

# **Environmental Aspects, Applications, and Implications of Nanomaterials and Nanotechnology**

**Topical Conference at the 2011 AIChE Annual Meeting**

**Minneapolis, Minnesota, USA  
16-21 October 2011**

**ISBN: 978-1-61839-583-2**

**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© (2011) by AIChE  
All rights reserved.

Printed by Curran Associates, Inc. (2012)

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>Assessment of Potential Exposure to Carbon Nanotubes in the Production of Polymer Nanocomposites</b> .....	1
<i>Drew J. Thompson, Lin Li, Jing Wang, David Y. H. Pui</i>	
<b>A Novel Technique for In-Vivo Toxicological Characterization of Engineered Nanomaterials</b> .....	2
<i>Georgios A. Sotiriou, Edgar Diaz, Mark Long, John Godleski, Joseph Brain, Sotiris E. Pratsinis, Philip Demokritou</i>	
<b>Evaluation of the Toxicity of Nanomaterials Based on Knowledge Extraction from High Throughput Screening of Biological Toxicity Data</b> .....	3
<i>Rong Liu, Saji George, Bryan France, Robert Damoiseaux, Robert Rallo, Kenneth Bradley, Andre E. Nel, Yoram Cohen</i>	
<b>Human Blood Biocompatibility of Silver Nanoparticles</b> .....	4
<i>Jonghoon Choi, Vytas Reipa, Victoria M. Hitchins, Peter L. Goering, Richard A. Malinauskas</i>	
<b>Nanotechnology – What's So Big about the Small Stuff?</b> .....	5
<i>William C. Looney</i>	
<b>Forensic Analysis of Nano-Material Environmental Regulation</b> .....	7
<i>Coby A. Scher, Dennis L. Caputo</i>	
<b>Effect of Shear Stress on Cytotoxicity of Silica Nanoparticles</b> .....	8
<i>Donghyuk Kim, Yu-Shen Lin, Christy L. Haynes</i>	
<b>Quantifying the Origin of Nanosilver Ions and Their Antibacterial Activity</b> .....	9
<i>Georgios A. Sotiriou, Andreas Meyer, Jesper Knijnenburg, Sven Panke, Sotiris E. Pratsinis</i>	
<b>Oxidation of Biomolecules by Emerging Inorganic Nanoparticles</b> .....	10
<i>Antonia Luna-Velasco, Reyes Sierra-Alvarez, Jim A. Field</i>	
<b>Demonstration of Nanoparticle-Bound Polymer Biodegradation and Resulting Nanoparticle Destabilization</b> .....	11
<i>Teresa L. Kirschling, Patricia L. Golas, Krzysztof Matyjaszewski, Kelvin B. Gregory, Gregory V. Lowry, Robert D. Tilton</i>	
<b>Partitioning of Fullerene Between Water and Synthetic Membrane Materials: Effects of Temperature and Membrane Compositions</b> .....	13
<i>Yeonjeong Ha, Howard M. Liljestrand, Lynn E. Katz</i>	
<b>Single Wall Carbon Nanotubes Enter Cells by Endocytosis and Not Membrane Penetration</b> .....	19
<i>Peter N. Yaron, Brian D. Holt, Phillip A. Short, Mathias Lösche, Mohammad F. Islam, Kris N. Dahl</i>	
<b>Modeling Aggregation and Size Distribution of Nanoparticles In Aqueous Suspensions</b> .....	20
<i>Haoyang H. Liu, Sirikarn Surawanvijit, G. Orkoulas, Yoram Cohen</i>	
<b>Stability of Engineered Nanoparticles In Aqueous Systems: Elucidating the Roles of Capping Agents and Natural Organic Matter</b> .....	21
<i>Jeffrey A. Nason</i>	
<b>Removal of Nanoparticles In Semiconductor Manufacturing Effluents Using Porous Media Filtration</b> .....	22
<i>Jeff Rottman, Reyes Sierra, Farhang Shadman</i>	
<b>Adsorption of Gold Nanoparticles and Humic Acid On Activated Carbon Used In Drinking Water Treatment</b> .....	23
<i>Holly A. Stretz, Vasanta Pallem, Martha J. M. Wells</i>	
<b>High Throughput Collection and Detection of Environmental Nanoparticles</b> .....	24
<i>Fanxu Meng, Serdar Ozturk, Maria D. King, Yassin A. Hassan, Victor M. Ugaz</i>	
<b>Nanomaterials: The Latest Emerging Environmental Contaminant Identification and Measurement</b> .....	25
<i>Katrina Varner</i>	
<b>Enabling In Situ Real-Time Characterization of Interfaces with Quartz Crystal Microbalance with Dissipation Monitoring</b> .....	30
<i>Mark A. Poggi, Archana Jaiswal, Matthew Dixon</i>	
<b>Mobility and Deposition of Silver Nanoparticles On Silica Surfaces Under Environmentally Relevant Conditions</b> .....	31
<i>B. Reginald Thio, Milka O. Montes, Mahmoud A. Mahmoud, Arturo A. Keller</i>	
<b>Effect of the Aggregation of TiO<sub>2</sub> Nanoparticles on Their Fate and Transport in Natural Waters</b> .....	32
<i>María Marta Fidalgo, Marina B. Romanello, Liliana M. Bertini, Linna Du, Jianhong Ren</i>	
<b>Application of Screening-Level Life Cycle Assessment to Emerging Nanoproducts: Nanosilver Textiles and CNT Electronics</b> .....	34
<i>David E. Meyer, Venkata K. K. Upadhyayula</i>	

<b>Ultra-Rapid Elimination of Biofilms on Metal and Ceramic Surfaces Via the Combustion of a Nanoenergetic Coating .....</b>	<b>35</b>
<i>Shramik Sengupta, Rajagopalan Thiruvengadathan, Byung-Doo Lee, Brandon M. Smith, Sachidevi Puttaswamy, Keshab Gangopadhyay, Shubhra Gangopadhyay</i>	
<b>Life Cycle Energy Analysis and Midpoint Assessment of Multimegawatt Wind Turbines with Polymer Nanocomposite Blade Material.....</b>	<b>36</b>
<i>Laura A. Merugula, Bhavik R. Bakshi, Vikas Khanna</i>	
<b>Advanced Oxidation Processes with Carbon Nanotubes: Surface-Promoted Formation of Hydroxyl Radical During Ozonation .....</b>	<b>39</b>
<i>Rebekah L. Oulton, Michael J. Nalbandian, Howard A. Fairbrother, Kevin Wepasnick, David M. Cwiertny</i>	
<b>Evaluating the Dynamics of an Integrated Electrokinetic and Zero-Valent Iron Nanoparticle System for Treatment of Hexavalent Chromium In Groundwater .....</b>	<b>40</b>
<i>Ryan Thacher, Massoud Pirbazari</i>	
<b>Biodegradation of Carbazole by Microbial Cells Coated with Magnetite Nanoparticles .....</b>	<b>42</b>
<i>Jianmin Xing</i>	
<b>Comparison of Photoreactor Designs for Oxidation of Dilute Aqueous Waste Contaminants .....</b>	<b>43</b>
<i>Amanda M. Grannas, Dorothy W. Skaf, Kevin C. Brodwater, Montanna Herdeman</i>	
<b>Study of the Photodeposition of Noble Metal On BiOCl for the Photocatalytic Decomposition of Rhodamine B.....</b>	<b>44</b>
<i>Liang Kong, Zheng Jiang, Tiancun Xiao, Henry H.-C. Lai, Peter P. Edwards</i>	
<b>Synthesis and Characterization of Magnetic Nanoparticles for Enhanced Gas-Liquid Mass Transfer.....</b>	<b>49</b>
<i>Alexander P. Mathews, Dambar B. Hamal, Paul Owings, Ken J. Klabunde</i>	
<b>Visible-Light-Driven Photodegradation of Contaminants in Water Over Surface-Engineered BiOBr Semiconductor Micro/Nano-Structures.....</b>	<b>50</b>
<i>Zheng Jiang, Liang Kong, Tiancun Xiao, Peter P. Edwards</i>	
<b>Magnetic Catch &amp; Release: Reversible Organic Contaminant Adsorption and Enrichment From Water .....</b>	<b>52</b>
<i>Roland Fuhrer, Inge K. Herrmann, Evagelos K. Athanassiou, Robert N. Grass, Wendelin J. Stark</i>	
<b>Improved Photocatalytic Activity Under Visible Light Irradiation of Nanosized-TiO<sub>2</sub> Co-Doped with Vanadium and Nitrogen.....</b>	<b>54</b>
<i>Renuka Jaiswal, Rupali Dholam, Nainesh Patel, Antonio Miotello, Dushyant C. Kothari</i>	
<b>Author Index</b>	