Stimuli-Responsive Smart Membranes for Controlled Release

Liang-Yin Chu
School of Chemical Engineering, Sichuan University, Chengdu, Sichuan, 610065 China
http://teacher.scu.edu.cn/ftp_teacher0/cly/
Email: chuly@scu.edu.cn

Abstract
As a kind of functional barriers, membranes have been successfully developed for controlled release. Recently, as a new type of functional membranes, environmental stimuli-responsive membranes have been proposed. These functional membranes can control the diffusion permeability of solutes responding to environmental stimuli, such as temperature, pH, glucose concentration, special chemical substances and so on. They have been considered to be very useful for controlled release especially drug delivery, because they can be used to achieve stimuli-responsive rate-/time-programmed and/or site-specific drug delivery. The environmental stimuli-responsive membrane systems can just release chemicals or drugs as designed at a specific site where an environmental condition, such as pH or temperature, is different from that at other sites. For an example, they might release drug in a body when the membrane carrier systems passing through tumor cells that have a considerably lower pH than normal tissues. Because the release rate from membrane systems is generally controlled by the diffusion rate of the permeants across the thin membranes, a quicker change in the release rate responding to the stimuli may be expected, compared to cross-linked gels or microspheres. Therefore, much attention has been paid to the environmental stimuli-responsive smart membranes for controlled release. In this presentation, several kinds of environmental stimuli-responsive membrane controlled-release systems, such as thermo-responsive, pH-responsive, glucose-responsive, and molecular-recognizable ones, will be introduced and discussed.

Brief CV of Dr Chu

Prof. Liang-Yin Chu received his B.S. and M.S. degrees in Chemical Engineering from Chengdu University of Science and Technology (now Sichuan University) in 1989 and 1992, and his Ph.D. degree from Northeastern University in Shenyang in 1995. He was promoted as a full professor of Chemical Engineering at Sichuan University in 1997 and nominated as the Director of the Provincial Key Laboratory for Filtration and Separation of Sichuan Province in 2001. He was a research fellow at the University of Tokyo from October 1999 to September 2001, a visiting scholar at Harvard University from August 2006 to February 2007, and a visiting professor at the Ecole Supérieure de Physique et de Chimie Industrielles (ESPCI) of Paris from December 2007 to February 2008. He has received many honors and awards including the Natural Science Award issued by the Ministry of Education of China (2003), Science and Technology Award for Outstanding Youth issued by Sichuan Association of Science and Technology (2005),

Researcher of the Year 2006 in China issued by Scientific Chinese (2006), Distinguished Young Scholar issued by the National Natural Science Foundation of China (2008), and Distinguished Professor of "Chang Jiang Scholars Program" issued by the Ministry of Education of China (2009). He has authored and coauthored more than 200 articles, 19 patents, 3 books, and 10 book chapters. Currently, Professor Chu directs a talented research group with a diverse and interdisciplinary focus on the development of new materials and systems for membrane separation, controlled release and drug delivery.