## Giant Micelles: Properties and Applications: Surfactant Science Series

*By Raoul Zana and Eric W. Kaler, CRC Press, Taylor & Francis Group, Boca Raton-London-New York, 2007, $199.95.*

This book was edited by two main players in the field of molecular aggregation phenomena in aqueous solutions, and they were able to attract the best authors and teams of authors to summarize the state of the art of this scientific subject. Although the chapters are not written in the style of a textbook, a large part of the book is should be easy to read also for graduate students.

The book covers the main topics of the subject, and is organized by the editors in a very nice and logical way, covering the beginning of micelles as aggregates of surfactants in aqueous solutions above a certain concentration as postulated by McBain in 1913, and ending with the most sophisticated modern applications.

Beginning with the theoretical aspects of micelle formation in general and the peculiarities of giant micelles, it also provides a profound insight into the packing of molecules in aggregates. The thermodynamic approaches are complemented by intriguing computer simulations, showing the good understanding of the main features of these giant (cylindrical, rod-like, worm-like, thread-like) micelles. Due to their large length-to-diameter ratio, the giant micelles are often treated like polymers; however, in contrast to normal polymers they can break and recombine on different time scales, and are, therefore, often called "living polymers".

Rheology is one of the most powerful experimental techniques for solutions containing giant micelles, and the chapter on the rheological theory of such systems represents a great starting point for the chapters on their linear and nonlinear rheological behavior and relaxation processes going on upon perturbations.

The fundamentals of solutions of giant micelles are completed by several very important chapters, describing their peculiarities. The direct visualization by cryo-TEM (Transmission Electron Microscopy) demonstrates the beauty of this scientific topic, and lets the reader relax after having digested the partly heavy thermodynamics. The various scattering methods combined with simulations represent fascinating experimental tools for a very detailed analysis of the structures formed in such solutions. This manifold of structures is underlined by the phase behavior. Based on atomic force microscopy (AFM), the self-assembling of micelles at the solid-liquid interface can be visualized.

The book is concluded by some chapters discussing very interesting applications. The peculiarities of giant micelle solutions in the oilfield turn out to be extremely helpful for increasing the well productivity. Shampoos and other hair-care products are further prominent examples for the wide applications of giant micellar solutions. There are of course much more applications, such as in paints, cleaners, sunscreens and other personal-care products, which are described here as good selections. In particular their partial destruction under certain flow conditions, and the self-organized repair make solutions of giant micelles so unique in many applications.

This book can be recommended without any reservation to all scientists and engineers working in the fundamentals and application of surfactant solutions at higher concentrations, as it is typical in many practical fields.

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## Principles of Polymerization-Fourth Edition

*By George Odian, Wiley InterScience, Hoboken, NJ, 2004, 832 pp. $129.50.*

This is a comprehensive book on the mechanisms and kinetics of the different types of polymerization, with the latest (fourth) edition including topics of ongoing research interest. A typical course on polymers to students in (chemical) engineering in this integrative climate would comprise the following: polymers, their function and its characterization in the context of typical applications; polymerization chemistry and kinetics; polymerization reaction engineering; dynamic modeling and optimization/control. This book will be an invaluable textbook for the polymerization chemistry, kinetics and reactor dynamics part of such a course. The book includes extensive sets of problems after each chapter, illustrative of all the major concepts discussed in the chapters.

In addition to serving as a textbook, this book will be a useful reference book to industrial practitioners and to research students. Industrial practitioners and graduate students who carry out polymer synthesis studies are bound to find the theoretical considerations presented in this book very useful. In that regard, this book will be an excellent complement to practical books on polymer synthesis such as Sandler and Karo *Polymer Synthesis*, Academic Press, Vol 1–3 (1998). Industrial practitioners and research students researching on other topics of polymers and polymerization will find this book as an excellent introduction to the kinetics and mechanisms of polymer reactions, and as a reference to background material that is imperative to advance their research in a more systematic manner and on sound theoretical basis. In general, practitioners and students might find it useful to read this book in ?conjunction with books such as Schork et al., *Control of Polymerization Reactors* Marcel Dekker (1993), for topics on polymer reaction engineering, process modeling, and process control, and Kumar and Gupta *Fundamentals of Polymer Engineering*, Mc-Graw Hill (2003), for topics such as thermodynamics, rheology and processing.

An outline of the contents of the book is presented in this paragraph, with the latest additions being outlined in the next paragraph. Chapter 2 of the book provides an extensive discussion on the mechanisms and kinetics of step growth polymerization, including discussions on functional group reactivities and equilibrium limitations, and also discussions on the control of molecular weight. The industrial processes for representative polymers are also discussed, for example, poly(ethylene terephthalate) and poly(hexamethylene adipamide). Chapter 3 provides a comprehensive discussion on chain growth polymerization by the free-radical mechanism. The chapter also includes discussion on the industrial processes for representative commercial polymers including polyethylene, polystyrene and poly(vinyl chloride). The chapter also comprises a discussion on the different polymerization methods including bulk, solution, precipitation, suspension and dispersion polymerization. Emulsion polymerization and its unique mechanisms are discussed in chapter 4. Chapter 5 includes a thorough discussion on chain growth polymerization by the anionic and cationic mechanisms, and also typical example processes. Chapter 6 provides a thorough introduction to the mechanisms and kinetics of multimonomer polymerization with typical applications. Chapter 7 includes polymerization of cyclic monomers. Chapter 8 includes the mechanistic aspects of stereochemistry and tacticity, and also includes the derivation of statistical kinetic models. Finally, chapter 9 provides discussion of polymer modification through reactions such as grafting and crosslinking.

The latest additions of on-going research interest include discussions on novel types of polymers and their application, the mechanisms of these polymerization, and new methods of polymerization. Chapter 2 includes a thorough discussion on dendrimers, hyperbranched polymers and liquid crystals. The chapter also includes discussion on enzymatic polymers such as poly-hydroxy alkanoates. Chapters 3 and 5 include living polymerization kinetics. Chapter 4 presents both mini-emulsion and microemulsion polymerization.

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