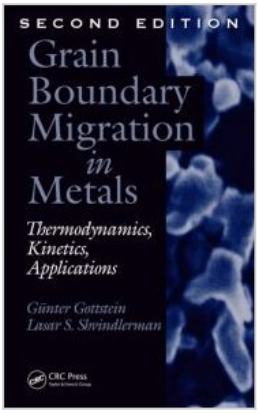

Grain Boundary Migration in Metals: Thermodynamics, Kinetics, Applications, Second Edition (Materials Science & Technology)

By Gunter Gottstein, Lasar S. Shvindlerman

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A major goal of materials science is to create new engineering materials and optimize their cost and performance. Understanding how adjacent materials behave at their borders is an essential part of this process. Grain boundaries are the longest-known crystal defects, but although they were discovered in the mid-eighteenth century, until quite recently, we did not understand them very well. Even now, scientists are still searching for the best ways to comprehensively characterize a material’s microstructure?and accurately predict its evolution and behavior.

Fills the gap between the physics of grain boundary motion and its engineering practicality

Like the popular first edition, **Grain Boundary Migration in Metals: Thermodynamics, Kinetics, Applications, Second Edition** focuses extensively on the thermodynamics, kinetics, and applications involved with individual grain boundary migration in metals. However, this new volume adds a decade’s worth of new developments in research and methods. It offers an up-to-date overview of current knowledge of the grain boundary migration process, and it details how migration influences microstructural evolution, including the recrystallization process and the creation of new materials. The authors rely on well-defined geometry and crystallography to address key topics such as grain growth, textures, and the properties and behavior of grain boundaries, particularly the nonlinear interaction of boundary elements.

This invaluable second edition:

- Covers the latest techniques and computer simulations used in the study of

single-grain boundary motion and grain boundary systems with junctions
- Provides the latest experimental data of grain boundary free volume measurements and offers the first measurements of grain boundary junction line tension
- Includes new problems with solutions

As a solid foundation on which you can build your understanding of the migration phenomenon, this book should be required reading for researchers in areas such as interface physics and materials science of microstructure evolution and property control. It will also be vastly useful to any professional engaged in metals production and/or the heat treatment of metals and alloys.

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Editorial Review

About the Author

Since 1989, **Dr. Gunter Gottstein** has been director of the Institute of Physical Metallurgy and Metal Physics of the RWTH Aachen University, Germany. He obtained his doctoral degree in Metal Physics from RWTH and, following his Habilitation at the Faculty of Mining and Metallurgy of RWTH, he spent about 10 years in the U.S., at Argonne National Laboratory, MIT, and Michigan State University. He was promoted to full professor at Michigan State University in 1985. Prof. Gottstein has published over 400 scientific papers, primarily in refereed journals, on topics such as interfaces, recrystallization, textures, materials modeling, and high-temperature crystal plasticity. He is the author, coauthor or coeditor of 12 books on material science, including a textbook which has been translated into several languages. Since 1991 he has worked closely with his co-author Prof. Shvindlerman on topics of grain boundary migration.

Dr. Lasar S. Shvindlerman is a Leading Scientific Researcher of the Institute of Solid State Physics (ISSP), Russian Academy of Sciences (Chernogolovka, Moscow distr., Russia) and Professor of Metal Physics at the Moscow Institute of Steel and Alloys. He studied Materials Science at the Kiev Polytechnic Institute, and obtained his doctoral degree in 1968 and his Dr. Sci. degree in Metal Physics in 1980. Since 1967, he has been associated with the Institute of Solid State Physics in Chernogolovka. Dr. Shvindlerman has published over 250 scientific papers and three books, primarily on topics of surface phenomena in solids, diffusion in metals, and phase transitions at grain boundaries in metals. Grain Boundary Migration in Metals: Thermodynamics, Kinetics, Applications is the result of his research collaboration with Prof. Gottstein.

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