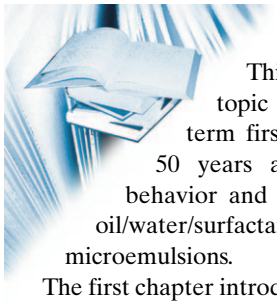

Microemulsions

This book introduces the topic of microemulsions, a term first introduced more than 50 years ago, and describes the behavior and uses of the three-phase oil/water/surfactant systems that comprise microemulsions.

The first chapter introduces the area and covers systems composed with ionic and non-ionic surfactants together with a brief consideration of a binary system. This chapter also includes an interesting discussion on surface tension in microemulsions. Chapter 2 describes analytical scattering techniques, in particular small-angle neutron scattering (SANS), that can be used to analyze the structure and dynamics of microemulsions. Chapter 3 considers the situation that a very small amount of surfactant is able to form a single phase from much larger amounts of hydrophilic and hydrophobic liquids; also the use of mixed surfactants and optimization of mixing is discussed. Chapter 4 looks at the use of amphiphilic (such as diblock copolymers) and non-amphiphilic polymers as additives to microemulsion systems.

Chapter 5 concerns an interesting concept of using microemulsions as confined reaction spaces for organic synthesis; selected examples of how this approach can be applied in industry as a "green" synthesis route are explored. This approach has been under-utilized and this chapter would serve as a useful introduction to researchers in this area.

For materials scientists, Chapter 6 would be of most interest as it describes using microemulsions as templates for nanomaterials, the use of confined water nanopools or channels for the synthesis of nanosized inorganic compounds including magnetite and photonic cadmium sulfide and copper sulfides is covered. A notable absence, however, is the inclusion of examples of reverse microemulsions as templates for bioceramic nanoparticles, such as calcium phosphate. Chapter 7 looks at recent research into non-aqueous microemulsions including supercritical CO_2 based and polar solvent systems and formation of microemulsion glasses for applications that include encapsulation and optics.

Chapter 8 would be of interest to industry researchers in particular, as a thorough review of microemulsion usage for cosmetics and detergents is given. Similarly, Chapter 9 would be of interest to industry or researchers interested in the area of drug delivery, as the use and advantages of microemulsion for formulations for oral and transdermal delivery are reviewed. Microemulsion template synthesis of nanosized pharmaceutics is also discussed. The following chapter considers the large-scale application of microemulsions, including a thorough discussion on the current and future important application of microemulsions for oil recovery from depleted wells. The book closes with a look at future challenges, including four possible areas for further investigation, and may provide a spur to researchers in this area.

The book provides a thorough introduction of the area with discussions of the physical dynamics of the systems, methods of analysis, and useful and applied microemulsion systems. References are thorough and generally dated up to 2007; the book is well illustrated, has many phase diagrams and EM micrographs, including freeze-fracture TEM and SEM micrographs of microemulsions. Overall, a good overview of the area is presented. This book would be of interest to postgraduates and industry researchers in areas including healthcare, detergents, and fine-chemical production, and points the way to future research directions for this topic.

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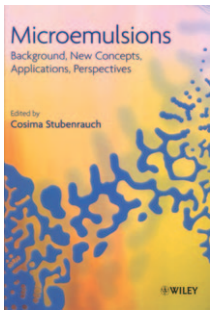

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