# Book Reviews

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**1 Modern Drying Technology**
**by: E. Tsotsas and A.S. Mujumdar**
**Published 2012**
**by Wiley-VCH Verlag GmbH & Co. KgaA**
**Boschstrasse 12, 69469 Weinheim, Germany, 342pp**
**ISBN: 978-3-527-31559-8 (Print)**
**ISBN: 978-3-527-63169-8 (ePDF)**
**ISBN: 978-3-527-63168-1 (oBook)**

The present series is dedicated to drying, that to the process of removing moisture from solids. Drying has been conducted empirically since the dawn of the human race. In traditional scientific terms it is a unit operation in chemical engineering. The reason for the continuing interest in drying and, hence, the motivation for the series concerns the challenges and opportunities. A permanent challenge is connected to the sheer amount and value of products that must be dried either to attain their functionalities, or because moisture would damage the material during subsequent processing and storage, or simply because customers are not willing to pay for water. This comprises almost every material used in solid form, from foods to pharmaceuticals, from minerals to detergents, from polymers to paper. Raw materials and commodities with a low price per kilogram, but with extremely high production rates, and also highly formulated, rather rare but very expensive specialties have to be dried.

The optimistic title should by no means conceal difficulties arising from thermodynamic and economic restraints, but it does express our confidence that modern drying technology can fulfil the task. This confidence stems from a number of available methods, emerging approaches and innovative ideas which can seriously serve significantly contribute to the ultimate goal of energetically efficient drying processes, as presented in the following eight chapters:

- Fundamentals of energy analysis of dryers
- Mechanical solid-liquid separation processes and techniques
- .Energy considerations in osmotic dehydration
- Heat pump assisted drying technology – overview with focus on energy, environment and product quality
- Zeolites for reducing drying energy usage
- Solar drying

- Energy of drying and heat treatment for solid wood and other
- Biomass sources
- Efficient sludge thermal processing: from drying to thermal valorisation.

Due to nature of the topic, the present volume of *Modern Drying Technology* has interdisciplinary links to thermodynamics, energy and environmental engineering, process systems engineering, food engineering, meteorology, forestry, biology and biotechnology, but also to economics. Concerning the scale, single particles and processing equipment (particle systems) are considered, but also production sites and global environmental economic systems.

## 2 Polyurethane Shape Memory Polymers

**by: W.M. Huang, B. Yang and Y.Q. Fu**
**Published 2012**
**by CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, USA, 367pp**
**ISBN: 978-1-4398-3800-6**

Shape memory polymers (SMPs) are some of the most important and valuable engineering materials developed in the last 25 years. These fascinating materials demonstrate a remarkably versatile properties including capacity for actuation and stimulus responsiveness that are enabling technologists to develop applications to be used in the exploration of everything from the outer reaches of space to the inside of the human body.

*Polyurethane Shape Memory Polymers* details the fundamentals of SMP makeup, as well as their shape-recovery features and their seemingly endless potential for use in applications ranging from macro- to submicron scales. With an abundance of illustrations and vivid pictures to explain how SMPs and composites work and how they can be used, this book covers:

- SMP history and most recent developments
- Thermomechanical properties and behaviour of the polymers and their composites
- Modification of SMPs and novel actuation mechanisms
- Large-scale surface pattern generation
- Multi-shape memory effect
- Fabrication techniques
- Characterisation of composites.

A must have reference for anyone working in the materials science and engineering fields, this book outlines the properties such as light weight, low cost, and ability to handle high strain that make the easily processed SMPs so useful in fields including aerospace, biomedicine, and textiles. It is intended to help readers understand and apply the knowledge and techniques presented to develop new innovations that will further benefit society.

The material in this book is valuable for university students, research scientists, and engineers. As an active participant in the SMP technology field in the past decade, I am convinced that this book will play a valuable role in generating a greater awareness of the numerous possibilities presented by this class of unique materials. SMPs are organic polymeric materials that offer actuation, shape memory, and stimulus responsiveness enabling new capabilities for engineering design. The 'smart' nature of these materials represents a new design paradigm and invites us to consider them for use in applications that are not feasible with conventional polymers.

## 3 Vibrations and Waves

**by: G.C. King**
**Published 2009**
**by Wiley-VCH Verlag GmbH & Co. KgaA**
**Boschstrasse 12, 69469 Weinheim, Germany, 228pp**
**ISBN: 978-0-470-01189-8**
**ISBN: 978-0-470-01188-1**

The Manchester Physics Series is a series of textbooks at first-degree level. It grew out of our experience at the University of Manchester, widely shared elsewhere, that many textbooks contain much more material than can be accommodated in a typical undergraduate course; and that this material is only rarely so arranged as to allow the definition of a short self-contained course.

The book contains the following eight chapters:

- Simple harmonic motion
- The damped harmonic oscillator
- Forced oscillations
- Coupled oscillators
- Travelling waves
- Standing waves
- Interference and diffraction of waves
- The dispersion of waves
- Appendix: solutions to problems.

The organisation of the book serves to provide a logical progression from the simple harmonic oscillator to waves in continuous media. The first three chapters deal with simple harmonic oscillation in various circumstances while the last four chapters deal with waves in their various forms. The connecting chapter (Chapter 4) deals with coupled oscillators which provide the bridge between waves and the simple harmonic oscillator. Chapter 1 describes simple harmonic motion in some detail. Here the universal importance of the simple harmonic oscillator is emphasised and it is shown how the elegant mathematical description of simple harmonic motion can be applied to a wide range of physical systems. Chapter 2 extends the study of simple harmonic motion to the

case where damping forces are present as they invariably are in real physical situations. It also introduces the quality factor Q of an oscillating system. Chapter 3 describes forced oscillations, including the phenomenon of resonance where small forces can produce large oscillations and possibly catastrophic effects when a system is driven at its resonance frequency. Chapter 4 describes coupled oscillations and their representation in terms of the normal modes of the system. As noted above, coupled oscillators pave the way to the understanding of waves in continuous media. Chapter 5 deals with the physical characteristics of travelling waves and their mathematical description and introduces the fundamental wave equation. Chapter 6 deals with standing waves that are seen to be the normal modes of a vibrating system. A consideration of the general motion of a vibrating string as a superposition of normal modes leads to an introduction of the powerful technique of Fourier analysis. Chapter 7 deals with some of the most dramatic phenomena produced by waves, namely interference and diffraction. Finally, Chapter 8 describes the superposition of a group of waves to form a modulated wave or wave packet and the behaviour of this group of waves in a dispersive medium. Throughout the book, the fundamental principles of waves and vibrations are emphasised so that these principles can be applied to a wide range of oscillating systems and to a variety of waves including electromagnetic waves and sound waves. There are some topics that are not required for other parts of the book and these are indicated in the text.

## 4 Castable Polyurethane Elastomers

**by: I. Clemitson**
**Published 2008**
**by CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, USA, 250pp**
**ISBN 10: 987 654 321, ISBN 13: 978-1-4200-6576-3**

*Castable Polyurethane Elastomers* is a practical guide to the production of castable polyurethane papers. These papers can be as simple as a doorstop to items used in nuclear and military industries. The book shows the progression from the raw materials needed to produce prepolymers to the production of prepolymers. This will include both the chemistry and the practical side of the production processes.

- The production of polyurethane components is explained from both theoretical and practical aspects, covering the different types of systems available and the reasons for choosing the right system, both on the micro and macro levels. Curing and post-curing operations are also covered.
- The traditionally quoted properties, for example, tensile strength and hardness, are often not the best for selecting the correct system to use. In the section on properties, the importance of using the correct property for the application is explained. The application of polyurethanes in various fields is expanded upon and logic for suitability is discussed. The effect of changes to the original application details is dealt with.
- As the world is not a perfect place, there are sections on problem solving and possible solutions. Throughout the book, there is an emphasis on the health and safety aspects that should be observed at all times.

Offering an inside look at the logic behind the formation of polyurethane components, this work enables material scientists, engineers, and chemists to understand the total production process and reproduce the procedures to achieve desired results.

The book contains the following eight chapters:

- Introduction
- Chemistry
- Prepolymer production
- Hand processing
- Processing
- Polyurethane problems
- Properties
- Applications
- Tools for evaluation
- Health and safety
- Appendix 1–8.

## 5 Polyurethane Casting Primer

**by: I.R. Clemitson**
**Published 2012**
**by CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, USA, 306pp**
**ISBN: 978-1-4398-7921-4**

The aim of Polyurethane Casting Primer is to give details on the casting of polyurethane products and to assist the individual carrying out the work. This book describes how to take a paper successfully without the more comprehensive chemistry as explained in author's earlier book Castable Polyurethane Elastomers. Polyurethanes can be used to make a multitude of items, from very simple, noncritical parts to products that are used in vital engineering applications. The versatility of polyurethane enables a wide range of uses often limited only by the imagination of the user and manufacturer.

- The casting and allied processes are fully explained. Processing may be very simple, from a bucket and paddle mix open pour to a machine pour with postcuring machining, bonding, and painting.
- The care needed to produce quality products continuously is explained. Precautions that must be taken to maintain the health and safety of the workers, both in the short and long term, are described.
- The aim of the book is of a practical nature and meant for day-to-day use.
  The amount of theory is reduced and is separated from the fundamental methods.

- Properties that are regularly specified for polyurethane systems are detailed together with how the results are obtained. Polyurethanes are most often used in compression, and particulars of these tests and typical results are described.
- Successful production in an economical manner needs knowledge of the correct grade and processing to use in order to meet customer requirements. These aims are detailed throughout the primer.
- Even with the best control, 'flops' are produced. The book gives details of how to evaluate what happened and the necessary corrections that should be made.
- Polyurethane Casting Primer is aimed at both professional and subprofessional people who are designing and producing polyurethane products.

The versatility of polyurethane enables a wide range of applications, from simple, noncritical parts to vital engineering products. This book guides manufacturers in designing and producing polyurethane products.

## 6 Handbook of Specialty Elastomers
**by: R.C. Klingender**
**Published 2008**
**by CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, USA, 558pp**
**ISBN: 978-1-57444-676-0**

Written and edited by experts on specialty elastomers applications in the mechanical and automotive products industries, the *Handbook of Specialty Elastomers* provides a single source reference for the design of compounds using specialty elastomers.

This book defines specialty elastomers as heat-, oil-, fuel-, and solvent-resistant polymers. Each chapter examines individual elastomers in terms of development history, chemical composition, structure, and properties as well as processing methods, applications, and commercially available products. Covering their applications in the rubber, energy, chemicals, and oil industries, the book also discusses the use of antioxidants, antiozonants, vulcanisation agents, plasticisers, and process aids for specialty elastomers. The concluding chapter details considerations and relevant processes such as moulding operations involved in designing application-specific rubber components.

*Features*

- Provides a handy guide for experienced rubber chemists developing new products using specialty elastomers.
- Focuses on the characteristics, behaviours, and reactivity of specific elastomers regarding their potential applications.
- Discusses elastomer requirements, using the proper design of drilling and production components of oil and gas wells as an example.
- Examines issues regarding the service-life needs of specialty rubber parts.

- Outlines considerations for moulding operations and other aspects of rubber processing.

The *Handbook of Specialty Elastomers* provides comprehensive insight into the processes and challenges of designing rubber formulations and specialty elastomeric components.