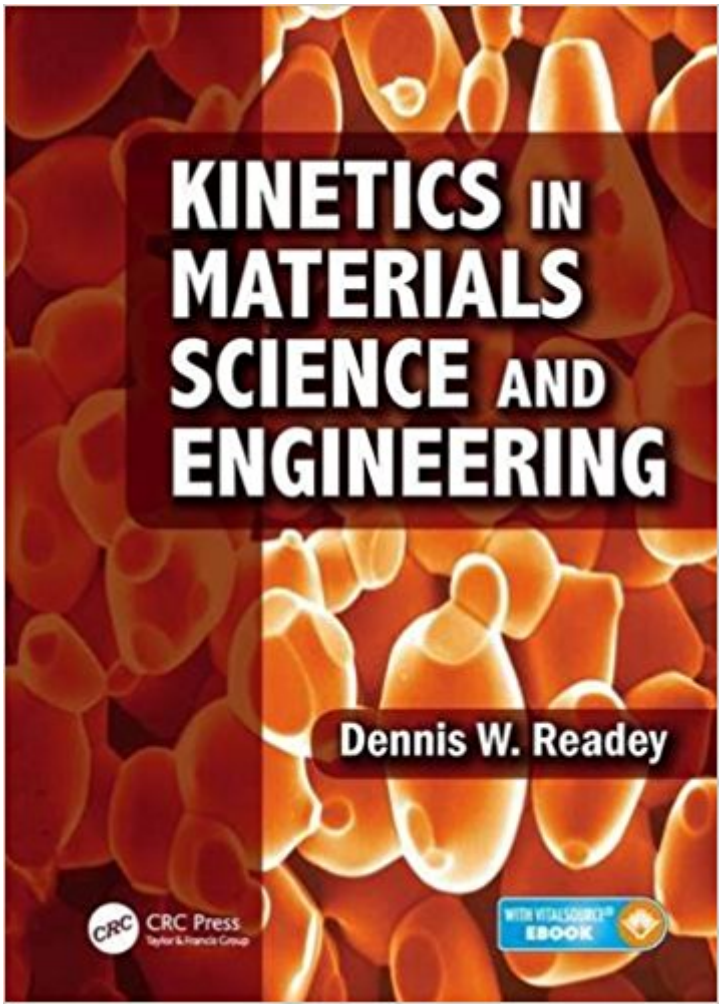
Kinetics In Materials Science And Engineering



Synopsis

"A pedagogical gemâ |. Professor Readey replaces â ˆblack-boxâ ™ explanations with detailed, insightful derivations. A wealth of practical application examples and exercise problems complement the exhaustive coverage of kinetics for all material classes." â “Prof. Rainer Hebert, University of Connecticut "Prof. Readey gives a grand tour of the kinetics of materials suitable for experimentalists and modellersâ |. In an easy-to-read and entertaining style, this book leads the reader to fundamental, model-based understanding of kinetic processes critical to development, fabrication and application of commercially-important soft (polymers, biomaterials), hard (ceramics, metals) and composite materials. It is a must-have for anyone who really wants to understand how to make materials and how they will behave in service." --Prof. Bill Lee, Imperial College London, Fellow of the Royal Academy of Engineering "A much needed text filing the gap between an introductory course in materials science and advanced materials-specific kinetics courses. Ideal for the undergraduate interested in an in-depth study of kinetics in materials." â “Prof. Mark E. Eberhart, Colorado School of Mines This book provides an in-depth introduction to the most important kinetic concepts in materials science, engineering, and processing. All types of materials are addressed, including metals, ceramics, polymers, electronic materials, biomaterials, and composites. The expert author with decades of teaching and practical experience gives a lively and accessible overview, explaining the principles that determine how long it takes to change material properties and make new and better materials. The chapters cover a broad range of topics extending from the heat treatment of steels, the processing of silicon integrated microchips, and the production of cement, to the movement of drugs through the human body. The author explicitly avoids "black box" equations, providing derivations with clear explanations.

Book Information

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Customer Reviews

"Finally a kinetics textbook that covers all materials groups, polymers, metals, and ceramics in depth! Dr. Readey has created a marvel with quantitative resources and highly relevant stories explaining the science and showing the relevance in todayâ ™s society. The book makes it easy to gain knowledge in kinetics. The problems provided enhance the active learning of the student. All materials students should read this book at some point in their studies. â | I will definitely recommend it to my students and colleagues."â •Wolfgang Sigmund, Professor, Department of Materials Science and Engineering, University of Florida Â "Professor Readey gives a grand tour of the kinetics of materials suitable for experimentalists and modellersâ |. In an easy-to-read and entertaining style, this book leads the reader to fundamental, model-based understanding of kinetic processes critical to development, fabrication and application of commercially-important soft (polymers, biomaterials), hard (ceramics, metals) and composite materials. It is a must-have for anyone who really wants to understand how to make materials and how they will behave in service." â •Professor Bill Lee, Imperial College London, Fellow of the Royal Academy of Engineering Â "A pedagogical gemâ |. Professor Readey replaces â ˆblack-boxâ ™ explanations with detailed, insightful derivations. A wealth of practical application examples and exercise problems complement the exhaustive coverage of kinetics for all material classes. A modern textbook that will undoubtedly earn appreciation from instructors and students alike." â •Prof. Rainer Hebert, University of Connecticut Â "a comprehensive textâ |. with clear illustrations, examples and brief historical notes" â •Mahadevan Khantha, Department of Materials Science and Engineering, University of Pennsylvania Â "This book captures the essential importance of kinetics across the field of materials science. The fundamental principles and appropriate applications are well presented." â •Robert L. Opila, Professor, University of Delaware Â "A much needed text filing the gap between an introductory course in materials science and advanced materials-specific kinetics courses. Ideal for the undergraduate interested in an in-depth study of kinetics in materials." â •Mark E. Eberhart, Professor, Department of Chemistry and Geochemistry, Colorado School of Mines Â "presents an in-depth, readily accessible treatment of the fundamentals to students of materials science and engineering. It will be a valuable primary or supplementary textbook for the standard materials kinetics course." â •Jeffrey M. Rickman, Professor, Lehigh University Â "This book fills a

long-standing gap in the education and training of undergraduate MSE students in the field of time-dependent phenomena. The clarity of the examples coupled with the immediacy of the notation will grant to this text the status of â ˆmust-haveâ ™ reference book for any professional in the field." â •Prof. Valter Sergo, Department of Engineering and Architecture, University of Trieste Â "Readey's Kinetics in Materials Science and Engineering is true to its name, treating all materials classes and providing examples for each. He does this very effectively while highlighting the contrasts between diffusion-controlled processes in hard materials and chemical reactions in soft materials." â •Katherine T. Faber, Simon Ramo Professor of Materials Science, California Institute of Technology Â "It was a pleasure to read this book. Itâ ™s refreshing to see a textbook that encompasses all classes of materials with a focus on areas of commonality, and written in a manner that students can follow on their own. â •Sheikh A. Akbar, Professor of Materials Science and Engineering, Ohio State University Â "This textbook goes well beyond related books on kinetics by its educational quality, allowing the student to follow the content by self-instruction; a difficult task given the complexity and breadth of the overall topic remarkably well mastered by Prof. Readey." â •Hans-Joachim Kleebe, Professor and Executive Director, Institute of Applied Geosciences, Technische UniversitÃ¤t Darmstadt Â "In this work, students will find most of the information necessary to understand the research in this wavelength regime. The early chapters focus on astronomical objects and phenomena often studied using THz telescopes, which include the different phases of the interstellar medium (ISM) and star-forming regions found in the ISM. Walker first develops the radiative transfer framework for understanding how interstellar gas clouds absorb and emit light. He then leads readers through specific examples to interpret the THz radiation obtained from different astronomical objects. The latter half of the book focuses on the technology used in THz astronomy. Significant detail is provided about the engineering of THz detectors, which is combined with how these detectors work in practice with both single-dish and interferometer telescopes. The sample problems in each chapter are suitable for upper-level undergraduate or graduate level courses in astronomical techniques."â •Choice Reviews (Chris Palma, Pennsylvania State University)

*Click here for a Q&A session with the author:https://www.crcpress.com/go/9781138732469_authorQA Dennis W. Readey is University Emeritus Professor of Metallurgical and Materials Engineering at the Colorado School of Mines, where he served as the H. F. Coors Distinguished Professor of Ceramic Engineering and Director of the Colorado Center for Advanced Ceramics for seventeen years. Prior to that, he served as

chairman of the Department of Ceramic Engineering at Ohio State University. He has been performing research on kinetic processes in materials for almost fifty years and teaching the subject for over thirty years. Before entering academia, he was a program manager in the Division of Physical Research of what is now the Department of Energy, where he was responsible for funding materials research in universities and national laboratories. Earlier, he was also group leader in the Research Division of the Raytheon Company and in the Materials Division of Argonne National Laboratory. He had been active in the Accreditation Board for Engineering and Technology (ABET) for a number of years representing TMS (The Mining, Minerals, and Materials Society) and served on several government committees including the Space Sciences Board and the National Materials Advisory Board of the National Academy of Sciences. He is a member of several professional societies and is a fellow of ASM International (formerly the American Society of Metals) and a fellow, distinguished life member, and Past-President of the American Ceramic Society. Dr. Readeyâ ™s research has involved gaseous and aqueous corrosion of ceramics, the effect of atmospheres on sintering, the properties of porous ceramics, processing and properties of ceramic-metal composites, and the electronic properties of compounds, particularly transparent conducting oxides and microwave and infrared materials. He advised 29 Ph.D. and 42 M.S. degree theses, which generated about 120 publications and 13 patents. He received a B.S. degree in metallurgical engineering from the University of Notre Dame and a Sc.D. in ceramic engineering from MIT.

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