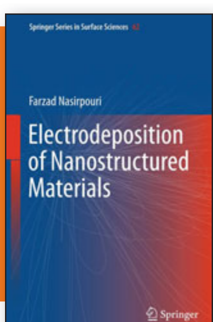
Chapters 6 and 7 represent the heart of the book: the deduction of the entropy of an ideal gas from SMI and the interpretation of the entropy change for some spontaneous processes in terms of SMI. These chapters argue that SMI provides the same function for the entropy of an ideal gas apart from a multiplicative constant, hence the entropy of an ideal gas is a measure of the information distributed among the gas particles: their number, energy, and volume. The last chapter of the first part deals with the basic formalism of thermodynamics and generalizes the previous theory with some constraints.

The second part of the book, chapters 9 to 12, presents thermodynamic applications on phase rule, phase diagram, mixtures and solutions, chemical equilibrium, pure water, and water solutions. The chapter on phase rule and phase diagrams covers the derivation of the Gibb's phase rule and its application for non-reacting and reacting systems, the coexistence of two phases in one-component systems, and a brief description of the two-component system. The chapter on mixtures and solutions provides an unusual approach to the thermodynamics of solutions using the pair correlation function (i.e., radial distribution function) and the Kirkwood–Buff theory to explain some properties and the interaction between different solute molecules with their environment. The chapter on chemical equilibrium derives the general equilibrium condition for a reaction and its dependence on pressure and temperature. The final chapter is devoted to water and aqueous solutions. It presents the different water phases and water properties as an equilibrium mixture of two species with low and high local density.

Edwin T. Jaynes provided the first connection of SMI to statistical thermodynamics in 1957 (*Phys. Rev.* **106** (4), 630). It was a mathematical approach without simple examples. Ben-Naim and Casadei have provided a more didactic approach. This book may not be considered a textbook for a normal graduate course on thermodynamics, though there are exercises throughout the book with solutions in the appendix. The figures are simple, but they provide important support for the text. The references are adequate. This book is a must for physicists, chemists, engineers, and people with some knowledge of mathematics who want to deepen their understanding of thermodynamic entropy and applications.

***Reviewer: Roberto Ribeiro de Avillez** of the Pontifícia Universidade Católica do Rio de Janeiro, Brazil.*



Electrodeposition of Nanostructured Materials
Farzad Nasirpouri
Springer, 2017
325 pages, $179.00 (e-book $139.00)
ISBN 978-3-319-44919-7

Nanostructured materials include zero-dimensional, one-dimensional, two-dimensional (2D), and three-dimensional (3D) nanoscale materials. They have attracted considerable attention for a few decades due to the very different physical and chemical properties from the bulk properties. There are many methods for synthesis of nanostructured materials. Among them, electrochemical deposition (i.e., electrodeposition), which has been widely used in the plating industry for anticorrosion and decorative applications in metals and alloys, has been successfully used in the growth of a wide range of nanoscale materials in recent years. Electrodeposition is an effective and low-cost method for mass production of nanomaterials.

This book gives an excellent introduction to electrodeposition of nanostructured materials, from basic concepts to practical applications. The author has more than 15 years of research experience on the electrodeposition of coatings and nanostructures. This book combines the information and knowledge in the literature as well as the research experience and results of the author.

The book comprises eight chapters. Chapter 1 gives an introduction to nanostructured materials with their concepts and classifications. Chapter 2 provides an overview of electrochemistry with a focus on basic knowledge. Chapter 3 introduces the fundamentals and principles of electrodeposition and details the process. By using the electrodeposition method, many kinds of nanostructured materials can be deposited. Chapters 4–8 discuss the growth of various nanomaterials by electrodeposition, including 2D and 3D meso- and nanostructures, nanowire arrays, nanocrystalline films and coatings, nanocomposite films, and miscellaneous nanostructures, respectively. These five chapters also cover nanoscale materials, deposition processes, measurements and evaluation, and applications. References are provided at the end of each chapter. An index is given at the end of the book.

This book provides a clear and comprehensive introduction to electrodeposition of nanostructured materials, from fundamental principles to recent advances. The figures and tables are adequate, and the book provides problem sets. As the author states, "this book is prepared to disseminate the major factors and principles of electrodeposition towards the fabrication of nanostructured materials as a unique reference." The author succeeded in doing this. I recommend this book to all interested in electrodeposition and nanostructured materials, particularly to those entering the field. The book is suitable as a text for a graduate course. In addition, it is a good monograph for researchers with a chemistry, physics, or materials background.

***Reviewer: Jianguo Lu** is an associate professor at Zhejiang University, China.*

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