

## Pei C. Chiu

Associate Professor  
Department of Civil & Environmental Engineering  
University of Delaware, Newark, DE 19716, USA  
Phone: 302-831-3104  
Fax: 302-831-3640  
E-mail: pei@ce.udel.edu

### EDUCATION

- 7/90 - 12/95 Ph.D., Stanford University, CA. Department of Civil and Environmental Engineering, Environmental Engineering and Science Program.  
9/89 - 6/90 M.S., Stanford University, CA. Department of Civil and Environmental Engineering, Environmental Engineering and Science Program.  
9/83 - 6/87 B.S., National Taiwan University, Taipei, Taiwan. Department of Chemical Engineering.

### EXPERIENCE

- 9/02 - present Associate Professor, Department of Civil & Environmental Engineering, University of Delaware, DE.  
9/96 - 8/02 Assistant Professor, Department of Civil & Environmental Engineering, University of Delaware, DE.  
1/96 - 8/96 Postdoctoral Scholar, Department of Civil & Environmental Engineering, Stanford University, CA.  
7/90 - 12/95 Research Assistant, Department of Civil & Environmental Engineering, Stanford University, CA.

### COURSES TAUGHT

- CIEG135: Introduction to Environmental Engineering (freshman)  
CIEG233: Environmental Engineering Processes (sophomore)  
CIEG434: Air Pollution Control (junior/senior)  
CIEG667: Environmental Engineering Kinetics (graduate)  
CIEG833: Fate of Organic Pollutants in the Environment (graduate)

### SELECTED REFEREED PUBLICATIONS (\*Senior/Corresponding Author)

- Ye, J. and Chiu\*, P. C. (2006) "Transport of Atomic Hydrogen through Graphite and Its Reaction with Azoaromatic Compounds." *Environmental Science & Technology*, 40(12), 3959-3964.  
Oh, S. Y., Lee, J., Cha, D. K. and Chiu\*, P. C. (2006) "Reduction of Acrolein with Elemental Iron: Kinetics, Pathway, and Enhanced Biodegradation" *Environmental Science & Technology*, 40(8), 2765-2770.  
Zhang J., Joslyn, A. and Chiu\*, P. C. (2006) "1,1-Dichloroethene as the Predominant Intermediate of Microbial Trichloroethene Reduction" *Environmental Science & Technology*, 40(6), 1830-1836.  
Oh, S. Y., Cha, D. K., Chiu, P. C. and Kim, B. J. (2006) "Zero-Valent Iron Treatment of RDX- and Perchlorate-Containing Wastewaters from an Ammunition-Manufacturing Plant at Elevated Temperatures" *Water Science & Technology*, 54(10), 47-53.

- Son, A., Lee, J., Chiu, P. C. and Cha, D. K. (2006) "Microbial Reduction of Perchlorate with Zero-Valent Iron." *Water Research*, 40(10), 2027-2032.
- Oh, S. Y., Chiu, P. C., Kim B. J. and Cha, D. K. (2006) "Enhanced Reduction of Perchlorate by Elemental Iron at Elevated Temperatures" *Journal of Hazardous Materials*, 129(1-3), 304-307.
- Han, B., Jafarpour, B., Gallagher, V. N., Imhoff, P. T. Chiu, P. C. and Fluman, D. A. (2006) "Measuring Seasonal Variations of Moisture in a Landfill with the Partitioning Gas Tracer Test" *Waste Management*, 26(4), 344-355.
- Saxe, J. R., Lubenow, B. L., Chiu, P. C., Huang, C.-P. and Cha, D. K. (2006) "Enhanced Biodegradation of Azo Dyes Using an Integrated Elemental Iron-Activated Sludge System: I. Evaluation of System Performance" *Water Environment Research*, 78(1), 19-25.
- Saxe, J. R., Lubenow, B. L., Chiu, P. C., Huang, C.-P. and Cha, D. K. (2006) "Enhanced Biodegradation of Azo Dyes Using an Integrated Elemental Iron-Activated Sludge System: II. Effect of Physical-Chemical Parameters" *Water Environment Research*, 77(1), 26-30.
- Oh, S. Y., Chiu, P. C., Kim B. J. and Cha, D. K. (2005) "Zero-Valent Iron Pretreatment for Enhancing the Biodegradability of RDX" *Water Research*, 39(20), 5027-5032.
- You, Y., Han, J., Chiu, P. C. and Jin, Y. (2005) "Removal and Inactivation of Waterborne Viruses Using Zero-Valent Iron" *Environmental Science & Technology*, 39(23), 9263-9269.
- Oh, S. Y., Cha, D. K., Kim, B. J. and Chiu\*, P. C. (2005) "Transformation of Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), and Methylenedinitramine (MDNA) with Elemental Iron" *Environmental Toxicology & Chemistry*, 24(11), 2812-2819.
- Jafarpour, B., Imhoff, P. T. and Chiu\*, P. C. (2005) "Quantification and Modeling of 2,4-Dinitrotoluene Reduction with High-Purity and Cast Iron" *Journal of Contaminant Hydrology*, 76(1&2), 87-107.
- Oh, S. Y., Cha, D. K., Kim B. J. and Chiu\*, P. C. (2004) "Reduction of Nitroglycerin with Cast Iron: Pathway, Kinetics, and Mechanisms" *Environmental Science & Technology*, 38(13), 3723-3730.
- Dentel, S. K., Strogen, B. and Chiu, P. C. (2004) "Direct Generation of Electricity from Sludges and Other Liquid Wastes" *Water Science & Technology*, 50(9), 161-168.
- Ye, J. and Chiu\*, P. C. (2004) "Graphite-Mediated Azobenzene Reduction with Zero-Valent Iron" *PWEA Keystone Water Quality Manager*, 37(5), 16 pp.
- Oh, S. Y., Cha, D. K., Chiu, P. C. and Kim B. J. (2004) "Conceptual Comparison of Pink Water Treatment Technologies: Granular Activated Carbon, Anaerobic Fluidized-Bed Reactor, and Zero-Valent Iron-Fenton Process" *Water Science & Technology*, 49(5/6), 129-136.
- Türkmen, M., Dentel, S. K., Chiu\*, P. C. and Hepner, S. (2004) "Analysis of Sulfur and Nitrogen Odorants Using Solid-Phase Micro-Extraction (SPME) and GC-MS" *Water Science & Technology*, 50(4), 115-120.
- DiFrancesco, A. M., Chiu\*, P. C., Standley, L. J., Allen, H. E. and Salvito, D. (2004) "Dissipation of Fragrance Materials in Sludge-Amended Soils" *Environmental Science & Technology*, 38(1), 194-201.
- Dentel, S. K., Strogen, B. and Chiu, P. C. (2004) "Direct Generation of Electricity from Biosolids Using Microbial Fuel Cells" *Biosolids Technical Bulletin*, 9(5), 6-8.

- Oh, S. Y., Chiu, P. C., Kim B. J. and Cha, D. K. (2003) "Enhancing Fenton Oxidation of TNT and RDX through Pretreatment with Zero-Valent Iron" *Water Research*, 37(17), 4275-4283.
- Oh, S. Y., Cha, D. K., Chiu, P. C. and Kim B. J. (2003) Enhancing Oxidation of TNT and RDX in Wastewater: Pretreatment with Elemental Iron" *Water Science & Technology*, 47(10), 93-99.
- Imhoff, P. T., Jakubowitch, A., Briening, M. L. and Chiu, P. C. (2003) "Partitioning Gas Tracer Tests for Measurement of Water in Municipal Solid Waste" *J. Air & Waste Manage. Assoc.*, 53(11), 1391-1400.
- Oh, S. Y., Cha, D. K. and Chiu\*, P. C. (2002) "Graphite-Mediated Reduction of 2,4-Dinitrotoluene with Elemental Iron" *Environmental Science & Technology*, 36(10), 2178-2184.
- Perey, J. R., Chiu, P. C., Huang C. P. and Cha, D. K. (2002) "Zero-valent Iron Pretreatment for Enhancing Biodegradability of Azo Dyes" *Water Environment Research*, 74(3), 221-225.
- Oh, S. Y., Cha, D. K., Kim B. J. and Chiu\*, P. C. (2002) "Effect of Adsorption to Elemental Iron on the Transformation of 2,4,6-Trinitrotoluene and Hexahydro-1,3,5-trinitro-1,3,5-triazine in Solution" *Environmental Toxicology & Chemistry*, 21(7), 1384-1389.
- Perey, J. R., Oh, S. Y., Lubenow, B. L., Cha, D. K., Huang C. P. and P. C. Chiu\* (2001). "Enhancing Biodegradability of Refractory Aromatics: Pretreatment with Elemental Iron" *The 6th International Symposium on In Situ and On-Site Bioremediation*, San Diego, CA, 6(6), 149-155.
- Kim, I. K., Huang, C. P. and Chiu, P. C. (2001) "Sonochemical Decomposition of Dibenzothiophene in Aqueous Solution" *Water Research*, 35(18), 4370-4378.
- Lampron, K. J., Chiu, P. C. and Cha, D. K. (2001) "Reductive Dehalogenation of Chlorinated Ethenes with Elemental Iron: the Role of Microorganisms" *Water Research*, 35(13), 3077-3084.
- Chiu\*, P. C. and Lee M. (2001) "2-Bromoethanesulfonate Affected Bacteria in a Trichloroethene-Dechlorinating Culture" *Applied & Environmental Microbiology*, 67(5), 2371-2374.
- Cha, D. K., Chiu, P. C., Kim, S. D. and Song, J. S. (2000). "Hazardous Waste: Treatment Technologies" *Water Environment Research*, 72(5), 59 pp.
- Lampron, K. J., Chiu\*, P. C. and Cha, D. K. (1998). "Biological Reduction of Trichloroethene Supported by Fe(0)" *Bioremediation Journal*, 2(3&4), 175-181.
- Semadeni, M., Chiu, P. C. and Reinhard, M. (1998). "Reductive Transformation of Trichloroethene Catalyzed by Vitamin B<sub>12</sub>: Reactivities of the Intermediates - Acetylene, Chloroacetylene, and DCE Isomers" *Environmental Science & Technology*, 32(9), 1207-1213.
- Huang, C. P., Wang, H. W. and Chiu, P. C. (1998). "Nitrate Reduction by Metallic Iron" *Water Research*, 32(8), 2257-2264.
- Chiu, P. C. and Reinhard, M. (1996). "Transformation of Carbon Tetrachloride by Reduced Vitamin B<sub>12</sub> in Aqueous Cysteine Solution" *Environmental Science & Technology*, 30(6), 1882-1889.
- Chiu, P. C. and Reinhard, M. (1995). "Metallocoenzyme-Mediated Reductive Transformation of Carbon Tetrachloride in Titanium(III) Citrate Aqueous Solution" *Environmental Science & Technology*, 29(3), 595-603.

## CONFERENCE PROCEEDINGS AND PRESENTATIONS

Ninety-nine conference proceeding papers and presentations, as of 10/31/2006.

Conferences include American Chemical Society (ACS) National Meetings, Gordon Research Conferences, Association of Environmental Engineering and Science Professors (AEESP) Conferences, Society of Environmental Toxicology and Chemistry (SETAC) Meetings, Battelle Remediation Conferences, and Water Environment Federation (WEF) Meetings.

## INVITED TALKS

- 03/06 ACS Special Symposium: *Creative Advances in Environmental Science & Technology*, in Honor of René P. Schwarzenbach, 231st American Chemical Society National Meeting, Atlanta, GA. "Graphite-Mediated Reduction of Nitrogenous Compounds."
- 02/06 Department of Civil and Environmental Engineering, University of Maryland, Baltimore County, Baltimore, MD. "Degradation of Nitro Explosives Using Elemental Iron – From Laboratory Study to Field Demonstration."
- 07/05 School of Environmental Science and Engineering, Shanghai Jiaotong University, Shanghai, China. "Mechanisms for the Reduction of Nitrogenous Compounds with Elemental Iron."
- 07/05 Department of Chemical and Biomolecular Engineering, National Singapore University, Singapore. "Beyond Groundwater Remediation: Applications of Zero-Valent Iron to Drinking Water and Wastewater Treatment."
- 07/05 College of Environmental Science and Engineering, Tongji University, Shanghai, China. "Zero-Valent Iron for Subsurface Permeable Reactive Barriers and Other Environmental Applications."
- 02/05 Department of Civil and Environmental Engineering, Rice University, Houston, TX. "The Roles of Graphite and Atomic Hydrogen in the Reduction of Nitrogenous Compounds with Elemental Iron."
- 06/04 National Taiwan University, Taiwan. "Mechanisms for the Reduction of Nitrogenous Pollutants with Elemental Iron: the Role of Carbon Inclusions"
- 06/04 Industrial Technology Research Institute, Taiwan. "Reductive Degradation of Energetic Compounds – TNT, RDX, HMX, and nitroglycerin – with Elemental Iron and Fenton's Reagent"
- 06/04 National Jiao-Tong University, Taiwan. "*In Situ* Anaerobic Bioremediation and Reactive Iron Barriers for the Reduction of Groundwater Pollutants"
- 06/04 National Cheng-Kung University, Taiwan. "Graphite-Mediated Reduction of Nitrogenous Pollutants with Elemental Iron"
- 06/04 National Chia-Nan University, Taiwan. "Graphite-Mediated Reduction of Nitrogenous Pollutants with Elemental Iron"
- 06/04 National Sun Yat-Sen University, Taiwan. "Regio-Selective Reduction of Nitrogenous Compounds with Commercial Cast Iron: the Role of Graphite Inclusions"
- 06/03 International Flavors and Fragrances, Inc., NJ. "Mechanisms for the Dissipation and Fate of Fragrance Materials in Sludge and Soil."
- 05/01 School of Environmental Science, Engineering, and Policy, Drexel University, PA. "Microbial Reductive Dechlorination Supported by Zero-Valent Iron."

- 03/01 URS Corporation / DuPont Co., Wilmington, DE. "Coupling Microbial and Chemical Dechlorination of TCE in an Iron-Water System."
- 06/99 Department of Civil and Environmental Engineering, Stanford University, CA. "Fate of Trichloroethene in an Iron-Water System in the Presence of a Dechlorinating Culture."
- 02/99 Department of Plant and Soil Sciences, University of Delaware, DE. "Microbial Dechlorination of Trichloroethene Coupled with Anaerobic Fe(0) Corrosion."
- 11/98 DuPont Experimental Station, Wilmington, DE. "Microbial Reductive Dechlorination Supported by Elemental Iron."
- 02/97 Geography and Environmental Engineering, Johns Hopkins University, MD. "The Pathway of Trichloroethene Reduction Mediated by Vitamin B<sub>12</sub>."
- 02/97 Tyndall Air Force Base, Tyndall, FL. "Reductive Transformation of Trichloroethene Catalyzed by Vitamin B<sub>12</sub>."

**ACTIVE AND RECENT GRANTS** (arranged based on end date)

- "Black Carbon-Mediated Reduction of Environmental Contaminants." Delaware EPSCoR Seed Grant Program, PI, with Doug Doren, 9/06 - 8/07.
- "Pilot-Plant Evaluation of an Integrated Iron-Fenton Process for Treatment of Pink Water." ESTCP sub-award through U.S. Army Engineer Research and Development Center, Co-PI, with D. K. Cha, 6/05 - 12/08.
- "Intelligent Bioreactor Management Information System." Department of Energy, Co-PI with P. T. Imhoff (PI) and R. Yazdani, 1/05 - 12/07.
- "Removal and Inactivation of Water-Borne Viruses Using Permeable Reactive Barriers." Delaware Water Resources Research Center, Co-PI with Y. Jin, 1/04 - 12/06.
- "Improving Performance of Wastewater Treatment Facilities Using Zero-Valent Iron." GS Engineering and Construction Corp. (Korea), Co-PI, with D. K. Cha, 6/05 - 5/06.
- "Reductive Removal of Aqueous Perchlorate by Zero-Valent Iron." U.S. Army, Co-PI, with J. W. Gillespie Jr., S. Yarlagadda, and D. K. Cha, 3/05 - 12/05.
- "Partitioning and Biological Uptake of Fragrance Materials in Sediments Receiving Wastewater Discharge." Research Institute for Fragrances Materials, PI, with H. E. Allen and D. Di Toro, 5/04 - 8/05.
- "Microbial Reductive Dechlorination Coupled with Iron Corrosion." National Science Foundation, Faculty Early Career Development (CAREER) Award, PI, 9/00 - 8/05.
- "Removal and Inactivation of Viruses in Drinking Water Using Zero-Valent Iron." National Science Foundation SBIR Grant, Phase I, 1/05 - 6/05. UD sub-award through Corporate Environmental Solutions, PI, with Y. Jin.
- "Enhancing Biodegradability of Refractory Compounds in Wastewater Treatment Facilities Using Elemental Iron." LG Corporation, Co-PI, with D. K. Cha, 4/04 - 03/05.
- "Reductive Removal of Aqueous Perchlorate by Elemental Iron." U.S. Army, Co-PI, with D. K. Cha, 4/04 - 03/05.
- "An Exploration of Odor Producing Mechanisms in Digested Biosolids and Optimal Control Strategies." Vivendi Water/US Filter, PI, with S. K. Dentel, 10/01 - 11/04.

- "Evaluation of Partitioning Gas Tracers for Measuring Water in Bioreactor Landfills." Department of Energy, Co-PI, with P. T. Imhoff, 9/03 - 8/04.
- "Volatilization and Partitioning of Fragrance Materials in Sludge and Soil." Research Institute for Fragrances Materials, PI, with H. E. Allen, 1/03 - 3/04.
- "Pretreatment of Energetic Materials before Biofilter." US Army, Co-PI with D. K. Cha, 7/03 - 12/03.
- "Characterizing Moisture Content within Landfills." U.S. EPA, Co-PI, with M. Tittlebaum of University of New Orleans and P. T. Imhoff, 7/00 - 6/03.
- "Volatilization and Partitioning of Fragrance Materials." Research Institute for Fragrances Materials, PI, with H. E. Allen, 7/02 - 6/03.
- "Odor Production from Landfill Cover Materials." Delaware Solid Waste Authority, Co-PI, with Steven K. Dentel, 3/03 - 4/03.
- "Treatability Study of Nitroglycerin in Wastewater." US Army, Co-PI with D. K. Cha, 4/02 - 3/03.
- "Performance Evaluation of a Pilot-Scale SO<sub>2</sub> Scrubber." Air Quality Management Section, DNREC, PI, 02/02 - 01/03.
- "Development of a Model to Predict the Fate of Fragrance Materials in Sludge-Amended Soils." Research Institute for Fragrances Materials, Co-PI, with L. J. Standley of Stroud Water Research Center and H. E. Allen, 6/00 - 5/02.
- "Enhancing Degradability of Refractory Aromatics in Wastewater: Pretreatment with Elemental Iron." Water Environment Research Foundation, Co-PI with D. K. Cha, 5/00 - 4/02.
- "Enhancing Biodegradability of TNT and Heterocyclic Nitramines in Wastewater: Pretreatment with Elemental Iron." U. S. Army, Co-PI with D. K. Cha, 6/00 - 12/01.
- CAREER Award Equipment Grant, National Science Foundation, 9/01.

## **AWARDS AND HONORS**

- Faculty Early Career Development (CAREER) Award, National Science Foundation, 2000.
- Biosolids Research Award, Vivendi Water/US Filter, 2001.
- Excellence in Teaching Award, College of Engineering, University of Delaware, 2003.
- Fellow, Institute for Transforming Undergraduate Education, University of Delaware, 1997.

## **GRADUATE STUDENT AWARDS**

- Jianchang Ye, Pennsylvania Water Environment Association (PWEA) Student Research Paper Award, "Graphite-Mediated Azobenzene Reduction with Fe(0)." 2004.
- Müserref Türkmen, Air Pollution Educational and Research Award, Mid-Atlantic States Section, Air and Waste Management Association, 2003.
- Müserref Türkmen, Air Pollution Educational and Research Award, Mid-Atlantic States Section, Air and Waste Management Association, 2002.
- Seok-Young Oh, Graduate Student Paper Award, American Chemical Society, Division of Environmental Chemistry, "Graphite-Mediated Reduction of 2,4-Dinitrotoluene with Elemental Iron," 2002.
- Jennie R. Perey, Battelle Student Paper Competition Award, "Enhancing Biodegradability of Azo Dyes through Pretreatment with Elemental Iron," 2002.

## PATENTS

Jin, Y. and Chiu, P. C. "Removal of Microorganisms and Disinfection Byproduct Precursors Using Elemental Iron or Aluminum." Serial No. 60/503,266, Pending.  
Imhoff P. T. and Chiu, P. C. "Partitioning Gas Tracers for Measuring Water in Solid Waste." Serial No. 60/524,965, Pending.

## PROFESSIONAL ACTIVITIES

Proposal Reviewer/Panelist    NSF SBIR/STTR Program  
  NSF CAREER Program  
  NSF-EPA New Technologies for Environment Program  
  EPA Future Atmospheric Chemistry Program  
  American Chemical Society Petroleum Research Foundation  
  Department of State ISTC Program  
  NSF Collaborative Research in Chemistry (CRC) Program

Journal Reviewer                *Environmental Science and Technology*  
  *Biotechnology and Bioengineering*  
  *Water Research*  
  *ASCE Journal of Environmental Engineering*  
  *Water Resources Research*  
  *Bioremediation Journal*  
  *Advances in Environmental Research*  
  *Chemosphere*  
  *Ground Water Monitoring & Remediation*  
  *Journal of Applied Electrochemistry*  
  *Journal of Chemical Technology and Biotechnology*  
  *Journal of Environmental Quality*  
  *Journal of Soil and Sediment Contamination*  
  *Industrial and Engineering Chemistry Research*  
  *Biotechnology Progress*  
  *Environmental Engineering Science*  
  *Chemical Engineering Science*  
  *Marine Environmental Research*  
  *Science of the Total Environment*  
  *Journal of Water Supply: Research and Technology-AQUA*

Affiliation                    American Chemical Society (ACS), Division of Environmental Chemistry  
  Association of Environmental Engineering and Science Professors (AEESP)  
  Society of Environmental Toxicology and Chemistry (SETAC)  
  Chinese American Environmental Protection Association (CAEPA)