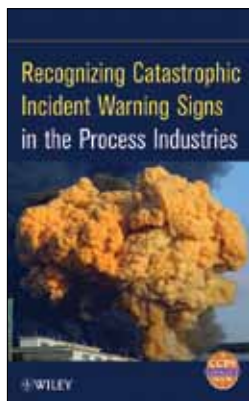




## RECOGNIZING CATASTROPHIC INCIDENT WARNING SIGNS IN THE PROCESS INDUSTRIES



**Center for Chemical Process Safety (CCPS), John Wiley & Sons, Hoboken, NJ, \$125, 264 pages, Dec. 2011, ISBN: 978-0-470-76774-0**

A review of significant incidents in the process industries suggests that most — if not all — incidents were preceded by warning signs. Some of these signs were clearly visible but not acted upon because their significance was not understood. Other warning signs were

less obvious, but observant personnel might have detected them and taken actions to avoid serious problems.

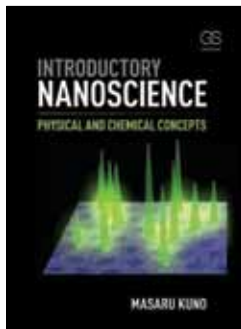
Catastrophic incident warning signs are indicators that something is wrong or about to go wrong. This volume — the latest in AIChE's Center for Chemical Process Safety's (CCPS) Concept Series — is about those warning signs that have preceded or contributed to past incidents. These warning signs share one common characteristic: The organization in question did not recognize them.

The book catalogues more than 160 incident warning signs, and discusses why these signs are so often overlooked. It also provides a template for what needs to be done to ensure that plant personnel at all levels recognize warning signs and take the initiative to do something about them.

The text presents a comprehensive look at how to design and implement effective process safety management (PSM) systems, including instructions on how to recognize and respond to warning signs that precede process incidents. Warning signs explored in the book include process deviations or upsets, instrumentation warnings or alarms, past operating history and incidents, observable problems such as corrosion and unusual odors, audit results indicating that procedures are not being followed, and much more. The book also elaborates on the need for effective safety leadership and a strong safety culture.

The practical advice contained in this guide is designed "to turn anyone in a process plant into a hazard lookout," and can be used by anyone who is interested in improving safety in the workplace. The book will be of particular value to PSM professionals in evaluating their processes and PSM systems, as well as to operators on the front line of defense against process incidents. The book will also be a useful resource to those seeking to develop key performance indicators (KPIs) of how well chemical process safety is being managed.

## INTRODUCTORY NANOSCIENCE: PHYSICAL AND CHEMICAL CONCEPTS



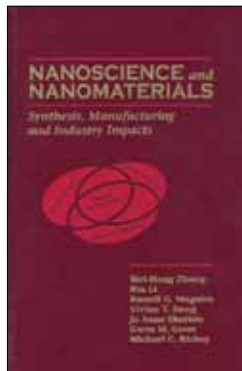
**Masaru Kuno, Garland Science, New York, NY, \$110, 420 pages, Aug. 2011, ISBN: 978-0-815-34424-7**

Based on the author's lectures for upper-level undergraduate and graduate students, this introductory book on nanoscience takes a quantitative approach to describing the physical and chemical principles that make nanomaterials and

nanostuctures special. Rather than attempting to illustrate nanoscience and nanotechnology in an encyclopedic way, the goal of this book is to illustrate the breadth of nanoscience by highlighting key quantitative concepts that underlie the field — including how optical and electrical properties of nanomaterials are dependent upon size, shape, and morphology, and how nanometer-sized objects are constructed.

Through examples, the text shows to what extent the behavior and functionality of nanomaterials can be predicted by understanding how the materials' properties change with scale. Fundamental concepts are reinforced through end-of-chapter problems and further reading lists. The book also includes relevant equations, simplified assumptions for practical calculations, references, and a historical overview of the development of colloidal quantum dots, as well as a lengthy exploration of other topics in quantum mechanics.

## NANOSCIENCE AND NANOMATERIALS: SYNTHESIS, MANUFACTURING AND INDUSTRY IMPACTS



**Wei-Hong Zhong, Bin Li, Jo Anne Shatkin, Russell G. Maguire, Vivian T. Dang, Gwen M. Gross, Michael C. Richey, DEStech Publications, Lancaster, PA, \$150, 317 pages, July 2011, ISBN: 978-1-60595-013-6**

This comprehensive account of nanomaterial synthesis and processing explains the theory and technology involved in introducing nano-based materials as

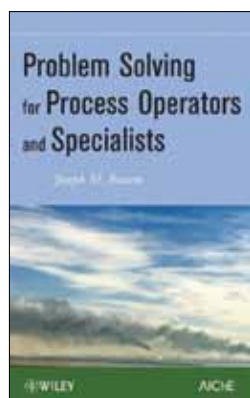
value-added elements in product manufacturing. Readers will learn about the fundamentals of vapor-, liquid-, solid-phase-, and biosystem-assisted nanoparticle syntheses, and receive guidance on selecting the most productive, energy-efficient, and safe methods. The book investigates not only

# Books

the most frequently used nanomanufacturing techniques but also the methods that have been most successful.

With a cross-disciplinary group of scientists, engineers, business leaders, and entrepreneurs as its authors, the book begins with in-depth coverage of the major methods by which nanoparticles are synthesized and incorporated into nanomaterials (e.g., nanoparticles). Nanoscale processing, nanopatterning, and nanometrology are explored. The text then addresses the problems of scaling up from lab-based syntheses to manufacturing, and demonstrates how nanomaterials on the shop floor require new protocols of quality assurance, employee safety, and environmental protection. The book also discusses the challenges involved with nanotechnology commercialization. It concludes with case studies and lessons learned from successful as well as unsuccessful projects to offer insight into the future direction of nanotechnology.

## PROBLEM SOLVING FOR PROCESS OPERATORS AND SPECIALISTS



**Joseph M. Bonem, John Wiley & Sons, Hoboken, NJ, \$85, 344 pages, May 2011, ISBN: 978-0-309-13864-2**

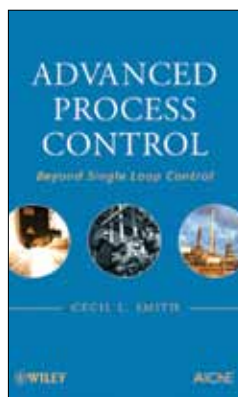
This book stems from the author's belief that there is a need to provide problem-solving training to the new generation of process operators — who can be taught to use basic chemical engineering calculations to solve problems, rather than only relying on experience-based solutions.

The first part of the book is largely devoted to a structured five-step problem-solving technique that combines cause-and-effect problem solving with the formulation of theoretically correct hypotheses. This approach, developed by the author during his more than 50 years of industry experience, emphasizes classical problem-solving (defining the sequence of events), employing steps to verify that the problem actually occurred; writing a clear description of the problem to be solved; developing a working hypothesis; providing a mechanism to test the hypothesis; and providing a foolproof means to eliminate the problem. The book also presents techniques to identify and define problems early, before they progress to the critical level.

The book then delves into how to use fundamental chemical engineering skills to develop a technically correct working hypothesis as the key to problem-solving, with the emphasis on simple pragmatic calculation techniques that are theoretically correct. Throughout the book, the theory

behind each calculation technique is explained. Many sample problems and examples of real-world problem-solving illustrate the use of this approach.

## ADVANCED PROCESS CONTROL: BEYOND SINGLE LOOP CONTROL



**Cecil L. Smith, John Wiley & Sons, Hoboken, NJ, \$100, 450 pages, Aug. 2010, ISBN: 978-0-470-38197-7**

In the preface to this volume, the author presents his favorite definition of advanced control: “Advanced control is what we should be applying in our plants but are not applying, for whatever reason.” The author notes that this definition reflects the reality that what seems advanced to some does

not seem advanced to others.

To address this discrepancy, this book provides engineers with an arsenal of tested and proven techniques for analyzing and troubleshooting process control systems, all of which have been successfully applied in production processes. The author explains how to implement process control, while noting that “process control” is not equivalent to “process safety.” He also examines the economics of applying various control technologies, which can help decision-makers to select the most appropriate technologies for their plant and operations.

This book covers the full range of process control techniques from basic control configurations (practical process control) to model predictive control (MPC). Control technologies discussed include: constraint control (i.e., technologies that maintain a process variable as close as possible to a constraint), including override configurations and valve position control applications; configurations that incorporate process relationships to enhance control performance; multiloop control configurations that account for the degree of interaction between loops; and dead-time compensation and MPC.

In addition to explaining the basic principles behind each technique, the book covers practical considerations such as ensuring a smooth transition from manual operations to automatic operations, and placing limits on control outputs. The author also discusses methods for avoiding windup caused by factors external to the controller.

With its emphasis on advanced control techniques that have been successful in real-world situations, this book will be useful to engineers and technicians responsible for process control in practically any production facility.

CEP