PEI C. CHIU
Department of Civil and Environmental Engineering
University of Delaware, Newark, DE 19716, USA
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EDUCATION

7/90 - 1/96	Ph.D., Stanford University, CA. Civil and Environmental Engineering.
9/89 - 6/90	M.S., Stanford University, CA. Civil and Environmental Engineering.
9/83 - 6/87	B.S., National Taiwan University, Taipei, Taiwan. Chemical Engineering.

EXPERIENCE

9/09 - present	Professor, Department of Civil & Environmental Engineering, University of Delaware, DE.
2/18 – 5/18	Visiting Professor, Department of Environmental Systems Science (D-USYS) ETH Zürich, Switzerland.
9/02 – 8/09	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 - 7/96	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

CIEG233: Environmental Engineering Processes (sophomore)
CIEG333: Environmental Engineering Thermodynamics (junior)
CIEG434: Air Pollution Control (junior/senior)
CIEG640: Environmental Organic Chemistry - I (graduate)
CIEG833: Environmental Organic Chemistry - II (graduate)

AWARDS AND HONORS

Fellow, Institute for Transforming Undergraduate Education, University of Delaware.
Faculty Fellow, Delaware Environmental Institute, University of Delaware, 2019.
Top Innovation of 2007, NASA *Tech Briefs*, 2007.
Excellence in Teaching Award, College of Engineering, University of Delaware, 2003.
Biosolids Research Award, Vivendi Water/US Filter, August 2001.
NSF Faculty Early Career Development (CAREER) Award, 2000.

SELECTED REFEREED PUBLICATIONS

Xin, D., Li, W., Choi, J., Yu, Y.-H., Chiu*, P. C. (2023) "Pyrogenic Black Carbon Suppresses Microbial Methane Production by Serving as a Terminal Electron Acceptor" *Environmental Science & Technology*, in press. DOI: 10.1021/acs.est.3c05830

Cárdenas-Hernández, P. A., Hickey, K. P., Di Toro, D. M., Allen, H. E., Carbonaro, R. F. and Chiu*, P. C. (2023) "Linear Free Energy Relationship for Predicting the Rate Constants of Munition Compound Reduction by the Fe(II)-Hematite and Fe(II)-

Goethite Redox Couples" *Environmental Science & Technology*, 57(36):13646–13657. DOI: 10.1021/acs.est.3c04714

Hickey, K. P., Cárdenas-Hernández, P. A., Di Toro*, D. M., Allen, H. E., Carbonaro, R. F. and Chiu, P. C. (2023) "Thermodynamic Two-Site Surface Reaction Model for Predicting Munition Constituent Reduction Kinetics with Iron (Oxyhydr)oxides" *Environmental Science & Technology*, 57(33):12411–12420. DOI: 10.1021/acs.est.3c02651

Zhu, L., Chattopadhyay, S., Akanbi, O. E., Lobo, S., Panthi, S., Malayil, L., Craddock, H. A., Allard, S. M., Sharma, M., Kniel, K. E., Mongodin, E. F., Chiu, P. C., Sapkota, A. and Sapkota*, A. R. (2023) "Biochar and Zero-valent Iron Sand Filtration Simultaneously Removes Contaminants of Emerging Concern and *Escherichia coli* from Wastewater Effluent" *Biochar*, 5, 41. doi.org/10.1007/s42773-023-00240-y

Murillo-Gelvez, J., Hickey, K. P., Di Toro, D. M., Allen, H. E., Carbonaro, R. F. and Chiu*, P. C. (2023) "Electron Transfer Energy and Hydrogen Atom Transfer Energy-Based Linear Free Energy Relationships for Predicting the Rate Constants of Munition Constituent Reduction by Hydroquinones" *Environmental Science & Technology*, 57(13):5284–5295. doi.org/10.1021/acs.est.2c08931

Hickey, K. P., Murillo-Gelvez, J., Di Toro*, D. M., Allen, H. E., Carbonaro, R. F. and Chiu, P. C. (2022) "Modeling the Reduction Kinetics of Munition Compounds by Humic Acids" *Environmental Science & Technology*, 56(8):4926–4935. doi.org/10.1021/acs.est.1c06130

Xin, D., Giron, J., Fuller, M. E. and Chiu*, P. C. (2022) "Abiotic Reduction of 3-Nitro-1,2,4-triazol-5-one (NTO) and Other Munitions Constituents by Wood-Derived Biochar through Its Rechargeable Electron Storage Capacity" *Environmental Science: Processes & Impacts*, 24, 316–329. doi.org/10.1039/D1EM00447F

Akanbi, O. E., Kim, I., Cha, D. K., Chiu*, P. C., Attavane, A. A., Hubbard, B. P. (2022) "A Synergistic Nano-Zerovalent Iron-Hydrogen Peroxide Technology for Insensitive Munitions Wastewater Treatment" *Propellants, Explosives, Pyrotechnics*, 47, e202100300. doi.org/10.1002/prep.202100300

Fuller, M. E., Farquharson, E. M., Hedman, P. C. and Chiu, P. C. (2022) "Removal of Munition Constituents in Stormwater Runoff: Screening of Native and Cationized Cellulosic Sorbents for Removal of Insensitive Munition Constituents NTO, DNAN and NQ, and Legacy Munition Constituents HMX, RDX, TNT, and Perchlorate" *Journal of Hazardous Materials*, 424, Part C, 127335. doi.org/10.1016/j.jhazmat.2021.127335

Murillo-Gelvez, J., Di Toro, D. M., Allen, H. E., Carbonaro, R. F. and Chiu*, P. C. (2021) "Reductive Transformation of 3-Nitro-1,2,4-triazol-5-one (NTO) by Leonardite Humic Acid and AQDS" *Environmental Science & Technology*, 55(19):12973–12983. doi.org/10.1021/acs.est.1c03333

Xin, D., Saha, N., Reza, M. T., Hudson, J. and Chiu*, P. C. (2021) "Pyrolysis Creates Electron Storage Capacity of Black Carbon (Biochar) from Lignocellulosic Biomass" *ACS Sustainable Chemistry & Engineering*, 9(19), 6821–6831. DOI:10.1021/acssuschemeng.1c01251

Kim, S., Eckart, K., Sabet, S., Chiu, P. C., Sapkota, A. R., Handy, E. T., East, C. L., Kniel, K. E. and Sharma, M. (2021) "*Escherichia coli* Reduction in Water by

Zero-valent Iron Sand Filtration Is Based on Water Quality Parameters" *Water*, 13(19), 2702. doi.org/10.3390/w13192702

Anderson-Coughlin, B. L., Litt, P. K., Kim, S., Craighead, S., Kelly, A. J., Chiu, P. C., Sharma, M. and Kniel, K. E. (2021) "Zero-Valent Iron Filtration Reduces Microbial Contaminants in Irrigation Water and Transfer to Raw Agricultural Commodities" *Microorganisms*, 9(10), 2009. doi.org/10.3390/microorganisms9102009

Hickey, K. P., Di Toro*, D. M., Allen, H. E., Carbonaro, R. F. and Chiu, P. C. (2020) "A Unified Linear Free Energy Relationship for Abiotic Reduction Rate of Nitroaromatics and Hydroquinones using Quantum Chemically Estimated Energies" *Environmental Toxicology & Chemistry*, 39(12), 2389-2395. DOI:10.1002/etc.4867

Kulkarni, P., Olson, N. D., Bui, A. Q., Bradshaw, R. N., Del Collo, L. P., Hittle, L. E., Handy, E. T., Paulson, J. N., Ghurye, J., Nasko, D. J., East, C., Kessel, J. A. V., Kniel, K. E., Chiu, P. C., Mongodin, E. F., Pop, M., Sharma, M. and Sapkota, A. R. (2020) "Zero-Valent Iron Sand Filtration Can Reduce Human and Plant Pathogenic Bacteria While Increasing Plant Growth Promoting Bacteria in Reclaimed Water" *Frontiers in Environmental Science*, 8:541921. DOI:10.3389/fenvs.2020.541921

Cárdenas-Hernández, P. A., Anderson, K. A., Murillo-Gelvez, J., Di Toro, D. M., Allen, H. E., Carbonaro, R. F. and Chiu*, P. C. (2020) "Reduction of 3-Nitro-1,2,4-Triazol-5-One (NTO) by the Hematite–Aqueous Fe(II) Redox Couple" *Environmental Science & Technology*, 54(19), 12191–12201. DOI:10.1021/acs.est.0c03872

Xin, D. and Chiu*, P. C. (2020) "Visualizing the Distribution of Black Carbon's Electron Storage Capacity Using Silver" *MethodsX*, 7, 100838. https://doi.org/10.1016/j.mex.2020.100838

Di Toro*, D. M., Hickey, K. P., Allen, H. E., Carbonaro, R. F. and Chiu, P. C. (2020) "Hydrogen Atom Transfer Reaction Free Energy as a Predictor of Abiotic Nitroaromatic Reduction Rate Constants: A Comprehensive Analysis" *Environmental Toxicology & Chemistry*, 39(9), 1678-1684. DOI:10.1002/etc.4807

Kim, S., Bradshaw, R. N., Kulkarni, P., Allard, S., Chiu, P. C., Sapkota, A. R., Newell, M. J., Handy, E. T., East, C. L., Kniel, K. E. and Sharma, M. (2020) "Zero-valent Iron Filtration Reduces *Escherichia coli* in Surface Water and Leafy Green Growing Environments" *Front. Sustain. Food Syst.*, 4:112. DOI:10.3389/fsufs.2020.00112

Xin, D., Barkley, T. and Chiu*, P. C. (2020) "Visualizing Electron Storage Capacity Distribution in Biochar through Silver Tagging" *Chemosphere*, 248, 125952. https://doi.org/10.1016/j.chemosphere.2020.125952

Murillo-Gelvez, J., Hickey, K. P., Di Toro, D. M., Allen, H. E., Carbonaro, R. F. and Chiu*, P. C. (2019) "Experimental Validation of Hydrogen Atom Transfer Gibbs Free Energy as a Predictor of Nitroaromatic Reduction Rate Constants" *Environmental Science & Technology*, 53(10), 5816-5827.

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Chopyk, J., Kulkarni, P., Nasko, D. J., Bradshaw, R. N., Kniel, K. E., Chiu, P. C., Sharma, M., and Sapkota, A. R. (2019) "Zero-valent Iron Sand Filtration Reduces Concentrations of Virus-Like Particles and Modifies Virome Community Composition in Reclaimed Water Used for Agricultural Irrigation" *BMC Research Notes*, 12:223, 8 pp.

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Kulkarni, P., Raspanti, G. A., Bui, A. Q., Bradshaw, R. N., Kniel, K. E., Chiu, P. C., Sharma, M., Sapkota, A. and Sapkota, A. R. (2019) "Zerovalent Iron-Sand Filtration Can Reduce the Concentration of Multiple Antimicrobials in Conventionally Treated Reclaimed Water" *Environmental Research*, 172, 301-309.

Xin, D., Xian, M. and Chiu*, P. C. (2019) "New Methods for Assessing Electron Storage Capacity and Redox Reversibility of Biochar" *Chemosphere*, 215, 827-834.

Tian, J., Jin, J., Chiu, P. C., Cha, D. K., Guo, M. and Imhoff*, P. T. (2019) "A Pilot-Scale, Bi-layer Bioretention System with Biochar and Zero-Valent Iron for Enhanced Nitrate Removal from Stormwater" *Water Research*, 148, 378-387.

Xin, D., Xian, M. and Chiu*, P. C. (2018) "Chemical Methods for Determining the Electron Storage Capacity of Black Carbon" *MethodsX*, 5, 1515-1520.

#Saquing, J., Yu, Y.-H. and Chiu*, P. C. (2016) "Wood-Derived Black Carbon (Biochar) as a Microbial Electron Donor and Acceptor" *Environmental Science & Technology Letters*, 3(2), 62-66.
#One of the most highly cited *ES&TL* papers since 2015.

Tian, J., Miller, V., Chiu, P. C., Maresca, J. A., Guo, M. and Imhoff, P. T. (2016) "Nutrient Release and Ammonium Sorption by Poultry Litter and Wood Biochars in Stormwater Treatment" *Science of the Total Environment*, 553, 596-606.

Zhang, C., Weiss, A., Lin, C., Li, H., Joerger, R. and Chiu, P. C. (2016) "Effects of Multiple Litter Amendment Applications in Commercial Broiler Houses on Ammonia Emissions and Litter Microflora" *Trans. ASABE*, 59(5), 1393-1401.

Oh, S.-Y., Son, J.-G. and Chiu, P. C. (2015) "Black Carbon-Mediated Reductive Transformation of Nitro Compounds by Hydrogen Sulfide" *Environmental Earth Sciences*, 73, 1813-1822.

Yi, S., Witt, B., Chiu, P. C., Guo, M. and Imhoff*, P. T. (2015) "The Origin and Reversible Nature of Poultry Litter Biochar Hydrophobicity" *Journal of Environmental Quality*, 44(3), 963-971.

Wang, Y., Lin, Y., Chiu, P. C., Imhoff, P. T. and Guo*, M. (2015) "Phosphorus Release Behaviors of Poultry Litter Biochar as a Soil Amendment" *Science of the Total Environment*, 512/513, 454-463.

Yu, Y.-H. and Chiu*, P. C. (2014) "Kinetics and Pathway of Vinyl Fluoride Reduction over Rhodium" *Environmental Science & Technology Letters*, 1(11), 448-452.

Oh, S.-Y., Son, J.-G., Hur, S. H., Chung, J. S. and Chiu P. C. (2013) "Black Carbon-Mediated Reduction of 2,4-Dinitrotoluene by Dithiothreitol" *Journal of Environmental Quality*, 42(3), 815-821.

Chiu, P. C. (2013) "Applications of Zero-Valent Iron (ZVI) and Nanoscale ZVI to Municipal and Decentralized Drinking Water Systems – A Review" In: *Novel*

Solutions to Water Pollution, American Chemical Society, Washington, DC, pp. 237–249.

Oh, S.-Y., Son, J.-G. and Chiu P. C. (2013) "Biochar-Mediated Reductive Transformation of Nitro Herbicides and Explosives" *Environmental Toxicology & Chemistry*, 32(3), 501-508.

Shi, C., Wei, J., Jin, Y., Kniel, K. E. and Chiu*, P. C. (2012) "Removal of Viruses and Bacteriophages from Drinking Water Using Zero-Valent Iron" *Separation and Purification Technology*, 84, 72-78.

Ingram, D. T., Callahan, M. T., Ferguson, S., Hoover, D. G., Chiu, P. C., Shelton, D. R., Millner, P. D., Camp, M. J., Patel, J. R., Kniel, K. E., Sharma, M. (2012) "Use of Zero-Valent Iron Biosand Filters to Reduce *Escherichia coli* O157:H12 in Irrigation Water Applied to Spinach Plants in a Field Setting" *Journal of Applied Microbiology*, 112, 551-560.

Oh, S.-Y., Son, J.-G., Lim, O.-T. and Chiu P. C. (2012) "The Role of Black Carbon as a Catalyst for Environmental Redox Transformation" *Environmental Geochemistry and Health*, 34(1), 105-113.

Jung, Y., Han, B., Mostafid, M. E., Chiu, P., Yazdani, R. and Imhoff, P. T. (2012) "Photoacoustic Infrared Spectroscopy for Conducting Gas Tracer Tests and Measuring Water Saturations in Landfills" *Waste Management*, 32(2), 297-304.

Phillips, K. L., Sandler, S. I. and Chiu, P. C. (2011) "A Method to Calculate the One-Electron Reduction Potentials for Nitroaromatic Compounds Based on Gas-Phase Quantum Mechanics." *Journal of Computational Chemistry*, 32(2), 226-239.

Oh, S.-Y., Kang, S.-G., Kim, D.-W. and Chiu P. C. (2011) "Degradation of 2,4-Dinitrotoluene by Persulfate Activated with Iron Sulfides" *Chemical Engineering Journal*, 172(2/3), 641-646.

Phillips, K. L., Chiu, P. C. and Sandler, S. I. (2010) "Reduction Rate Constants for Nitroaromatic Compounds Estimated from Adiabatic Electron Affinities." *Environmental Science & Technology*, 44(19), 7431-7436.

Yazdani, R., Mostafid, M. E., Han, B., Imhoff, P. T., Chiu, P. C., Augenstein, D., Kayhanian, M. and Tchobanoglous, G. (2010) "Quantifying Factors Limiting Aerobic Activity During Aerobic Bioreactor Landfilling" *Environmental Science & Technology*, 44(16), 6215-6220.

Oh, S. Y., Kang, S. G. and Chiu P. C. (2010) "Degradation of 2,4-Dinitrotoluene by Persulfate Activated with Zero-Valent Iron" *Science of the Total Environment*, 408, 3464-3468.

Oh, S. Y. and Chiu*, P. C. (2009) "Graphite- and Soot-Mediated Reduction of 2,4-Dinitrotoluene and Hexahydro-1,3,5-trinitro-1,3,5-triazine" *Environmental Science & Technology*, 43(18), 6983-6988.

Oh, S. Y., Chiu, P. C. and Cha, D. K. (2008) "Reductive Transformation of 2,4,6-Trinitrotoluene, Hexahydro-1,3,5-trinitro-1,3,5-triazine, and Nitroglycerin by Pyrite and Magnetite" *Journal of Hazardous Materials*, 158(2/3), 652-655.

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.

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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.

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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.

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Chiu*, P. C. and Lee M. (2001) "2-Bromoethanesulfonate Affected Bacteria in a Trichloroethene-Dechlorinating Culture" *Applied & Environmental Microbiology*, 67(5), 2371-2374.

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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_{12}: 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_{12} 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.

INVITED TALKS

03/23 2023 American Chemical Society (ACS) National Meeting, Indianapolis, IN. Invited talk in the session *Aquatic Redox Chemistry*, "Electron Transfer Energy and Hydrogen Atom Transfer Energy-based LFERs for Predicting Reaction Rate Constants of Nitro Contaminants with Hydroquinones."

11/22 2022 SERDP and ESTCP Symposium, *Legacy, and Insensitive High Explosive Constituents: Fate, Transport, Treatment*, "Predicting the Kinetics of Munition Compound (MC) Reduction by Redox-Active Soil Constituents."

04/21 2021 American Chemical Society (ACS) National Meeting (virtual). Invited talk in the Symposium *Biogeochemical Transformation in the Underground Environment*, "On the Electron Storage Capacity of Black Carbon: Origin, Reversibility, Spatial Distribution, and Biogeochemical Implications.

08/19 The 19th Southern School on Chemistry and Engineering Conference. "Reversible Electron Storage as a New Mechanism for Black Carbon-Mediated Redox Transformation."

04/18 Environmental Engineering Institute, School of Architecture, Civil and Environmental Engineering, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland. "Exploring the Electron Storage Capacity of Black Carbon (Biochar)."

04/18 Institute of Biogeochemistry and Pollutant Dynamics, Department of Environmental Sciences, ETH Zürich, Switzerland. "Exploring the Electron Storage Capacity of Black Carbon (Biochar)."

10/17 Department of Civil and Environmental Engineering, University of Maryland, College Park, MD. "Abiotic and Microbial Redox Transformation Reactions Mediated by Black Carbon."

08/17 Keynote speaker, The 254th American Chemical Society (ACS) National Meeting, Washington, DC. Platform presentation. "Mechanisms for Black Carbon-Mediated Abiotic Redox Transformation Reactions."

05/17 Peking University, College of Urban and Environmental Sciences, Beijing, China. "Mechanisms for Redox Transformation Mediated by Biochar and Other Black Carbon."

05/17 Chinese Academy of Sciences (CAS), State Key Laboratory of Environmental Aquatic Chemistry, Beijing, China. "Mechanisms for Abiotic and Microbial Transformation of Contaminants Mediated by Black Carbon."

12/16 National Kaohsiung Marine University, Taiwan. "Black Carbon as a Redox Catalyst and Microbial Electron Storage Medium for Stormwater Contaminant Degradation."

05/16 Industrial Technology Research Institute, Hsinchu, Taiwan. "Biochar as a Reversible Electron Storage Medium to Enhance Stormwater Bioremediation."

04/16 MATS UTC Research Webinar Series. "Simultaneous Removal of Nitrogen and Phosphorus from Stormwater by Zero-Valent Iron and Biochar in Bioretention Cells."

04/15 Department of Civil and Environmental Engineering, Penn State University, University Park, PA. "The Mechanism for Biochar-Promoted Microbial Nitrate Reduction."

02/15 Department of Civil and Environmental Engineering, University of Virginia, Charlottesville, VA. "Microbial Nitrate Reduction Promoted by Zero-Valent Iron and Biochar."

12/14 DENIN Environmental Frontier Seminar Series, Newark, DE. "Microbial Reduction of Nitrate Promoted by Zero-Valent Iron and Black Carbon (Biochar)."

11/14 State Key Laboratory of Environmental Aquatic Chemistry, Chinese Academy of Sciences (CAS), Beijing, China. "Catalytic Reduction of Vinyl Fluoride over Rhodium: Kinetics, Pathway, and the Critical Role of Water."

02/14 National Cheng-Kung University, Taiwan. "Kinetics, Pathway, and Mechanism for the Catalytic Reduction of Fluoroethene by Hydrogen over Rhodium."

08/13 National Cheng-Kung University, Taiwan. "From Iron Wall to Chicken Poop: The Role of Carbon in Environmental Redox Catalysis."

03/13 Air Liquide, Delaware Research and Technology Center, Newark, DE. "Preventing Formation of Total Trihalomethanes (TTHM) in Drinking Water Using Zero-Valent Iron."

03/13 Third Annual Delaware Sustainable Chemistry Summit, Delaware Biotechnology Institute, Newark, DE. "Preventing Formation of Toxic DBPs in Drinking Water Using ZVI."

02/13 Delaware River Water Alliance, First Topical Meeting on Water Technology, King of Prussia, PA. "Using ZVI for Drinking Water Treatment"

09/12 2012 CAPA Annual Meeting, National Agricultural Library, Washington, DC. "Improving Drinking Water Treatment through Use of Zero-Valent Iron (ZVI) and Nanoscale ZVI."

07/12 Beijing Construction Engineering Group Environmental Remediation Compary, Beijing, China. "The Mechanisms for the Reductive Degradation of Nitro Explosive Compounds by Granular Iron."

04/12 Department of Civil and Environmental Engineering, Villanova University, Villanova, PA. "Improving Drinking Water Treatment through Use of Zero-Valent Iron (ZVI) and Nanoscale ZVI."

04/12 Department of Plant and Soil Sciences, University of Delaware, Newark, DE. "The Discovery of Black Carbon as a Mediator of Organic Contaminant Redox Transformation in Reducing Environments."

03/12 College of Bioresources and Agriculture, National Taiwan University, Taiwan. "Environmental Nanotechnology: Application of Iron Nanoparticle Media to Drinking Water Purification."

03/12 Department of Agricultural Chemistry, National Taiwan University, Taiwan. "Abiotic Oxidation-Reduction Reactions of Organic Contaminants in Environmental Systems."

03/12 College of Bioresources and Agriculture, National Taiwan University, Taiwan. "A Novel Remediation Approach Inspired by a New Redox Mechanism in Reactive Iron Barriers."
03/12 Second Annual Delaware Sustainable Chemistry Summit, Newark, DE. "Innovations for Clean Drinking Water: Zero-Valent Iron."
02/12 Department of Civil and Environmental Engineering, Temple University, Philadelphia, PA. "Improving Drinking Water Treatment through Use of Zero-Valent Iron (ZVI) and Nanoscale ZVI."
09/11 State Key Laboratory of Environmental Aquatic Chemistry, Chinese Academy of Sciences, Beijing, China. "A Novel Remediation Approach Inspired by a Redox Mechanism in Reactive Iron Barriers.
03/11 2011 IWA Workshop for Young Water Professionals, National Taiwan University, Taipei, Taiwan. "A Few Things I Learned … Or Wish I Had."
01/11 National Chiao-Tung University, Taiwan. "Black Carbon as a Catalyst of Environmental Transformation Reactions…And Beyond."
12/10 University of Ulsan, Ulsan, South Korea. "The Discovery of Black Carbon as an Environmental Redox Mediator."
11/10 Industrial Technology Research Institute, Taiwan. "Nanoscale Zero-Valent Iron (nZVI) for Portable Drinking Water Treatment."
10/10 National Taiwan University of Science and Technology, Taipei, Taiwan. "Graphitic Carbon-Catalyzed Reductive Degradation of Organic Contaminants."
10/10 Keynote speaker, 2010 Annual Conference on Civil and Ecological Engineering, Kaohsiung, Taiwan. "Applications of Zero-Valent Iron (ZVI) and Nanoscale ZVI to Drinking Water Treatment."
10/10 Department of Environmental Engineering, National Chung Hsing University, Taichung, Taiwan. "Black Carbon-Mediated Reductive Transformation of Nitrogenous Pollutants."
04/10 The Inaugural Delaware Environmental Institute (DENIN) Symposium, Newark, DE. "Potential Impacts of Biochar Addition on Soil Transport Properties, Nutrient Levels, and Greenhouse Gas Emissions."
07/09 2009 International Workshop on Integrated Watershed Management (IWIWM), Taipei, Taiwan. "Application of Zero-Valent Iron to Drinking Water Treatment."
06/09 The Chesapeake Section of American Water Works Association (CSAWWA), Milford DE. "Simultaneous Removal of Viruses, DBP Precursors, Arsenic, and Iron Using Zero-Valent Iron."
09/08 ACHMM 2008 National Conference, Nicollet Mall, Minneapolis, MN. "Synergistic Treatment of Hazardous Chemicals Using Zero-Valent Iron and Graphite."
11/07 The 5th UNU & GIST Joint Workshop on Sound Management of Hazardous Chemicals and Sustainable Energy, Gwangju Institute of Science and Technology, Gwangju, Korea. "Removal of Viruses from Water Supply Using Zero-Valent Iron."
10/07 Penn State Institute of Energy and the Environment, Penn State Harrisburg, PA. "Removal of Microbial Pathogens from Drinking Water Using Zero-Valent Iron."
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."

03/06 School of Civil Engineering, Purdue University, West Lafayette, IN. "Graphite-Mediated Transformation of Nitrogenous Contaminants by Zero-Valent Iron."

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_{12}."

02/97 Tyndall Air Force Base, Tyndall, FL. "Reductive Transformation of Trichloroethene Catalyzed by Vitamin B_{12}."

CONFERENCE PROCEEDINGS AND PRESENTATIONS

Over two hundred conference proceedings and presentations:

- American Chemical Society (ACS) National Meeting
- Gordon Research Conference
- Goldschmidt Conference
- Association of Environmental Engineering & Science Professors (AEESP) Meeting
- SERDP and ESTCP Annual Meeting
- American Geographical Union (AGU) Annual Meeting
- Society of Environmental Toxicology & Chemistry (SETAC) Meeting
- Battelle Bioremediation Conference
- Water Environment Federation (WEF) Conference
- AWWA Water Quality Technology Conference
- International Association of Food Protection (IAFP) Annual Meeting

RESEARCH GRANTS

"Flexible Wastewater Treatment Train for Munitions Production" DoD Life Cycle Pilot Process (LCPP) Program, Co-PI, w/ Brian P. Hubbard (PI) et al., 1/24-12/25.

"Designing Microbial Biochar Technologies for Promoting Healthy and Sustainable Rice Production." Interdisciplinary Frontier Grant Program, University of Delaware, Co-PI, w/ Clara Chan (PI) and Angelia Seyfferth, 9/23-8/24.

ER19-C3-1106: "Development of Innovative Passive and Sustainable Treatment Technologies for Energetic Compounds in Surface Runoff on Active Ranges." Strategic Environmental Research and Development Program (SERDP), Co-PI, w/ Mark E. Fuller (Aptim), 8/19-7/24.

ER-2617: "Measuring and Predicting the Natural and Enhanced Rate and Capacity of Abiotic Reduction of Munitions Constituents." Strategic Environmental Research and Development Program (SERDP), PI, w/ Dom Di Toro and Herb Allen, 7/16-7/24.

ER22-3415: "Novel Swellable Ionomers for Enhanced PFAS Sorption and Destruction." Strategic Environmental Research and Development Program (SERDP), Co-PI, w/ Seetha Coleman-Kammula (PI, STRIDE), 5/22-12/23.

"Tailored Ionomers for Targeted Removal of PFAS from Drinking Water." Delaware Bioscience CAT Applied Research Collaborations Grant, PI, w/ Seetha Coleman-Kammula (STRIDE), 5/22-4/23.

ER18-5049: "An Integrated Nanoscale Zero-Valent Iron-Hydrogen Peroxide Process for Rapid and Complete Destruction of Munitions Compounds in Wastewater." Environmental Security Technology Certification Program (ESTCP), Co-PI, w/ Brian P. Hubbard (PI) and Daniel K. Cha, 5/19-5/23.

ER-2617 Supplemental Grant: "Measuring and Predicting the Natural and Enhanced Rate and Capacity of Abiotic Reduction of Munitions Constituents." Strategic Environmental Research and Development Program (SERDP), PI, w/ Dom Di Toro and Herb Allen, 9/17-12/23.

"Evaluation of Pyrolysis as a Potential Option for Scrap Tire Management in Delaware." Department of Natural Resources and Environmental Control (DNREC), PI, w/ Mingxin Guo (Delaware State University), Dominic Di Toro, and Paul Imhoff, 9/20-5/22.

"CONSERVE: A Center of Excellence at the Nexus of Sustainable Water Reuse, Food, and Health." USDA Agriculture and Food Research Initiative (AFRI), Co-PI, with Amy Sapkota et al., 3/16-3/21.

"Removing Nitrate from Stormwater with Biochar Amendment to Roadway Soils." Mid-Atlantic Transportation Sustainability University Transportation Center (MAST–UTC), Co-PI, w/ Paul T. Imhoff (PI) and Teresa Culver (UVa), 5/17-5/18.

"Integrating Zero-Valent Iron and Biochar Amendments in Green Stormwater Management Systems for Enhanced Treatment of Roadway Runoff – Field Demonstration." Delaware Department of Transportation (DelDOT), Co-PI, w/ Paul T. Imhoff (PI), Daniel K. Cha, Julia A. Maresca, and Mingxin Guo (Del State), 5/16-5/17.

"Reducing Stormwater Volume and Nutrients with Biochar" National Fish and Wildlife Foundation – Chesapeake Bay Innovative Nutrient and Sediment Program, Co-PI, w/ Paul T. Imhoff and Julia A. Maresca, 9/14-8/17.

"Pilot-Scale Investigation of an Integrated Biological-Zero-Valent Iron ("Bio-ZVI") Technology for Nitrate Removal from Water." HKF Technology, LLC, PI, w/ Daniel K. Cha, 9/15-9/16.

"Integrating Zero-Valent Iron and Biochar Amendments in Green Stormwater Management Systems for Enhanced Treatment of Roadway Runoff – Field Demonstration." Delaware Department of Transportation (DelDOT), Co-PI, w/ Paul T. Imhoff (PI), Daniel K. Cha, Julia A. Maresca, and Mingxin Guo (Delaware State University), 9/15-8/16.

"Reducing Stormwater Runoff and Pollutant Loading with Biochar Addition to Highway Greenway" Transportation Research Board, NCHRP IDEA Program, Co-PI, w/ Paul T. Imhoff (PI), 3/15-2/17.

"Understanding Nitrate Reduction by Exoelectrogenic Microbes Supported by Black Carbon and ZVI." DENIN Environmental Frontier Grant, PI, w/ Paul T. Imhoff and Mingxin Guo, 2/14-8/15.

"Integrating Zero-Valent Iron and Biochar Amendments in Green Stormwater Management Systems for Enhanced Treatment of Roadway Runoff: Phase III Field Demonstration." Delaware Department of Transportation (DelDOT), Co-PI, w/ Paul T. Imhoff (PI), Daniel K. Cha, Julia A. Maresca, and Mingxin Guo (Delaware State University), 9/13-8/14.

"Enhancing Nitrogen Removal in Stormwater Treatment Facilities for Transportation." Center for Advanced Infrastructure and Transportation, Co-PI, w/ Paul T. Imhoff (PI) and Qizhong Guo (Rutgers, the State University of New Jersey), 1/14-12/14.

"Developing and Evaluating an Innovative Litter Amendment Application System For Poultry Operations." USDA, AFRI Program, Co-PI, with Hong Li (PI), Eric Benson, Rolf Joerger, Carl Schmidt, Daniel Bautista, and Jennifer Timmons (University of Maryland), 9/13-8/15.

"Integrating Zero-Valent Iron and Biochar Amendments in Green Stormwater Management Systems for Enhanced Treatment of Roadway Runoff – Phase II: Field Evaluation." Delaware Department of Transportation. Co-PI, w/ Paul T.

Imhoff (PI), Daniel K. Cha, Julia A. Maresca and Mingxin Guo (Delaware State University), 9/12-8/13.

"Frequent Application of Litter Amendments in Broiler Houses during Grow-out on Animal Health, Production, and Environment." U.S. EPA, Co-PI, with Hong Li (PI), Eric Benson, Rolf Joerger, Kali Kniel, and Yan Jin, 10/12-3/14.

"Disinfection Byproduct Precursor Removal by Zero-Valent Iron for Drinking Water Purification." Delaware Sustainable Chemistry Alliance (DESCA), PI, 10/12-3/13.

"Integrating Zero-Valent Iron and Biochar Amendments in Green Stormwater Management Systems for Enhanced Treatment of Roadway Runoff." Delaware Department of Transportation. Co-PI, w/ Daniel K. Cha (PI), Paul T. Imhoff, Julia A. Maresca and Mingxin Guo (Delaware State University), 9/11-12/12.

"Removal of Natural Organic Matter (NOM) through Use of Zero-Valent Iron in Water Treatment Plants." Air Liquide, PI, 10/12-3/13.

"Mitigation of Irrigation Water Using Zero-Valent Iron Treatment." Center for Produce Safety and California Leafy Greens Research Board, Co-PI, with Kalmia E. Kniel (PI) and Dallas Hoover (Animal and Food Sciences), 10/09 - 9/11.

"Understanding the Mechanisms for the Reduction in Greenhouse Gas Emissions from Soil by Biochar Addition." Delaware EPSCoR Seed Grant Program, PI, with Paul Imhoff and Mingxin Guo (Delaware State University), 1/10 - 6/11.

"Developing a Multi-Functional Nanoparticle-Enhanced Filter Media for Decentralized Water Purification Systems." National Science Foundation, SBIR Phase I, 1/10 - 6/11. UD sub-award through HydroQual, Inc., PI.

"Quantifying Capture Efficiency of Gas Collection Systems with *In Situ* Gas Tracers." Environmental Research and Education Foundation (EREF), Co-PI, with Paul T. Imhoff (PI), Ramin Yazdani (Yolo County, CA), and Don Augenstein (Institute for Environmental Management, CA), 1/10 - 8/11.

"Mitigation of Irrigation Water Using Zero-Valent Iron Treatment." Center for Produce Safety and California Leafy Greens Research Board, 10/09 - 9/11, Co-PI, with Kalmia E. Kniel (PI) and Dallas Hoover (Animal and Food Sciences).

"Intelligent Bioreactor Management Information System – Extension." Department of Energy, Co-PI, with Paul T. Imhoff (PI) and Ramin Yazdani (Yolo County, CA), IEM, and Hydro Geo Chem, 6/08 - 4/10.

"Improved Filtration Technologies for Pathogen Inactivation in Rural and International Water Supplies." International Research Award, University of Delaware Office of International Studies, Co-PI, with Steve Dentel (PI), George Elambo Nkeng (ENSTP), and Diane Herson (Biology), 7/08 - 6/09.

"Intelligent Bioreactor Management Information System." Department of Energy, Co-PI with P. T. Imhoff (PI) and R. Yazdani, 1/05 - 12/08.

"Enhancing Removal of Viruses in Water Treatment Plants Using Zero-Valent Iron" AWWA Research Foundation, PI, with Yan Jin and Kali Kniel, 10/07 – 1/09.

"Synergistic Treatment of Hazardous Chemicals Using Zero-Valent Iron and Graphite." IHMM John J. McCambridge Research Grant, PI, 6/07 - 5/08.

"Black Carbon-Mediated Reduction of Environmental Contaminants." Delaware EPSCoR Seed Grant Program, PI, with Doug Doren, 9/06 - 2/08.

"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.

"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, $200,001.

"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 - 3/05.

"Reductive Removal of Aqueous Perchlorate by Elemental Iron." U.S. Army, Co-PI, with D. K. Cha, 4/04 - 3/05.

"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_2 Scrubber." Air Quality Management Section, DNREC, PI, 2/02 - 1/03.

"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, $10,000.

STUDENT AWARDS

Jiwon Choi, Climate Hub Graduate Research Enhancement Grant, October 2023.

Paula Andrea Cárdenas Hernández, MIT Postdoctoral Fellowship for Engineering Excellence, June 2023.

Paula Andrea Cárdenas Hernández, Honorable Mention Finalist for C. Ellen Gonter Graduate Student Paper Award in Environmental Chemistry, American Chemical Society, April 2023.

Paula Andrea Cárdenas Hernández, Hagerty Environmental Engineering Graduate Award, College of Engineering, University of Delaware, March 2023.

Danhui Xin, 2022 Air Pollution Educational and Research Trust Fund Grant (APERG), Air & Waste Management Association (A&WMA), August 2022.

Paula Andrea Cárdenas Hernández, Environmental Engineering Graduate Research Award, College of Engineering, April 2022.

Danhui Xin, 2021 Air Pollution Educational and Research Trust Fund Grant (APERG), Air & Waste Management Association (A&WMA), August 2021.

Danhui Xin, 2021 ACSenvr-SETAC Travel Exchange Award, American Chemical Society, May 2021.

Danhui Xin, C. Ellen Gonter Graduate Student Paper Award in Environmental Chemistry, American Chemical Society, April 2021.

Oluwasegun Elijah Akanbi, Hagerty Environmental Engineering Graduate Award, College of Engineering, April 2021.

Jimmy Gelvez, Environmental Engineering Graduate Research Award, College of Engineering, April 2021.

Danhui Xin, 2020 Graduate Student Award in Environmental Chemistry, American Chemical Society (ACS), February 2021.

Jimmy Gelvez, Delaware Environmental Institute (DENIN) Wharry Grant, October 2020.

Danhui Xin, University Dissertation Fellowship, University of Delaware, April 2020

Jimmy Gelvez, Delaware Environmental Institute (DENIN) Wharry Grant, October 2020.

Jimmy Gelvez, Delaware Environmental Institute (DENIN) Graduate Fellowship, July 2019.

Danhui Xin, Environmental Engineering Graduate Research Award, College of Engineering, May 2019.

Danhui Xin, Delaware Environmental Institute (DENIN) Graduate Fellowship, August 2018.

Kathy Phillips, Ellen Gonter Environmental Chemistry Award, American Chemical Society, March 2010.

Kathy Phillips, Graduate Student Award in Environmental Chemistry, American Chemical Society, January 2010.

Wendi Xu, Air & Waste Management Association (A&WMA) DVC Scholarship Award, April, 2013.

Anthony McGuire, Interdisciplinary Undergraduate Research in Sustainability Prize, Second Prize, "Replacing Chlorine with Nanoscale Zero-Valent Iron-Coated Media for Point-of-Use Drinking Water Treatment." August, 2011.

Liping Zhang, Pennsylvania Water Environment Association (PWEA) Student Research Award, "Removal and Inactivation of Waterborne Viruses using Elemental Iron." June, 2007.

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

Chiu, P. C. and Xin, D. "Preventing Biogenic Methane Emissions Using Oxidized Pyrogenic Carbon." Invention disclosure filed on 02/21/23. U.S. Patent Application Serial No. 63/493,056.

Chiu, P. C., Xin, D. and Lobo, S. "Methods for Producing Silver-Amended Carbon Materials." International application (PCT) filed on 07/12/19 (PCT/US 19/41530). International Publication No. WO 2020/014565 A1, pending.

Hubbard, B., Attavane, A., Cha, D. K. and Chiu, P. C. "Integrated Nanoscale Zero-Valent Iron–Hydrogen Peroxide (nZVI-H_2O_2) Technology for Rapid and Complete Destruction of Insensitive Munitions Constituents in Explosive Production Wastewaters." Provisional application filed on 08/01/19; U.S. patent application filed on 07/31/20 (serial number 62/881,427), pending.

Chiu, P. C., Xin, D. and Lobo, S. "Methods for Producing Silver-Amended Carbon Materials." International application (PCT) filed on 07/12/19 (PCT/US 19/41530).

Jin, Y. and Chiu, P. C. "Removal of Microorganisms and Disinfection Byproduct Precursors Using Elemental Iron or Aluminum." U.S. Patent No. 8,114,279.

Jin, Y. and Chiu, P. C. "Removal of Microorganisms and Disinfection Byproduct Precursors Using Elemental Iron or Aluminum." Canadian Patent Number 2,538,783.

Kim, B. J., Oh, S.-Y., Chiu, P. C. and Cha, D. K. "System for Destroying Hazardous Waste Resultant from the Production of Energetics such as Explosives" U.S. Patent No. 7,479,259.

Cha, D. K., Oh, S.-Y., Chiu, P. C. and Kim, B. J. "Process for Treating Waste from the Production of Energetics" U.S. Patent No. 7,445,717.

Cha, D. K., Chiu, P. C., Oh, S.-Y., Lee, J.-W. et al. "Process for Treating Refractory Wastewater Using Zero-Valent Iron Treatment and Biodegradation." Korean Patent No. 10-0735635.

TECHNICAL REPORT

Determining Properly Normalized Second Order Rate Constants and Reactive Reductant Concentrations: Limited Reductant Kinetic Experiments, Dominic M. Di Toro, Kevin P. Hickey, Jimmy Murillo-Gelvez, Paula Cardenas-Hernandez, Herbert E. Allen, Richard F. Carbonaro and Pei C. Chiu. Strategic Environmental Research and Development Program (SERDP), May 2020.

ENVIRO-WIKI ARTICLE

Munitions Constituents - Abiotic Reduction, Jimmy Murillo-Gelvez, Paula Cárdenas-Hernández, Dominic M. Di Toro, Richard F. Carbonaro and Pei C. Chiu. SERDP/ESTCP, April 28, 2022.
https://www.enviro.wiki/index.php?title=Munitions_Constituents_-_Abiotic_Reduction

PROFESSIONAL ACTIVITIES

Member, Advanced Research & Development Advisory Committee (ARAC), Industrial Technology Research Institute (ITRI), Taiwan, ROC (2016–2018, 2022–2025).

Co-organizer, *Biochar 2018: Watershed Restoration: Using the Carbon Link to Improve Ecosystem Services* with Charles Hegberg (L3C), Paul Sturm and Ruby Rivera (Ridge to Reefs), Paul Imhoff, and Mingxin Guo (DSU), Wilmington, DE (8/18).

Chair, ACS Symposium "*Surface Chemistry of Biochar and Its Applications in Environmental and Related Systems*" with Chin-Pao Huang et al., The 254th American Chemical Society (ACS) National Meeting, Washington, DC (8/17).

Organizer and Chair, ACS Symposium "*Thermodynamics and Kinetics in Treatment Processes, Past, Present and Future: Symposium in Honor of Prof. Chin-Pao Huang*" with Doong et al. for the 248th American Chemical Society (ACS) National Meeting, San Francisco, CA (8/14).

Chair, *Hazardous Chemicals Management* Session at the 5th UNU & GIST Joint Workshop on Sound Management of Hazardous Chemicals and Sustainable Energy, Gwangju Institute of Science & Technology, Gwangju, Korea (11/07).

Organizer and Chair, ACS Symposium "*Advances in Surface-Mediated Transformation in Environmental Systems*" with C. H. Huang of Georgia Institute of Technology for the 231st American Chemical Society (ACS) National Meeting in Atlanta, GA (3/06).

Proposal Reviewer/Panelist
NSF SBIR/STTR Program
NSF CAREER Program
NSF Environmental Engineering Program
NSF Collaborative Research in Chemistry (CRC) Program
NSF-EPA New Technologies for Environment Program
EPA Future Atmospheric Chemistry Program

American Chemical Society Petroleum Research Foundation
American Association for the Advancement of Science (AAAS)
National Academy of Sciences (NAS) Partnerships for Enhanced Engagement in Research (PEER) Program
DoD Strategic Environmental Research and Development Program (SERDP)
DoD Environmental Security Technology Certification Program (ESTCP)
Department of State ISTC Program
U.S.-Israel Binational Science Foundation
Research Grants Council (RGC), Hong Kong
Maryland Industrial Partnerships (MIPS) Program
Environmental Molecular Sciences Laboratory (EMSL)
University of Iowa Center for Health Effects of Environmental Contamination (CHEEC) Seed Grant Program
Towson University SET Seed Grant Program

Journal Reviewer

Environmental Science and Technology
Environmental Science and Technology Letters
Water Research
Environmental Science: Water Research & Technology
PLOS ONE
Critical Reviews in Environmental Science and Technology
Chemosphere
Environmental Engineering Science
Environmental Pollution
Applied Catalysis B: Environmental
Applied and Environmental Microbiology
Catalysis Letters
Carbon
Virus
Water
Scientific Reports
ASCE Journal of Environmental Engineering
Biotechnology and Bioengineering
Advances in Environmental Research
Chemical Engineering Journal
Biotechnology Progress
Water Resources Research
Bioremediation Journal
Science of the Total Environment
Ecotoxicology and Environmental Safety
Journal of Environmental Quality
Journal of Contaminant Hydrology
Journal of Applied Electrochemistry
Journal of Chemical Technology and Biotechnology
Journal of Soil and Sediment Contamination

Journal of Water Supply: Research and Technology—AQUA
Journal of American Water Works Association
Journal of Environmental Science
Journal of Hazardous Materials
Ground Water Monitoring & Remediation
Chemical Engineering Science
Industrial and Engineering Chemistry Research
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Environmental Technology
Separation and Purification Technology
Journal of Analytical and Applied Pyrolysis
Journal of the Taiwan Institute of Chemical Engineers
Electrochemistry Communications
ACCESS Books

Affiliations American Chemical Society (ACS), Division of Environmental Chemistry
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