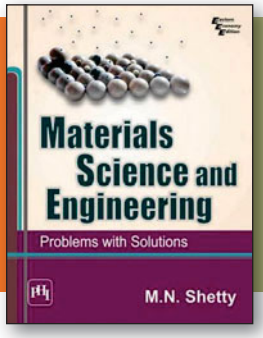


Materials Science and Engineering: Problems with Solutions

M.N. Shetty

PHI Learning, 2016
516 pages, $9.00
ISBN 978-81-203-5109-7

This book presents the solutions of problems and exercises covering a broad range of topics in materials science. It deals with electronic behavior in solids, the nature of bonding, and the corresponding structural, electric, magnetic, and thermal properties of materials. It gives a short introduction to all of these areas and is targeted toward undergraduate students, and possibly teachers from engineering areas, to be used as a backup book with examples that may be used along the entire course. The book is composed of five main chapters. The solution to each problem is performed with each step thoroughly justified, allowing the reader to easily follow the resolution. It is a large compilation of several years of teaching activities.

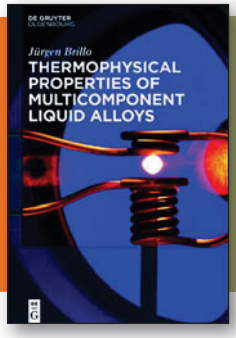
The book has more than 300 solved problems with a huge number of schemes and diagrams. Introductory concepts are given at the beginning of each chapter and during the resolution, and are always based on fundamental concepts taken from referenced sources on each specific topic. The first chapter is the longest one, nearly 190 pages and 90 problems, and presents a short introduction to wave mechanics and to the electronic behavior of materials. The second chapter has 160 pages and 120 problems related to chemical bonding and structural properties of materials. The third chapter focuses on both thermal and electrical properties of materials, although the main focus is on thermal characteristics of materials. This chapter has 84 pages and 28 problems. The fourth chapter is mainly dedicated to magnetic properties and has 36 pages and 14 problems. It does not give an exhaustive explanation, but covers the basics of magnetism. The last chapter has only 17 pages and nine problems and is mainly devoted to dielectrics and a specific ferroelectric material: $BaTiO_3$.

The organization of the book seems to be a bit unbalanced with two very long first chapters and ending with two much shorter ones. Also, the subdivision of topics makes it difficult to clearly identify the location of a specific theme in the book, such as electrical properties of materials. An equilibrium could have been reached by merging some details in a common chapter devoted to electrical properties of materials, gathering the Hall effect and electric properties of semiconductors from the first chapter along with the electrical conductivity from the second chapter and the dielectric and ferroelectric materials from the last chapter.

The book presents pictures and schematics along with the text that are very helpful. They are all diagrams and schematics in black and white and allow for clear reading.

The book has only 40 references, and they are not referenced in the body of the text, making it difficult to know where to get more insight or information on any specific topic. It is not clear if the problems are the author's own ones or if they were adapted from other sources. If the latter, then source references should have been explicitly mentioned. References are from older books and are not up to date (the most recent is from 2000). Aside from this, it is an excellent resource for students and teachers in materials science and engineering.

***Reviewer: Joana Vaz Pinto** of the Universidade Nova de Lisboa, Portugal.*



Thermophysical Properties of Multicomponent Liquid Alloys

Jürgen Brillo

De Gruyter Oldenbourg, 2016
254 pages, $140.00 (e-book $140.00)
ISBN 978-3-11-046684-3

This is a small and very interesting book on thermophysical properties of liquid metals and their alloys. The author draws from his extensive experience on measuring properties of liquid metals to propose—and many times to develop—relationships between the thermodynamic properties and the density (molar volume), surface tension, and viscosity of pure liquid metals and some of their alloys. His approach is based on the well-established subregular solution model, which assumes that the excess thermodynamic properties of the alloys may be a function of temperature and composition. The thermodynamic model is semiempirical but has a large amount of assessed data from different research groups up to 2014, so it provides a robust approach to explain the liquid properties.

The book is structured with eight chapters and two appendices. The first chapter outlines the four questions that are answered within the book and provides the basis to use the experimental data to design new metallic alloys. Brillo aims to (1) find a general rule for the mixing behavior, (2) establish relationships between the excess thermophysical properties and thermodynamics, (3) correlate thermophysical properties of