

American Institute of Chemical Engineers

# Nanomaterials for Energy Applications

Topical Conference at the  
2007 AIChE Annual Meeting

November 4-9, 2007  
Salt Lake City, Utah, USA

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

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571  
[www.proceedings.com](http://www.proceedings.com)

ISBN: 978-1-60423-833-4

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

ISBN: 978-1-60423-833-4

Copyright (2007) by the American Institute of Chemical Engineers.  
All rights reserved.

For permission requests, please contact the American Institute of Chemical Engineers at the address below.

American Institute of Chemical Engineers  
Proceedings  
Three Park Avenue  
New York, NY 10016-5991  
Phone: 212-591-8100

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

American Institute of Chemical Engineers

Nanomaterials for Energy Applications

## TABLE OF CONTENTS

<b>A Computational Investigation of Metal-Porphyrin-Frameworks (Mps) as a New Nanostructured Adsorbent for Hydrogen Storage</b> .....	1
<i>R. Xiong, M. H. Kassae, J. T. Fern, D. J. Keffer, W. V. Steele</i>	
<b>Methane Decomposition Over Graphene Edges for CO and CO<sub>2</sub>-Free Hydrogen Production</b> .....	2
<i>L. Huang, E. E. Santiso, K. E. Gubbins, M. B. Nardelli</i>	
<b>Hydrogen Storage Equilibrium and Kinetics of Palladium Nanowires Grown in Anodized Alumina</b> .....	3
<i>A. Ertan, O. Talu</i>	
<b>Highly Proton Conductive Self-Assembled Sulfonated Silica Colloidal Membranes</b> .....	4
<i>I. Zharov</i>	
<b>Methanol Oxidation on Platinum-Ruthenium Nanoparticles Supported on Well Defined Mesoporous Carbons</b> .....	5
<i>K. Chan, J. Ren, S. W. Ting, J. Ding, H. Wang</i>	
<b>Nano-Scale Molybdenum Sulfides for Electrocatalytic Hydrogen Evolution</b> .....	9
<i>T. F. Jaramillo, K. P. Jorgensen, J. Bonde, S. Horch, J. H. Nielsen, I. Chorkendorff</i>	
<b>Hydrogen Storage in Single-Wall Carbon Nanohorns</b> .....	11
<i>T. D. Trinh, C. M. Lastoskie, K. Kaneko</i>	
<b>Carbon Based Lithium Metal Hydrides for Hydrogen Storage</b> .....	12
<i>M. M. Ghouri, D. S. Mainardi</i>	
<b>Ab-initio Calculations for Ni Additives in Zn(BH<sub>4</sub>)<sub>2</sub></b> .....	18
<i>P. Choudhury, V. R. Bhethanabotla, E. Stefanakos</i>	
<b>Nanowires as Anode Materials for Lithium Ion Batteries</b> .....	24
<i>P. Meduri, M. K. Sunkara</i>	
<b>Synthesis of SnO<sub>2</sub>-Based Hollow Nanostructures as Electrodes for Lithium Ion Battery</b> .....	25
<i>D. X. W. Lou, L. A. Archer</i>	
<b>Mesoporous Crystalline Metal Oxide as Anode Materials for Lithium Ion Batteries</b> .....	26
<i>D. Wang, V. Viswanathan, J. Liu, Z. Nie</i>	
<b>Synthesis of Li<sub>x</sub>Mn<sub>2-x</sub>O<sub>4</sub> (M=Mn, Al And Co) Nanoparticles by Spray Pyrolysis with Addition of Citric Acid and Their Battery Performance</b> .....	27
<i>I. Taniguchi, T. Yano, Z. Bakenov</i>	
<b>Metal-Dielectric Nanocomposites for Solar Energy Applications</b> .....	29
<i>J. Trice, C. Favazza, R. Kalyanaraman, R. Sureshkumar, H. Garcia</i>	
<b>Fabrication and Optical Characterization of Large-Area, Vertically Aligned Arrays of Silicon Nano and Microwires for Photovoltaic Devices</b> .....	30
<i>M. A. Filler, B. M. Kayes, M. D. Kelzenberg, M. C. Putnam, H. A. Atwater</i>	
<b>Nanowire-Based Quantum-Dot-Sensitized Solar Cells</b> .....	31
<i>K. S. Leschkies, R. Divakar, J. Basu, E. Enache-Pommer, J. E. Boercker, C. B. Carter, U. R. Kortshagen, D. J. Norris, E. S. Aydil</i>	

<b>Interfacial Electron Transfer in Dye Sensitized Solar Cells Measured by Time Resolved Terahertz Spectroscopy</b> .....	32
<i>J. B. Baxter, C. A. Schmittenmaer</i>	
<b>Zr modified nitrogen doped TiO<sub>2</sub> nanomaterials by a surfactant free Sol-Gel process in supercritical CO<sub>2</sub> for solar energy applications</b> .....	33
<i>R. A. Lucky, P. A. Charpentier</i>	
<b>Development of Low-Cost CuInSe<sub>2</sub> Nanocrystal-Ink Based Solar Cells</b> .....	41
<i>R. Agrawa, H. W. Hillhouse, Q. Guo, M. Kar</i>	
<b>Scalable Non-Lithographic Approach to Fabricate Wafer-Scale Subwavelength Surface Textures for Improving The Conversion Efficiency of Silicon Solar Cells</b> .....	42
<i>P. Jiang, C. Sun, N. Linn, B. Jiang</i>	
<b>Author Index</b>	