning Glass Works; thanks are also due to Corning Glass Works and Sylvania Electric Products Inc. for their assistance. Special thanks are given to all the authors who have contributed articles to this volume.

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