

# Membrane Technology in Environmental Management

Selected Proceedings of the 2nd International Conference on Membrane Technology in Environmental Management, held in Tokyo, Japan, 1–4 November 1999

**Issue Editors: K Yamamoto\* and T Urase\*\***

\* University of Tokyo, Japan

\*\* Tokyo Institute of Technology, Japan

## Contents

### Drinking water treatment by membranes

- 1 **Development of reverse osmosis membrane seawater desalination in Japan**  
Y. Magara, M. Kawasaki, M. Sekino and H. Yamamura
- 9 **Membrane application to water purification process in Japan – development of hybrid membrane system** Y. Watanabe, K. Kimura and T. Suzuki
- 17 **Pilot plant evaluation of an ozone-microfiltration system for drinking water treatment**  
M. Hashino, Y. Mori, Y. Fujii, N. Motoyama, N. Kadokawa, H. Hoshikawa, W. Nishijima and M. Okada
- 25 **Pursuing the effect of aeration, pH increment, and H<sub>2</sub>O<sub>2</sub> coupled with UV irradiation on the removal efficiency of manganese by microfilter membrane**  
Md. Abdur Rahman, J.Y. Huang, Y. Iwakami and K. Fujita
- 33 **Practical experiences from membrane filtration plants for humic substance removal**  
H. Ødegaard, T. Thorsen and E. Melin
- 43 **Influence of molecular weight distribution of organic substances on the removal efficiency of DBPs in a conventional water treatment plant**  
C-N. Chang, A. Chao, F-S. Lee and F-F. Zing
- 51 **Microfiltration-adsorption hybrid system in organics removal from water**  
H.H. Ngo, S. Vigneswaran, S.H. Kim, A. Bidkar and H. Moon
- 59 **Analysis of organic matter causing membrane fouling in drinking water treatment**  
Y. Kaiya, Y. Itoh, S. Takizawa, K. Fujita and T. Tagawa
- 69 **Cross-flow ultrafiltration for surface water treatment in North Thailand**  
S. Takizawa, S. Babel, N. Pradhan, T. Prathomrungsiyunkul, K. Suwannarit and S. Yamazaki
- 77 **Pilot-plant study of a high recovery membrane filtration process for drinking water treatment** J.Y. Huang, S. Takizawa and K. Fujita
- 85 **Macroscopic fluid flow conditions in spiral wound membrane elements: packed bed approach** D. Van Gauwbergen and J. Baeyens

### Industrial water and wastewater treatment by membranes

- 93 **Flexible design and operation of a two-step UF/NF-system for product recovery from rinsing waters in batch production** B. Goers and G. Wozny
- 101 **Membrane filtration for preferential removal of emulsified oil from water**  
T. Leiknes and M.J. Semmens
- 109 **Separation of oil-water emulsion from car washes**  
S. Panpanit, C. Visvanathan and S. Muttamara
- 117 **Volume reduction of produced water generated from natural gas production process using membrane technology** C.Visvanathan, P. Svenstrup and P. Ariyamethee
- 125 **Coupled transport of cyanide ions through liquid membranes**  
C. Aydiner, M. Kobya and I. Koyuncu
- 135 **Effect of the operating parameters on the separation of metal chelates using low pressure reverse osmosis membrane (LPROM)** Z. Ujang and G.K. Anderson
- 143 **The removal of acrylonitrile from aqueous solution by Fenton's reagent and membrane filtration** C.Y. Chang, S.H. Chen, J.S. Chang and C.C. Wang

## **Wastewater treatment and reuse by membrane process**

- 149 **Two approaches to indirect potable reuse using membrane technology** J. Lozier
- 157 **Waste water reuse, the South African experience**  
C.A. Buckley, C.J. Brouckaert and G.E. Rencken
- 165 **Optimal membrane selection for brackish water desalination** G. Oron and A. Bick
- 173 **Gas sparged cross-flow microfiltration of biologically treated wastewater**  
L. Vera, S. Delgado and S. Elmaleh
- 181 **A new design of microfiltration system and application to wastewater treatment**  
D.J. Chang, S.H. Chen, C.Y. Chang, S.S. Lin and J.S. Chang
- 189 **Pilot-scale membrane bioreactor and reverse osmosis studies for direct reuse of secondary textile effluents** A. Rozzi, F. Malpei, R. Bianchi and D. Mattioli

## **Membrane separation bioreactors**

- 197 **Treatment performance of newly developed johkasous with membrane separation**  
H. Ohmori, T. Yahashi, Y. Furukawa, K. Kawamura and Y. Yamamoto
- 209 **Wastewater treatment using membranes: the North American experience**  
P. Côté and D. Thompson
- 217 **Two stage intermittent aeration membrane bioreactor for simultaneous organic, nitrogen and phosphorus removal** G.T. Seo, T.S. Lee, B.H. Moon, J.H. Lim and K.S. Lee
- 227 **Study on a sequencing batch membrane bioreactor for wastewater treatment**  
W.J. Ng, S.L. Ong, M.J. Gomez, J.Y. Hu and X.J. Fan
- 235 **Influence of important operational parameters on performance of a membrane biological reactor** S-H. Yoon, H-S. Kim, J.-K. Park, H. Kim and J.-Y. Sung
- 243 **Ultrafiltration of activated sludge with ceramic membranes in a cross-flow membrane bioreactor process** X-J. Fan, V. Urbain, Y. Qian and J. Manem
- 251 **Sludge production in membrane bioreactors under different conditions**  
J. Wagner and K-H. Rosenwinkel
- 259 **Analysis of bacterial community in membrane-separation bioreactors by fluorescent *in situ* hybridization (FISH) and denaturing gradient gel electrophoresis (DGGE) techniques** B.S. Luxmy, F. Nakajima and Kazuo Yamamoto
- 269 **Operation of different membrane bioreactors: experimental results and physiological state of the micro-organisms** S. Rosenberger, R. Witzig, W. Manz, U. Szewzyk and M. Kraume
- 279 **Bioaugmentation with the *clc*-element carrying *Pseudomonas putida* BN210 in a membrane separation bioreactor**  
W. Ghysels, D. Springael, Q. Dong, S. Van Roy, G. Nuyts and L. Diels
- 287 **Application of MBR to an easily installed municipal wastewater treatment plant**  
M. Ogoshi and Y. Suzuki
- 295 **Application of immersed-type membrane separation activated sludge process to municipal wastewater treatment** T. Murakami, J. Usui, K. Takamura and T. Yoshikawa

## **Fouling control in membrane process**

- 303 **Membrane fouling and its control in environmental applications**  
A.G. Fane, P. Beatson and H. Li
- 309 **Improvement of microfiltration performance in water treatment: is critical flux a viable solution?** S. Vigneswaran, D.Y. Kwon, H.H. Ngo and J.Y. Hu

- 317 **Fouling performance in the filtration of water containing humic acid and/or kaolin with microporous membrane**  
S. Fukada, T. Tsuji, T. Minegishi, S. Yamamoto, T. Itazawa and K. Matsumoto
- 327 **A study on membrane fouling due to algal deposition** S. Babel and S. Takizawa
- 337 **Cross-flow microfiltration with high frequency reverse flow**  
M. Hérán and S. Elmaleh
- 345 **Understanding membrane fouling in ultrafiltration of WWTP-effluent**  
J.H. Roorda and J.H.J.M. van der Graaf
- 355 **Influence of organic loading rate on membrane fouling in membrane separation activated sludge process** H. Nagaoka, S. Kono, S. Yamanishi and A. Miya
- 363 **Approaches to membrane fouling control in anaerobic membrane bioreactors**  
K-H. Choo, I-J. Kang, S-H. Yoon, H. Park, J-H. Kim, S. Adiya and C-H. Lee

### **Membrane application to chemical analysis**

- 373 **Development of membrane introduction mass spectrometry for monitoring trace organics in water**  
K. Sharara, J. Mansouri, A.G. Fane, P.T. Crisp, P. Calderon and M. Guilhaus