

# **Trace Contaminants in Water: Genesis, Rapid Detection and Sustainable Removal Processes**

**Topical Conference at the 2008 AIChE Annual Meeting**

**Philadelphia, Pennsylvania  
16 - 21 November 2008**

**ISBN: 978-1-61567-204-2**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2008) by AIChE  
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact AIChE  
at the address below.

AIChE  
3 Park Avenue  
New York, NY 10016-5991

Phone: (203) 702-7660  
Fax: (203) 775-5177

[www.aiche.org](http://www.aiche.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>The Fate, Transport and Control of Persistent Organic ChEmicals In Sediments</b> .....	1
<i>Danny D. Reible</i>	
<b>Synthetic Organic Contaminant Uptake by Carbon Nanotubes</b> .....	2
<i>James Kilduff, Hyung-Nam Lim</i>	
<b>Nanoparticle-Based Functionalized Membrane Reactor for Chloro-Organic Detoxification at Room Temperature: An Overview (Invited Paper)</b> .....	3
<i>D. Bhattacharyya, Jian Xu, Yit Hong Tee, L. Bachas, David Meyer</i>	
<b>In-Situ Reductive Transformation of Chlorinated Solvents and Immobilization of Chromium In Soils Using Polysaccharide-Stabilized Iron Nanoparticles</b> .....	4
<i>Dongye Zhao, Feng He, Lucida Xu, Christopher B. Roberts</i>	
<b>Biosensors for Organophosphate Nerve Agents</b> .....	5
<i>Ashok Mulchandani</i>	
<b>Reduction of Perchlorate and Other Micropollutants in a Hydrogen-Based, Hollow-Fiber Membrane Biofilm Reactor</b> .....	6
<i>Robert Nerenberg</i>	
<b>Arsenic Removal in Bangladesh and South East Asia - the Role of Competitive Oxidation, Sorption and Precipitation Reactions</b> .....	15
<i>Stephan J. Hug, Ioannis A. Katsoyiannis, Linda C. Roberts, Ralf Kaegi, Andreas Voegelin</i>	
<b>Selective Ion Exchange for Removal of Inorganic Trace Contaminants from Water</b> .....	16
<i>Wolfgang H. Höll</i>	
<b>Toxic Heavy Metal Removal by Hollow Fiber Membrane Solvent Extraction-Based Techniques</b> .....	22
<i>Kamalesh K. Sirkar</i>	
<b>Endocrine Disrupting ChEmical Risk Management Research in the US Epa's Office of Research and Development</b> .....	23
<i>Carolyn Acheson, Marc Mills, Steve Hutchins, Todd Martin, Gregory Sayles, Kathleen Schenk, Douglas Young</i>	
<b>Selective and Regenerable Ion Exchange for Perchlorate Removal, Recovery, and Environmental Forensics</b> .....	24
<i>Bachua Gu</i>	
<b>Adsorption of Trace Levels of Arsenic from Aqueous Solutions by Conditioned Layered Double Hydroxides: Flow Experiments and Multi Solute Batch Experiments</b> .....	25
<i>Megha Dadwhal, Muhammad Sahimi, Theodore T. Tsotsis</i>	
<b>Remove Arsenic and MS2 Virus by Iron Oxide Nanoparticles Coated on Glass Fibers</b> .....	27
<i>Xuan Li, Jinwen Wang, Leonardo A. Gutierrez, Thanh H. Nguyen</i>	
<b>Chromium (III) Sequestration by Oats Straw and Agave Baggasse: Sorption Mechanism</b> .....	28
<i>Refugio Bernardo García Reyes, José René Rangel Méndez</i>	
<b>Hybrid Ion Exchanger (HIX): Characterization and New Application Opportunities</b> .....	33
<i>Arup K. Sengupta</i>	
<b>Arsenic Removal from Drinking Water Using a Regenerable Adsorbent</b> .....	34
<i>Paul Sylvester, Teresia Moller</i>	

<b>Investigation of Extraordinarily High Cr(VI) Removal Capacity by a Weak-Base Anion Exchange Resin: The Mechanism of Reactive Ion Exchange</b> .....	37
<i>Sudipta Sarkar, Nicole Blute, Jin-ChEng Lin, Arup K. SenGupta</i>	
<b>Low Cost - Sustainable - High Capacity Potable Water Treatment Media for Arsenic Removal</b> .....	38
<i>Rajiv Banavali, Jose Antonio Trejo, Garth R. Parker</i>	
<b>Rapid Sensing of Toxic Metals In Water Using a Hybrid Inorganic Material</b> .....	44
<i>Prasun K. Chatterjee, Arup K. Sengupta</i>	
<b>Magnetic Edta – Attaching Metal ChElators to Nanomagnets for Water Purification and Heavy Metal Recovery</b> .....	45
<i>Fabian M. Koehler, Michael Rossier, Evagelos K. Athanassiou, Robert N. Grass, Wendelin J. Stark</i>	
<b>Physicochemical Denitrification Process for Drinking Water Resources at Ambient Conditions</b> .....	46
<i>Masamichi Tsuji, Mitsuo Kawamura, Harue Tsuji</i>	
<b>Destruction of Trichloroethylene with Zerovalent Iron/ Persulfate</b> .....	64
<i>Anita Padmanabhan, John Bergendahl</i>	
<b>Relationship Between Micellar and Hemi-Micellar Processes and the Bioavailability of Surfactant-Solubilized Hydrophobic Organic Compounds</b> .....	65
<i>Derick G. Brown</i>	
<b>Metal Oxide Nanoparticles Coated on a Glass Fiber Substrate to Remove Viruses from Water</b> .....	66
<i>Xuan Li, Leonardo A. Gutierrez, Thanh H. Nguyen, James Economy</i>	
<b>Comparison of Treatment Kinetics for Removal of Btex Compounds and Chlorinated Solvents Using Advanced Oxidation Processes</b> .....	67
<i>Robert W. Peters, M. P. Sharma, Yusuf G. Adewuyi</i>	
<b>Disinfection Byproducts Control with Ion Exchange</b> .....	76
<i>Francis Boodoo, Joe D'Alessandro, Edward T. Begg, Dj Shannahan</i>	
<b>Enhanced Chlorinated Organic Removal from Water Using Iron and Bimetallic Nanoparticle Composite Membranes</b> .....	86
<i>Stephen M. Ritchie</i>	
<b>Investigation of Quality Concerns Due to Elastomeric Compunds Degradation in Chloramine-Disinfected Waters</b> .....	87
<i>Raja Mohan Nagisetty, Thomas D. Rockaway, Gerold A. Willing</i>	
<b>Adsorption of Chloroform &amp; MTBE on Granular Zeolites; Batch and Column Adsorption Studies</b> .....	88
<i>Laila Abu-Lail, John Bergendahl, Robert Thompson, Arjan Giaya</i>	
<b>Cost Estimation of Advanced Oxidation Processes (AOPs) Involving Ultrasound. A Comparative Study</b> .....	89
<i>Naresh N. Mahamuni, Yusuf G. Adewuyi, Robert W. Peters</i>	
<b>Advanced Oxidation of Pharmaceuticals: Preparing for Indirect and Direct Water Reuse</b> .....	90
<i>Lee M. Blaney, Lynn E. Katz, Desmond F. Lawler</i>	
<b>Removal of Volatile Organic Compounds from Water by Use of Microcapsules Containing PDMS</b> .....	91
<i>Ziyang Xiang, Yangcheng Lu, Xingchu Gong, Guangsheng Luo</i>	
<b>Water Compatible Resin for Separation and Recovery of Dissolved Precious Metals</b> .....	92
<i>Yu Lung Lam, Kwong Yu Chan, Patrick H Toy</i>	

**Author Index**