authors) among which are: relatively low cost, good long-term stability, good impact and compressive strength, and high resistance to biodegradation.

The editors describe their book and its contents as follows:

"This book is intended to provide the regulatory and scientific basis for the use of S/S processes, a description of different S/S systems, a description of the testing and evaluation of the materials before and after treatment, and finally a summary of some previous field applications of S/S. Chapter 2 discusses the general guidelines for developing a waste form for a given application, giving two decision flow path schematics. Chapter 3 discusses characterization and classification of waste, an important preliminary step in treating waste or remediation sites. Binders are discussed in Chapters 4 (cement), 5 (polymers), and 6 (phosphate, sulfur polymer cement, gypsum, and hydroceramic). A variety of additives or sorbents are available to minimize interference with the hydration of cement or to enhance the immobilization of contaminants. Common additives or sorbents include activated carbon, zeolites, clays, carbonate, oxidizing agent, reducing agent, sulfides, organoclays, iron, and aluminum compounds. Chapter 7 discusses interactions between contaminants and binders, and Chapter 8 discusses some of the additives used to enhance binder properties or contaminant stabilization. Chapter 9 discusses the microstructure of S/S waste forms. Chapter 10 discusses the leachability from S/S waste forms. Chapter 11 discusses the evaluation of waste forms, their durability, and the test methods used. Chapter 12 discusses QA/QC for S/S. Chapter 13 presents four applications of S/S to real-world problems, one going back three decades that is still relevant today, one a more recent hazardous site, and two at USDOE sites."

The above brief recitation by the editors of the book's contents well-describes its coverage that ranges from the theoretical to the practical. The latter (practical) is the topic of the final chapter which is entitled "Case Studies: Full-Scale Operations and Delivery Systems." It was written by Jesse Conner and two colleagues (Conner is a long-time practitioner of stabilization/solidification); his book published in 1990, *Chemical Fixation and Stabilization of Hazardous Wastes*, is a classic reference in the field.

In the above noted chapter, four case studies are presented to give a fairly broad view of full-scale operations employing cement-based systems. These case studies are entitled:

1. Lead-contaminated soil at a former battery processing site;
2. In situ stabilization of mixed waste contaminated soil;
3. Solidification of liquid waste contaminated with antimony;
4. Radioactive waste stabilization at the US Department of Energy Savannah River Site.

Solidification/stabilization of wastes has been a topic discussed in many papers in the Journal of Hazardous Materials, including several papers written by contributors to this book. Spence and Shi have utilized a significant number of well-recognized researchers in the field to produce this very useful and authoritative volume to review and highlight these very useful remediation techniques.

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Louis Theodore, Robert G. Kunz, Nanotechnology: Environmental Implications and Solutions, John Wiley & Sons Inc., Hoboken, NJ, 2005, 396 pp., US$ 99.95, ISBN 0-471-69976-4.

At the same time as Wiley sent me this book, I received a University of Michigan Alumni Magazine whose title article was "Nanotechnology – going small has a big future." One of the columns in this article described research on the use of nanoscale systems for the removal of heavy metals from groundwater. There were other potential applications discussed in this article in health (quantum dots for medical imaging), energy (layer-by-layer assembly for solar cells and fuel cells) and even homeland security (nanocomposites to combat chemical and biological terrorism). Numerous other potential applications of nanotechnology are cited by the authors of this book in their first chapter. Clearly, this is an exciting new area of technology with many potential applications.

However, in addressing the title, the book's content is woefully weak. Indeed, the authors state "To the authors' knowledge there are no documented nano-human hazards. Statements in the literature refer to potential health problems." Theodore and Kunz then go on to describe a recent study that showed inhaled nanosized particles accumulate in the nasal cavities, lungs, and brains of rats.

Clearly, a research note such as described in the previous paragraph is important and should be carefully considered. To this end, the authors note "...that nano-environmental concerns are starting to be taken seriously around the globe." In this context, the book is forward-looking with a view to preventing problems from being caused by a new technology.

Given there are no real technology-based nanoscale-caused environmental problems, there is little directly for the authors to address vis-a-vis environmental problems resulting from nanoscale production and/or use. What the writers do in the greater part of the text is to rehash conventional environmental technology concerns. They do this

well, but the material presented is found in a host of other books.

My conclusion is that the book, while well written and containing useful environmental information, is well ahead of its time in addressing potential problems and solutions for yet unrealized environmental impacts.

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Lawrence K. Wang, Yung-Tse Hung, Nazih K. Shammas (Eds.), Physicochemical Treatment Processes, Humana Press, Totowa, NJ, 2005, 743 pp., US$ 175.00, ISBN 1-58829-165-0.

This book will be the third of Wang's (and his co-workers') publications that I have reviewed recently. It is one of a series of handbooks ". . .developed as a complete set of environmental engineering textbooks for university professors/students and as a one-stop comprehensive reference source for practicing engineers, researchers, environmental students and the libraries that serve them." Twelve books, covering the total environmental spectrum, are planned.

Previous reviews have been written and published in the Journal of Hazardous Materials by this editor for two of Wang's prior books, *Air Pollution Control Engineering and the Handbook of Environmental Engineering*. The amount of work that Wang has done for any one of these books is impressive. In each and every volume I have reviewed, he has contributed to many chapters as well as serving as editor.

The book jacket for this volume notes: "The authors discuss the performance, potential, and limitations of each major physicochemical treatment process in detail – including the physical and chemical theory behind it, the applications, the design procedures, examples, references, and cost data – as a basis for intelligent planning and realization of abatement systems." The 17 well-written chapters in the book which are listed below were contributed by 29 engineers from universities, industries, government and consulting firms.

1. Screening and comminution
2. Flow equalization and neutralization
3. Mixing
4. Coagulation and flocculation
5. Chemical precipitation
6. Recarbonation and softening
7. Chemical oxidation
8. Halogenation and disinfection
9. Ozonation
10. Electrolysis
11. Sedimentation
12. Dissolved air flotation
13. Gravity filtration
14. Polymeric adsorption and regenerant distillation
15. Granular activation carbon adsorption
16. Physicochemical treatment processes for water reuse
17. Introduction to sludge treatment

As I noted above, the book is well written with clear explanations of the processes, explanations enhanced by the use of charts, tables, and equipment and process diagrams. Almost all the chapters have, much to my liking, several example problems.

Although cost data are found in three chapters (Ozonation, Activated Carbon and Solids Removal), they are missing in other chapters; inclusion of cost estimation information for all unit operations would have been beneficial. A topic of personal interest, oil and grease removal, is barely mentioned much to my surprise as oil and grease are key water pollutants. A final comment involves references. The book is well referenced, but, in my opinion, Wang has included too many references to his own work; I say this recognizing his extensive publication record. My preference would have been for citations to have been from the broader published literature.

That said, I must conclude with strong praise of another excellent book by Wang and his collaborators. The book will find a significant market with practicing engineers as well as, I predict, faculty who will adopt it for use as a text even though its price is high for student purchase.

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