

Book Review

Membrane Separation Principles and Applications: From Material Selection to Mechanism and Industrial Uses

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ABSTRACT

This book provides a comprehensive knowledge on the fundamental and mechanism of various membrane processes as well as discussion on the current trends of membrane research shared by the leading membrane scientist from various countries. There are thirteen chapters in this book for different types of membrane processes. All chapters are broken down to few subchapters that are composed of beneficial information of membrane process including fabrication methods, membrane properties and characterization, and their applications. In particular, this book is essential to understand further the importance of material selection for fabrication of various membranes. For instance, Chapter 2 discussed the common monomers used in thin film composite (TFC) nanofiltration (NF) membrane such as polyamide, polyester and polyamine, supplement by an explanation on the strategies to further enhance the properties of the membranes. Details explanation on interfacial polymerization (IP) which is the widely used method for preparation of TFC membrane is also included. Current progresses in membrane development is also well explained in this book which could impart better understanding on the adoption of membrane technology for various applications. Recent advances in reverse osmosis (RO) membrane which include the incorporation of inorganic nanoparticles into membrane matrix and fillers in the support to enhance the membrane separation properties is also discussed. Formation of inorganic membranes for gas separation (i.e. dense ceramic, dense metallic, microporous membrane) including the gas transport mechanism are well elaborated in this book. Some of the latest development of ultrafiltration (UF) membranes including antibacterial, adsorptive and photocatalytic membrane particularly for water and wastewater treatment are also presented in details. The mechanism of UF photocatalytic membrane is also included to give an important insights into the photodegradation of pollutants via photocatalytic membrane. Besides polymeric membrane, this books also discussed well the application and mechanism of ceramic based membranes (i.e. microfiltration membrane, dense ceramic membrane). Additionally, the book also highlights the fouling problem, which is the major challenge in RO, UF and microfiltration (MF) membranes. The fouling mitigation of the membranes are also summarized to provide better understanding on the fouling strategies. Interestingly, this book also presented a clear description of haemodialysis membrane for blood purification process. This includes discussion on the properties of the membrane and biocompatibility which play a vital role during haemodialysis process. Emerging membrane technologies such as forward osmosis (FO), pressure retarded osmosis (PRO) and adsorptive membrane for heavy metals removal from water are also discussed. Vast information of hybrid membrane process- membrane

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bioreactor (MBR) and the applications of MBR in municipal wastewater, leachate, dyes and textile wastewater, pharmaceutical wastewater are also included in the book. In short, this book provides broad coverage of theories related to material science for membrane development, separation principles, applications of membranes as well as the future prospects and challenges of membrane technology. This book is well written and will serve as a comprehensive resource for professionals in industry, academia and researchers in various field.