

### Nanoporous Metals for Advanced Energy Technologies

Yi Ding and Zhonghua Zhang

Springer, 2016

223 pages, \$129.00 (e-book \$99.00)

ISBN 978-3-319-29747-7

This book focuses on an important part of advanced materials (i.e., nanoporous materials), with an emphasis on the ongoing energy technologies. It encompasses the various nanoporous metals (NPMs) that have been studied in the past and further describes their utilization in energy technologies. The book systematically explains recent energy generation and storage technologies where NPMs play an important role as a constituent entity. The authors cover the utilization of NPMs for fuel cells, supercapacitors, and lithium-battery applications.

Chapter 1 introduces NPMs, and chapter 2 gives further in-depth information with respect to mechanistic as well as methodological formation of various NPMs.

Chapters on fuel cells (chapter 3), supercapacitors (chapter 4), and lithium

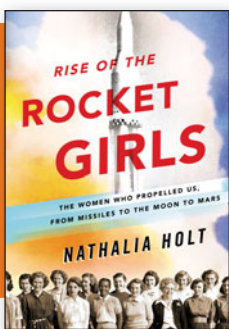
batteries (chapter 5) present work on the importance and utilization of NPMs for these applications. Chapter 3 discusses the importance of NPMs while making a comparison with the existing status of proton-exchange membrane fuel cells and nanoporous gold. The chapter discusses how NPMs form a new class of materials for electrodes. Chapters 4 and 5 on electrochemical energy storage present relevant aspects of electrochemistry. The book explains how NPMs are excellent technological candidates for energy-storage solutions.

Apart from the previously mentioned fields of energy application areas, the authors additionally include specific sections on the use of NPMs for other evolving energy technologies, such as the hydrogen and oxygen evolution reactions. These fields are of tremendous interest and

are one of the frontier research areas where energy generation by water splitting has been discussed. The book clearly guides the reader with respect to the scope of NPMs in research and development.

The book overall demonstrates the status and importance of NPMs in energy technologies. The figures and tables are appropriately chosen and displayed to provide insight into their respective research and technology. Accordingly, the recent status of the work is appropriately cited in relevant references. Further conclusions in the last chapter guide the reader with respect to the prospects of NPMs. This book is valuable to readers who are looking for concise and updated information on all of the advanced energy technologies where NPMs find an application. It is useful to scientists and technologists working in these areas. Some may find this book best suited as a reference book in materials science. It appropriately includes theoretical as well as experimental information relevant to NPM applications.

**Reviewer: Pramod H. Borse** of the *International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), India.*



### Rise of the Rocket Girls: The Women Who Propelled Us, from Missiles to the Moon to Mars

Nathalia Holt

Little, Brown and Company, 2016

352 pages, \$16.99 (e-book \$2.99)

ISBN 9780316338929

*Rocket Girls* is based on Holt's interviews of the female "human computers" of the early days of the Jet Propulsion Lab (JPL). The computers did the calculations, usually by hand, that were needed to help the engineers get the rockets and ultimately spacecraft into space and orbit. The men of the "Suicide Squad" (Frank Malina, Jack Parsons, and Ed Forman), affiliated with the California

Institute of Technology, started experimenting with rockets in the mid-1930s and enlisted one of the wives, Barbey Canright, to do their propulsion calculations. The members of the Suicide Squad went on to help found JPL and became famous aeronautical engineers. However, Canright quit when she had a baby, and that was the end of her career as a human computer. Her colleague, Macie Roberts,

became manager of the computers and developed the policy of exclusively hiring women for the job, and went on to develop a large staff of women.

The book goes on to introduce the stories of many of the women whom Roberts hired. These women's lives were similar to those of mothers today: they struggled with work and family obligations. Their struggle to overcome the mind-set against working mothers is briefly discussed. Unfortunately, the book gives little information about the math they performed and their technical accomplishments, leaving their careers an enigma.

Holt introduces some drama into the book as the women follow the course of funding decisions. Despite JPL's leadership in rocketry, the United States funded a Navy program, Vanguard, as the US satellite program for the International

Geophysical Year (1957–1958). As the Navy program struggled, JPL rejoined the race with the Army's Redstone Arsenal and soon was first in the United States to put a satellite in space (following the Soviet Union's Sputnik).

As JPL set a new course in exploring other planets in the solar system, a new drama emerged with the introduction of machine computers. Holt adequately explains how the women grappled with losing their jobs to automation.

I queried my father, a retired geophysicist, about whether he had come across such women computers in his career. "Yes, of course, we had them at Penn State when I was in graduate school (in the early 1960s). We would give them the calculations for our work, and they would hand back the results. They knew how to run those Friedan computers." One

woman was very talented and ultimately co-authored a paper with my father. Aside from a few such examples, the women computers remained in the background performing calculations.

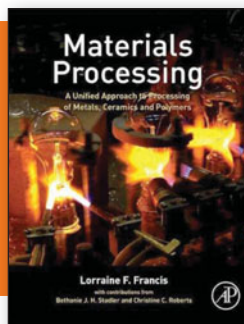
JPL's history with having women computers is still part of its lab culture today; JPL has a relatively high percentage of women engineers. Holt brings all the women together for a reunion—with all but one retired, it was a tearful and joyful event. These women had a lot to be proud of in how they contributed to space research. The fact that they did not boast about their accomplishments is also in line with the space culture, where the ratio of scientists/engineers to famous astronauts is literally in the range of 10,000 to 1.

The reader will get a different perspective about the space race. However, additional reference books are needed

to help understand how all of the subsequent deep space programs fit together. A graph showing the programs' names and the women who worked in them would have been helpful. The writing in the book often wanders aimlessly and could have been improved with additional editing.

While the book could have had a larger impact by going into more details about the technical work and by giving a better perspective on the computing roles for women, Holt manages to capture a history of women in science and engineering that is informative and comprehensive.

**Reviewer: Karen Swider Lyons** *researches fuel-cell and battery materials and their integration into naval systems in Alexandria, Va., USA.*



**Materials Processing:  
A Unified Approach to Processing of  
Metals, Ceramics and Polymers**

Lorraine F. Francis

Academic Press, 2016

614 pages, \$120.00 (e-book \$120.00)

ISBN 9780123851321

This book is an excellent introduction to materials processing for students, researchers, and newcomers to the field. It covers a combination of fundamentals and applications of materials science and engineering, and provides students with comprehensive knowledge supported by solved examples and problems.

Chapter 1 is an introduction to the field of materials processing and provides an overview of metals, ceramics, and polymers. Chapter 2 deals with the preparation, formulation, and characterization of the starting materials for processing. Chapter 3 details the fundamentals and

processing of converting melt to solids; heat transfer through the melting process; solidification; and different types of casting and post-casting processes for metals and glasses. The chapter also includes fundamentals and theoretical background of the extrusion and injection molding processes. Chapter 4 describes the solid deformation processes of metals, polymers, and ceramics, such as deformation under uniaxial tension, deformation with friction, wire drawing, direct extrusion, indirect extrusion, impact extrusion, forging, rolling, bending, thermoforming, and superplastic forming processes.

Chapter 5 covers the fabrication, necessary characterization and investigation of different types of powders, compaction under cold or hot conditions, the fundamentals of solid-state sintering, and the full densification process by cold and hot isostatic pressing. Chapter 6 explains the dispersion and stability of colloidal solutions, the curing of liquid monomers, the different types of shape casting of ceramics and polymers, extrusion, and powder injection molding of ceramics and polymers. The last chapter describes the thermodynamics of vapor processes, thin-film formation, epitaxial growth of single crystals, evaporation of metals and their alloys, the different types of sputtering techniques, and chemical vapor deposition processes.

Overall, this book will serve as an important addition to the libraries of those interested in materials processing and will stimulate a new generation of materials processing techniques.

**Reviewer: Walid M. Daoush** *of Helwan University, Egypt.*

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