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Chair, Environmental Engineering and Science Program  
Arthur and Virginia Nauman Faculty Scholar  
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### **Education**

B.S., Mechanical Engineering, Texas A&M University, 1988  
M.S., Civil/Environmental Engineering, Stanford University, 1992  
Ph.D. minor, Chemistry, Stanford University, 1997  
Ph.D., Civil/Environmental Engineering, Stanford University, 1997

### **Professional Experience**

Chair, Environmental Engineering and Science Program, UIUC, June 2008-Present  
Professor, UIUC, starting August 2008  
Associate Professor, UIUC, August of 2003-August 2008  
Visiting Professor, Tuebingen University, Tuebingen, Germany, 2004-2005  
Assistant Professor, UIUC, January of 1997-August of 2003  
Post Doctoral Researcher, Stanford University, 1996  
Research Assistant, Stanford University, 1992-1996  
Systems Analyst, Anderson Consulting (now Accenture), Houston, TX, 1989-1991

### **Professional Affiliations**

American Chemical Society, member since 1994.  
American Society of Civil Engineers, member since 2007.  
American Geophysical Union, member since 1997.  
Association of Environmental Engineering and Science Professors, member since 1999

### **Honors, Recognition, and Service**

Nauman Faculty Scholar, 2006-Present.  
Associate Editor, Journal of Contaminant Hydrology, 2004-Present  
Associate Editor, ASCE, Journal of Environmental Engineering, 2004-2008  
Distinguished Service Award, Association of Environmental Engineering and Science Professors, 2005  
Board of Directors, Association of Environmental Engineering and Science Professors, 2005-2008  
Board of Directors, AEESP Foundation, 2006-2009  
Secretary, Association of Environmental Engineering and Science Professors, 2006-2008  
Environmental Engineering and Science Faculty Scholar, 2001-2006  
Humboldt Research Fellowship Award, 2004-2005  
ASCE Journal of Environmental Engineer's Editor Award for Service, 2004  
National Science Foundation CAREER Award, 1998-2002  
Collins teaching fellow 2000, 2001  
General Electric teaching fellow 1999  
General Electric teaching scholar 1998  
List of teachers ranked as excellent by their students for CEE540, Fall 2001, 2003, 2008

List of teachers ranked as excellent by their students for CEE440, Spring 1997, 2000, 2001, 2002, 2004, 2006, 2007, 2009

### **Major Research Funding**

1. Werth (PI), NSF, \$270k, Competitive Sorption of Volatile Organic Chemicals in Model and Natural Solids, Completed, 2001.
2. Werth (PI), NSF-CAREER, \$250k, Spatial and Temporal Characterization of Dense Non-Aqueous Phase Liquids in Porous Media, Completed: 2001.
3. Werth (co-PI), NSF, \$250k, Contaminant Transport Through a Field-Scale Earthen Liner, Completed, 2002.
4. Werth (co-PI), NSF, \$400k, Effects of Redox Conditions on the Bioavailability and Biodegradation of Nonaqueous Phase Chlorinated Ethenes at the Pore Scale, Completed, 2002.
5. Werth (co-PI), EMSP-DOE, \$600k, Investigation of Pore-Scale Processes that Affect Soil Vapor Extraction, Completed, 2004.
6. Werth (co-PI), NSF, \$400k, Effects of Pore-Scale Mixing on Reactive Transport, Completed, 2006.
7. Werth (PI), NIWR-USGS, \$170k, Carbonaceous Material Fractions in Sediment and Their Effect on the Sorption and Persistence of Organic Pollutants in Small Urban Watersheds. Completed, May, 2008.
8. Werth (PI), ESPR / DOE, \$920k, Influence of Wetting and Mass Transfer Properties of Organic Chemicals in the Vadose Zone on Groundwater Contamination, 3/06-3/09.
9. Werth (PI), NSF Project within Science and Technology Center, \$500k, Nitrate Reduction Using Bimetallic Catalysts, 7/02-7/08.
10. Werth (PI), GAANN / US Dept. Educ., \$540k, Enhancing Quality and Diversity of Environmental Engineering at UIUC. 5/06-5/09.
11. Werth (PI), NRI / USDA, \$460k, Evolution of Gene Expression and Herbicide Degradation in a Model Dynamic Soil System, 1/07-1/10.
12. Werth (co-PI), NSF, \$350k, Development of a Sustainable Catalytic Treatment Process for Perchlorate, 5/7-5/10.
13. Werth (co-PI), DOE ERSP, \$488k, Characterizing the combined roles of iron and transverse mixing on uranium bioremediation in groundwater using micromodels, 8/09-8/12.
14. Werth (co-PI), DOE, \$1,183k, Reuse of produced water from CO<sub>2</sub> enhanced oil recovery, coal-bed methane, and mine pool water by coal-based power plants, 6/09-6/12.

### **Peer-Reviewed Journal Publications (w indicates publication is with students)**

1. Werth, C.J. and M. Reinhard, Effects of temperature on trichloroethylene desorption from silica gel and natural sediments. 1. Isotherms. *Environ. Sci. & Technol.*, 31(3), 689-696, 1997.
2. Werth, C.J. and M. Reinhard, Effects of temperature on trichloroethylene desorption from silica gel and natural sediments. 2. Kinetics. *Environ. Sci. & Technol.*, 31(3), 697-703, 1997.
3. Cunningham, J., C. J. Werth, M. Reinhard, and P. V. Roberts, Effects of grain-scale mass transfer on the transport of volatile organics through sediments: 1. Model development, *Water Resour. Res.*, 30, 12, 2713-2726, 1997.
4. Werth, C. J., J. Cunningham, P. V. Roberts, and M. Reinhard, Effects of grain-scale mass transfer on the transport of volatile organics through sediments: 2. Column results, *Water Resour. Res.*, 30, 12, 2727-2740, 1997.
5. Hollenbeck, K. J., C. F. Harvey, R. Haggerty, C. J. Werth, Estimation of continuous mass-transfer rate distributions, *J. Contam. Hydrol.*, 37, 367-388, 1999.
6. Werth, C. J. and M. Reinhard, Sterically-hindered counter-diffusion of isotopically-labeled trichloroethylene in silica gel and geosorbent micropores. Column results, *Environ. Sci. Technol.*, 33, 730-736, 1999.
7. w McMillan, S. A. and C. J. Werth, Sterically-hindered counter-diffusion of trichloroethylene isotopes in silica gel and geosorbent micropores. Model Development, *Environ. Sci. Technol.*, 33, 2178-2185, 1999.

8. Schaefer, C. E., C. Schuth, C. J. Werth, and M. Reinhard, Binary desorption isotherms of TCE and PCE from silica gel and natural solids, *Environ. Sci. Technol.*, 34, 4341-4347, 2000.
9. w Castilla, H. J., Werth, C. J., and S. A. McMillan, Structural evaluation of slow-desorbing sites in model and natural solids using temperature stepped desorption profiles. 2. Column results, *Environ. Sci. Technol.*, 34, 2966-2972, 2000.
10. w Werth, C. J., S. A. McMillan, and H. J. Castilla, Structural evaluation of slow-desorbing sites in model and natural solids using temperature stepped desorption profiles. 1. Model development, *Environ. Sci. Technol.*, 34, 2959-2965, 2000.
11. w Grens, B. K. and C. J. Werth, Durability of wood-based versus coal-based granular activated carbon, *J. American Water Works Association*, 175-181, April, 2001.
12. w Li, J. and C. J. Werth, Evaluating competitive sorption mechanisms of volatile organic compounds in soils and sediments using polymers and zeolites, *Environ. Sci. Technol.*, 35, 568-574, 2001.
13. w Vera, S. M., C. J. Werth, and R. A. Sanford, Evaluation of different polymeric organic materials for creating conditions that favor reductive processes in groundwater, *Bioremediation J.*, 5(3), 169-181, 2001.
14. w Knutson, C. E., C. J. Werth, and A. J. Valocchi, Pore-scale modeling of dissolution from variably distributed nonaqueous phase liquid blobs, *Water Resour. Res.*, 37(12), 2951-2963, 2001.
15. w Werth, C. J., K. M. Hansen, Modeling the effects of concentration history on the slow desorption of trichloroethene from a soil, *J. Contam. Hydrol.*, 54, 307-327, 2002
16. w Li, J., C. J. Werth, Modeling sorption isotherms of volatile organic chemical mixtures in model and natural solids, *Environ. Toxicol. Chem.*, 21, 7, 1377-1383, 2002.
17. w Toupiol, C., T. Willingham, A. J. Valocchi, C. J. Werth, I. G. Krapac, T. D. Stark, D. E. Daniel, Long-Term Tritium Transport Through a Field-Scale Compacted Soil Liner, *J. Geotech. Geoenviron. Eng.*, 128, 640-650, 2002.
18. w Zhang, C., C. J. Werth, A. G. Webb, A magnetic resonance imaging study of dense nonaqueous phase liquid dissolution from angular porous media, *Environ. Sci. Technol.*, 36, 3310-3317, 2002.
19. Nambi, I., C. J. Werth, R. A. Sanford, A. J. Valocchi, Pore-scale analysis of anaerobic halorespiring bacterial growth along the transverse mixing zone of an etched silicon pore network, *Environ. Sci. Technol.*, 37(24), 5617-5624, 2003.
20. w Chomsurin, C., C. J. Werth, Analysis of pore-scale nonaqueous phase liquid dissolution in etched silicon pore networks, *Water Resour. Res.*, 39(9), 1265, 2003.
21. w Yoon, H., A. J. Valocchi, C. J. Werth, The influence of water content on soil vapor extraction, *Vadose Zone J.*, 2, 368-381, 2003.
22. w Li, J., C. J. Werth, Slow desorption mechanisms of volatile organic chemical mixtures in soil and sediment micropores, *Environ. Sci. Technol.*, 38(2), 440-448, 2004.
23. Valocchi, A. J., C. J. Werth, Web-based interactive simulation of groundwater pollutant fate and transport, *Computer Appl. Engineer. Education*, 12(2), 75-84, 2004.
24. Baumann, T., C. J. Werth, Visualisation and modelling of polystyrol colloid transport in a silicon micromodel, *Vadose Zone J.*, 3 (2), 434, 2004.
25. w Chu, Y., C. J. Werth, A. J. Valocchi, H. Yoon, A. G. Webb, Magnetic resonance imaging of nonaqueous phase liquid during soil vapor extraction in heterogeneous porous media, *J. Contam. Hydrol.*, 73, 15-37, 2004, 2004.
26. w Willingham, T., C. J. Werth, A. J. Valocchi, I. Krapac, T. Stark, D. Daniel, Evaluation of multi-dimensional transport through a field-scale compacted soil liner, *J. Geotech. Geoenviron. Eng.*, 130(9), 887-895, 2004.
27. Baumann, T., C. J. Werth, Visualization of Colloid Transport Through Heterogeneous Porous Media Using Magnetic Resonance Imaging, *Colloids and Surfaces A.*, 265(1-3), 2-10, 2005.
28. w Jeong, S., C.J. Werth, Evaluation of methods to obtain geosorbent fractions enriched in carbonaceous materials that affect hydrophobic organic chemical sorption, *Environ. Sci. Technol.*, 39(9), 3279-3288, 2005.

29. w Knutson, C., C. J. Werth, and A. J. Valocchi, Pore scale simulations of biomass growth along the transverse mixing zone of a model 2D porous medium, *Water Resour. Res.*, 41, W07007, 2005.
30. w Brennan, R. A., R. A. Sanford, C. J. Werth, Biodegradation of Tetrachloroethene by Chitin Fermentation Products in a Continuous Flow Column System, *J. Environ. Eng. ASCE.*, 132, 664, 2006.
31. Werth, C.J., O. Cirpka, P. Grathwohl, Enhanced mixing and reaction through flow focussing in heterogeneous porous media, *Water Resour. Res.*, 42, W12414, 2006.
32. w Knutson, C., A. J. Valocchi, and C. J. Werth, Comparison of continuum and pore-scale models of nutrient biodegradation under transverse mixing conditions, *Adv. Water Resour.*, doi:10.1016/j.advwatres.2006.05.012, 2006, 2006.
33. w Brennan, R. A., R. A. Sanford, C. J. Werth, Chitin and corncobs as electron donor sources for the reductive dechlorination of tetrachloroethene, *Water Res.*, 40(11), 2125-2134, 2006.
34. w Chaplin, B. P., E. Roundy, K. A. Guy, J. R. Shapley, C. J. Werth, The Effects of Natural Water Ions and Humic Acid on Nitrate Reduction Using an Alumina Supported Pd-Cu Catalyst, *Environ. Sci. Technol.*, 40(9); 3075-3081, 2006.
35. w Gopalakrishnan, G., C. M. Negri, B. S. Minsker, and C. J. Werth, Monitoring subsurface contamination using tree branches, *Ground Water Monitoring Remediation*, 27(1), 65-74, 2007.
36. w Zhang, C., C.J. Werth, A.G. Webb, Characterization of NAPL Source Zone Architecture and Dissolution Kinetics in Heterogeneous Porous Media Using Magnetic Resonance Imaging, *Environ. Sci. Technol.*, 41(10), 3672-3678, 2007.
37. w Chaplin, B.P., J. Shapley, C.J. Werth, Regeneration of Sulfur Fouled Bimetallic Pd-based Catalysts, *Environ. Sci. Technol.*, 41(15); 5491-5497, 2007.
38. w Yoon, H., A.J. Valocchi, C.J. Werth, Effect of soil moisture dynamics on dense nonaqueous phase liquid spill zone architecture in heterogeneous porous media, *J. Contam. Hydrol.*, 90(3-4), 159-183, 2007.
39. Acharya, R.C., A.J. Valocchi, C.J. Werth, T.W. Willingham, Pore-scale simulation of dispersion and reaction along a transverse mixing zone in two-dimensional porous media, *Water Resour. Res.*, 43, W10435, doi:10.1029/2007WR005969, 2007.
40. w Yoon, H., C. Zhang, C.J. Werth, A.J. Valocchi, A.G. Webb, Three Dimensional Characterization of Water Flow in Heterogeneous Porous Media Using Magnetic Resonance Imaging, *Water Resour. Res.*, 44, W06405, doi:10.1029/2007WR006213, 2008.
41. w Jeong, S., M.M. Wander, S. Kleinedam, P. Grathwohl, B. Ligouis, C.J. Werth, The Role of Condensed Carbonaceous Materials on the Sorption of Hydrophobic Organic Contaminants in Subsurface Sediments, *Environ. Sci. Technol.*, 42(5); 1458-1464, 2008.
42. w Willingham, T.M., C.J. Werth, A.J. Valocchi, Evaluation of the effects of porous media structure on mixing-controlled reactions using pore-scale modeling and micromodel experiments, *Environ. Sci. Technol.*, 42(9); 3185-3193, 2008.
43. w Yoon, H., C.J. Werth, A.J. Valocchi, M. Oostron, Impact of Nonaqueous Phase Liquid (NAPL) Source Zone Architecture on Mass Removal Mechanisms in Strongly Layered Heterogeneous Porous Media during Soil Vapor Extraction, *J. Contam. Hydrol.*, 100(3-4), 116-126, 2008.
44. w Zhang, C., C.J. Werth, A.G. Webb, Investigation of Surfactant-Enhanced Mass Removal and Flux Reduction in 3D Correlated Permeability Fields Using Magnetic Resonance Imaging, *J. Contam. Hydrol.*, In Press, 2008.
45. w Zhang, C., H. Yoon, C.J. Werth, A.J. Valocchi, N.B. Basu, J.W. Jawitz, Evaluation of Simplified Mass Transfer Models to Simulate the Impacts of Source Zone Architecture on Nonaqueous Phase Liquid Dissolution in Heterogeneous Porous Media, *J. Contam. Hydrol.*, 102(1-2), 49-60, 2008.
46. Yoon, H., C.J. Werth, C.P.L. Barkan, D.J. Schaeffer, P. Anand, An Environmental Screening Model to Assess the Consequences to Soil and Groundwater From Railroad-Tank-Car Spills of Non-Aqueous Phase Liquids, *J. Haz. Materials*, doi:10.1016/j.jhazmat.2008.09.121, 2008.

47. w Nellis, S.R., H. Yoon, C.J. Werth, M. Ostrom, A.J. Valocchi, Surface and interfacial properties of representative nonaqueous phase liquid mixtures released to the subsurface at the U.S. DOE Hanford site in Washington state, *Vadose Zone J.*, 8, 343-351, 2009.
48. w Gopalakrishnan, G., C.J. Werth, M.C. Negri, Mass recovery methods for trichloroethylene in plant tissue, *Environ. Toxic. & Chem.*, DOI: 10.1897/08-420.1, 2009.
- 49) Guy, K.A., H. Xu, J.C. Yang, C.J. Werth, J.R. Shapley, Catalytic nitrate and nitrite reduction with Pd-Cu/PVP colloids in water: Composition, structure, and reactivity correlations, *J. Phys. Chem. C.*, 113(19), 8177

12. w Vera S. M., R. A. Brennan, C. J. Werth, and R. A. Sanford, Analysis of substrates to support a halo-respiration enhanced redox transition zone, HERTZ, in chlorinated solvent impacted groundwater, Proceedings of the Groundwater 2000 Conference, Amsterdam, 2000.
13. w Brennan, R. A., S. M. Vera, R. A. Sanford, and C. J. Werth, Bioremediation of PCE in a Column Experiment Using Chitin Fermentation, Proceedings of the In Situ and On-Site Bioremediation 6th International Symposium, San Diego, Summer of 2001.
14. Nambi, I., R. Sanford, C. J. Werth, Investigation of the anaerobic reductive dechlorination of chlorinated ethenes at the pore-scale using micromodels, *9<sup>th</sup> International Symposium, Microbial Ecology Interactions with the Microbial World*, Amsterdam, August 2001.
15. w Knutson, C. and C. J. Werth (*ABSTRACT*), Pore-scale fluid velocity measurements through porous media using MRI, *EOS Transactions, The American Geophysical Union*, Hydrology Division, Boston, MA, 2001 Spring Meeting.
16. w Zhang, C. and C. J. Werth (*ABSTRACT*), Characterization of DNAPL dissolution in porous media using magnetic resonance imaging, *EOS Transactions, The American Geophysical Union*, Hydrology Division, Boston, MA, 2001 Spring Meeting.
17. w Nambi, I., C. J. Werth, and R. A. Sanford (*ABSTRACT*), Investigation of biodegradation of chlorinated ethenes at the pore scale using silicon based micromodels, *EOS Transactions, The American Geophysical Union*, Hydrology Division, Boston, MA, 2001 Spring Meeting.
18. w Knutson, C., C. J. Werth, and A. J. Valocchi (*ABSTRACT*), Pore scale modeling of apparent mass transfer limitations during equilibrium controlled NAPL dissolution, *EOS Transactions, The American Geophysical Union*, Hydrology Division, Boston, MA, 2001 Spring Meeting.
19. w Chomsurin, C. and C. J. Werth (*ABSTRACT*), DNAPL Dissolution in a silicon based micromodel using fluorescence microscopy and digital image analysis, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, Boston, MA, 2001 Spring Meeting.
20. w Werth, C. J. and C. Chomsurin (*ABSTRACT*), Pore-scale evaluation of dense nonaqueous-phase liquid dissolution using silicon-based micromodels, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, Boston, MA, 2001 Fall Meeting.
21. Baumann, T., C. J. Werth, R. Niessner, Quantitative observation of colloidal transport with etched silica micromodels, European Geophysical Union XXVII General Assembly, Nice, France, 22.-25.4.2001.
22. w Werth, C. J., C. Chomsurin, C. Zhang, A. Webb, Analysis of pore-scale mass transfer processes that control nonaqueous phase liquid dissolution and the implications for risk assessment, *Proceedings of the 1<sup>st</sup> International Workshop on Groundwater Risk Assessment at Contaminated Sites*, Tuebingen University, Tuebingen, Germany, 2002.
23. Valocchi, A. J. and C. J. Werth, Enhancing Student Understanding of Reactive Pollutant Fate and Transport Using Web-Based Interactive Simulation, XIV International Conference on Computational Methods in Water Resources, Delft, The Netherlands, June 23-28, 2002.
24. Valocchi, A. J. and C. J. Werth, Interactive web-based models for teaching students about integrated processes that control pollutant transport and fate in groundwater, Conference of the Association of Environmental Engineering and Science Professors, Toronto, August 11-13, 2002.
25. Sanford, R. A., C. J. Werth, I. Nambi, Pore-scale analysis of microbial growth using a silicon-based micromodel, Conference of the Association of Environmental Engineering and Science Professors, Toronto, August 11-13, 2002.
26. w Li, J. and C. J. Werth (*ABSTRACT*), Slow desorption mechanisms of volatile organic chemical mixtures in soil and sediment micropores, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, San Francisco, CA, 2002 Fall Meeting.
27. w Chomsurin, C. and C. J. Werth (*ABSTRACT*), Characterization of the mass flux to groundwater from DNAPL trapped in low conductivity zones, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, San Francisco, CA, 2002 Fall Meeting.
28. w Yoon, H., A. J. Valocchi, C. J. Werth (*ABSTRACT*), The influence of water content on soil vapor extraction, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, San Francisco, CA, 2002 Fall Meeting.

29. w Martin, J.P., K.S. Sorenson, L.N. Peterson, R.A. Brennan, C.J. Werth, R.A. Sanford, G.H. Bures, C.J. Taylor, "Enhanced CAH dechlorination in a low permeability, variably-saturated medium." *Proceedings of the Remediation of Chlorinated and Recalcitrant Compounds Conference*, Monterey, CA, 2002.
30. w Brennan, R.A., C.J. Werth, R.A. Sanford, K.S. Sorenson, J.P. Martin, G.H. Bures, "From the lab to the field: development and deployment of the halo-respiration enhancing redox transition zone (HERTZ) technology for bioremediation." *Proceedings of the Association of Environmental Engineering & Science Professors Conference*, Toronto, Canada, 2002.
31. Chu, Y., C. J. Werth, A. J. Valocchi, A. G. Webb (*ABSTRACT*), Magnetic resonance imaging of nonaqueous phase liquid during soil vapor extraction in heterogeneous porous media, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, San Francisco, CA, 2002 Fall Meeting.
32. w Zhang, C., C. J. Werth, and A. G. Webb, A Magnetic Resonance Imaging Study of Dense Nonaqueous Phase Liquid Dissolution from Angular Porous Media, 6th International Conference on Magnetic Resonance in Porous Media, Ulm, Sept. 8-12, 2002.
33. Nambi, I. M., C. J. Werth, R. A. Sanford, A Pore-scale investigation of anaerobic dechlorinating bacteria growth, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, New Orleans, 2003 Spring Meeting.
34. w Knutson, C., A. J. Valocchi, C. J. Werth (*ABSTRACT*), The influence of pore-scale transverse mixing upon biodegradation reactions and biomass growth, *EOS Transactions, Joint Meeting of The American Geophysical Union and the European Geophysical Society*, Hydrol. Division, Nice, France, 2003 Spring Meeting.
35. w Chomsurin, C., C. J. Werth (*ABSTRACT*), Pore-Scale Analysis of Mass Transfer from Dense Nonaqueous Phase Liquids Trapped in Low Permeability Zones of an Etched-Silicon Pore Network, *EOS Transactions, Joint Meeting of The American Geophysical Union and the European Geophysical Society*, Hydrol. Division, Nice, France, 2003 Spring Meeting.
36. Chu, Y., C. J. Werth, A. J. Valocchi, A. G. Webb (*ABSTRACT*), Investigation of Soil Vapor Extraction Mechanisms using Magnetic Resonance Imaging (MRI), *EOS Transactions, Joint Meeting of The American Geophysical Union and the European Geophysical Society*, Hydrol. Division, Nice, France, 2003 Spring Meeting.
37. w Yoon, H., A. J. Valocchi, C. J. Werth (*ABSTRACT*), Modeling the Influence of Temperature and Water Content on Soil Vapor Extraction, *EOS Transactions, Joint Meeting of The American Geophysical Union and the European Geophysical Society*, Hydrol. Division, Nice, France, 2003 Spring Meeting.
38. w Brennan, R.A., R.A. Sanford, C.J. Werth, "Bioremediation of tetrachloroethene using chitin: spatial and temporal effects in a 1-D column system." *Proceedings of the Remediation of Chlorinated and Recalcitrant Compounds: The Fourth International Conference*, Monterey, CA, 2004.
39. w Yoon, H., A.J. Valocchi, C.J. Werth, Impact of spatially distributed NAPL saturation and water content on soil vapor extraction in heterogeneous porous media, *Proceedings of the Computational Methods in Water Resources Meeting, University of North Carolina*, Chapel Hill, Spring 2004.
40. w Martin, J.P., K.S. Sorenson, Jr., R.A. Brennan, R.A. Sanford, C.J. Werth, G.H. Bures, G. Guest, R. Fulton, "Full-scale application of chitin for bioremediation of chlorinated solvents." *Proceedings of the Remediation of Chlorinated and Recalcitrant Compounds: The Fourth International Conference*, Monterey, CA, 2004.
41. w Knutson, C.E., C.J. Werth, A.J. Valocchi, B.J. Travis, Modeling biofilm morphology in porous media at the pore scale, *Proceedings of the Computational Methods in Water Resources Meeting, University of North Carolina*, Chapel Hill, Spring 2004.
42. w Roundy, E., K. Guy, J.R. Shapley, C.J. Werth, The effects of natural water ions and humic acid on nitrate reduction using an alumina supported Pd-Cu catalyst, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Philadelphia, PA, 2004 Fall Meeting.

43. w Jeong, S., C.J. Werth, Spectroscopic characterization of carbonaceous material properties that affect hydrophobic organic chemical sorption, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Philadelphia, PN, 2004 Fall Meeting.
44. w Brennan, R.A., C.J. Werth, R.A. Sanford, "Tracking the growth and distribution of a chloridogenic microbial community in PCE-contaminated sediments treated with chitin." *Proceedings of the 10<sup>th</sup> International Symposium on Microbial Ecology – ISME*, Mexico, 2004.
45. w Yoon, H., A.J. Valocchi, C.J. Werth (*ABSTRACT*), Effect of soil Moisture dynamics on DNAPL spill zone architecture in heterogeneous porous media, *EOS Transactions, The American Geophysical Union*, Hydrol. Division, San Francisco, CA, 2004 Fall Meeting.
46. Xu, H., K. Guy, J. Shapley, D. Johnson, C.J. Werth, J.C. Yang, Structural characterizations of bimetallic Pd/Cu nanocatalysts for the purification of drinking water, *Engineering Sustainability*, Pittsburgh, Pennsylvania, April 10-12, 2005.
47. w Werth, C.J., S. Jeong, S. Kleineidam, P. Grathwohl (*ABSTRACT*), Identification of carbonaceous material fractions and properties that control hydrophobic organic chemical sorption in soils and sediments, *Proceedings of the Society of Environmental Toxicology and Chemistry*, Lille, France, In Press, Spring 2005.
48. w Werth, C.J., S. Kleineindam, K. Silvers, S. Jeong, P. Grathwohl (*ABSTRACT*), Comparison of physiochemical treatment and petrographic methods to identify organic matter facies that control sorption in soils and sediments, *Proceedings of the European Geophysical Union*, Vienna, Austria, In Press, Spring 2005.
49. w Gopalakrishnan G, C.M Negri, B.S. Minsker and C.J. Werth, "Monitoring soil and groundwater plumes using trees in an existing phytoremediation system", *Third International Phytotechnologies Conference*, Atlanta, U.S.A., April 2005.
50. w Barnuevo, G., R. Sanford, C.J. Werth, Long-Term Management of Chlorinated Solvent Plumes Using a Slow-Release In Situ Electron Donor Source, *The Joint International Symposia for Subsurface Microbiology (ISSM 2005) and Environmental Biogeochemistry (ISEB XVII)* held in Jackson Hole, WY, August 14-19, 2005
51. w Barnuevo, G., R. Sanford, C.J. Werth, Biodegradation of tetrachloroethene in a continuous column system using chitin as the electron donor. *National Meeting of the American Society of Microbiology*, Atlanta. June, 2005.
52. Schmidt, T., P. Grathwohl, E. Bi, S. Endo. C. Werth, Sorption of organic compounds in the subsurface, *ConSoil*, Bordeaux, Oct 4, 2005.
53. w Zhang, C., C.J. Werth (*ABSTRACT*), Evaluation of Surfactant-Enhanced Nonaqueous Phase Liquid Dissolution in Heterogeneous Permeability Fields Using Magnetic Resonance Imaging, *National Fall Meeting of the American Geophysical Union*, Dec., 2005.
54. w Zhang, C., C.J. Werth (*ABSTRACT*), Effects of source zone architecture on nonaqueous phase liquid dissolution: a magnetic resonance imaging study, *National Fall Meeting of the American Geophysical Union*, Dec., 2005.
55. w Willingham, T., C.J. Werth, A.J. Valocchi (*ABSTRACT*), Evaluation of pore-scale effects on transverse dispersion and reactive transport, *National Fall Meeting of the American Geophysical Union*, Dec., 2005.
56. w Chaplin, B., J. Shapley, C.J. Werth (*ABSTRACT*), Nitrate reduction using bimetallic catalysts, *Midwest Chemistry Workshop*, Oct., 2005
57. w Werth, C.J., G. Barnuevo, R. Sanford, Long-Term Potential of Chitin Fermentation Products to Stimulate the Complete Bioremediation of Chlorinated Solvents, *Midwest Groundwater conference*, November, 2005
58. Barth, J.C., A. Kapppler, M. Piepenbrink, C. Werth, S. Regenspurg, L. Sempri, G.F. Slater, C. Schueth, P. Grathwohl, *New Challenges in Biogeochemical Gradients Research*, *EOS Transactions*, 86(44), 432-433, 2005.
59. Grathwohl, P., T. Gocht, S. Kleineidam, T. Schmidt, C.J. Werth, Role of black carbon (BC) for the fate of hydrophobic organic compounds (HOCs) in soils at the catchment scale, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Fall Meeting, Washington, D.C., 2005.

60. Werth, C.J, S. Jeong, B. Ligouis, P. Grathwohl, Contribution of black carbon to hydrophobic organic chemical sorption in central Illinois aquifer sediments, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Fall Meeting, Washington, D.C., 2005.
61. Gocht, T., C.J. Werth, M. Razzaque, P. Grathwohl, Role of carbonaceous particles during accumulation of persistent organic pollutants in rural soils, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Fall Meeting, Washington, D.C., 2005.
62. w Barnuevo, G., C.J. Werth, R. Sanford, Long-Term Potential of Chitin Fermentation Products to Stimulate the Complete Reduction of Chlorinated Solvents, International Conference on Hazardous Waste Management for a Sustainable Future, Bangkok, Thailand, January, 2006
63. w Chaplin, B., E. Roundy, J. Shapley, C.J. Werth, The Influence of Reduced Sulfur Compounds on Catalytic Nitrate Reduction by Alumina Supported Pd-Cu Catalysts, International Conference on Hazardous Waste Management for a Sustainable Future, Bangkok, Thailand, January, 2006
64. w Gopalakrishnan, G., C.J. Werth, C.M. Negri, and B.S. Minsker, Monitoring Subsurface Contamination Using Tree Branches, International Conference on Hazardous Waste Management for a Sustainable Future, Bangkok, Thailand, January, 2006
65. w T. Willingham, C.J. Werth, A.J. Valocchi, Effects of Pore-Scale Characteristics on Transverse Dispersion and Reactive Transport, National Fall Meeting of the American Geophysical Union, Dec., 2006.
66. w Werth, C.J., C. Zhang, H. Yoon, A.J. Valocchi, A.G. Webb, Impacts of Source Zone Architecture on Nonaqueous Phase Liquid Dissolution, National Fall Meeting of the American Geophysical Union, Dec., 2006.
67. w Zhang, C., C.J. Werth, A.G. Webb, Investigation Of Surfactant-Enhanced Mass Removal And Flux Reduction In 3D Correlated Permeability Fields Using Magnetic Resonance Imaging, National Fall Meeting of the American Geophysical Union, Dec., 2006.
68. w Chaplin, B.P., J.R. Shapley, C.J. Werth, Fouling and Regeneration of Pd-based Catalysts Used for Nitrate Reduction, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, San Francisco, Fall Meeting, 2006.
69. w Willingham, T., C.J. Werth, A.J. Valocchi, A Look at Sub-Continuum Effects of Pore Structure on Reactive Transport Using Micro-Models and LB-FVM, Gordon Research Conference on Flow and Transport in Porous Media, New Hampshire, Summer 2006.
70. w Zhang, C, H. Yoon, C.J. Werth, A.J. Valocchi, A. Webb, Characterization of Water Flow and Solute Transport in Three-Dimensional Heterogeneous Porous Media Using Magnetic Resonance Imaging, Gordon Research Conference on Flow and Transport in Porous Media, New Hampshire, Summer 2006.
71. w Wojnar, S., J.K. Choe, B.P. Chaplin, C.J. Werth, Effects of natural water ions, pH, pH buffering technique, and catalyst loading on the activity and selectivity of nitrate reduction using Alumina supported Pd-In bimetallic catalysts, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Chicago, Spring Meeting, 2007.
72. w Chaplin, B.P., J.R. Shapley, C.J. Werth, Long-term catalytic reduction of nitrate using Pd-based bimetallic catalysts under sulfide fouling conditions, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, Chicago, Spring Meeting, 2007.
73. w Yang, Y., C.J. Werth, B.J. Mahler, J.T. Wilson, The Role of Carbonaceous Materials in the Fate of Polycyclic Aromatic Hydrocarbons in a Small Urban Watershed, European Geophysical Union General Assembly, Vienna, Austria, 2007.
74. Werth, C.J., C. Zhang, H. Yoon, A.J. Valocchi, N. Basu, J.W. Jawitz, Evaluation of modeling approaches to describe nonaqueous phase liquid dissolution in 3D heterogeneous permeability fields, Spring Meeting of the American Geophysical Union, Acapulco, 2007.
75. w Willingham, T.W., C.J. Werth, A.J. Valocchi, Effects of flow focusing on enhancement of transverse-mixing limited reactions at the pore and continuum scale, Fall Meeting of the American Geophysical Union, San Francisco, 2007

76. Yoon, H., Zhang, C., Werth, C.J., and Valocchi, A.J. (ABSTRACT) Evaluation of Water Flow-Paths and Dispersivities in Three-Dimensional Heterogeneous Porous Media Based on Magnetic Resonance Imaging Experiments, *Eos Trans. AGU*, 88(23), Jt. Assem. Suppl., Abstract H41B-02., 2007.
77. Yoon, H., Valocchi, A.J., and Werth, C.J. (ABSTRACT) Effects of Soil Moisture Dynamics on NAPL Spill Zone Architecture in Two-Dimensional and Three-Dimensional Heterogeneous Porous Media, *Eos Trans. AGU*, 88(23), Jt. Assem. Suppl., Abstract H31A-05, 2007.
78. Robinson, B.A., Vrugt, J.A., Yoon, H., Zhang, C., Werth, C.J., Kitanidis, P.K., Lichtner, P.C., and Lu, C (ABSTRACT) An Inverse Model of Three-Dimensional Flow and Transport in Heterogeneous Porous Media, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract H14C-06, 2007.
79. Yoon, H., Valocchi, A.J., Werth, C.J., and Oostrom, M (ABSTRACT) Numerical investigation of NAPL Source Zone Architecture in Two-Dimensional and Three- Dimensional Unsaturated Porous Media, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract H33H-1732, 2007.
80. w Chaplin, B.P., J.R. Shapley, C.J. Werth, Effect of solution conditions on the product distribution of catalytic nitrate reduction using Pd-In catalysts in a continuous-flow packed-bed reactor, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, New Orleans, Spring Meeting, 2008.
81. w Shuai, D., J.R. Shapley, C.J. Werth, Shuai, D., B.P. Chaplin. S. Wojnar, J.R. Shapley, C.J. Werth, Effects of Methyl Orange on Nitrate Reduction by a Pd-In/gamma-Al<sub>2</sub>O<sub>3</sub> Catalyst, Presented at the American Chemical Society Meeting, Division of Environmental Chemistry, New Orleans, Spring, 2008., *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, New Orleans, Spring Meeting, 2008.
82. w Choe, J., C.J. Werth, Effects of Natural Water Constituents on Perchlorate Reduction by a Heterogeneous Pd/Re Catalyst., *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, New Orleans, Spring Meeting, 2008.
83. w Werth, C.J., S. Jong, Y. Yang, M. Razzaque, B. Ligouis, Measurement of Black Carbon Contents in Soils, Surface Water Sediments, and Groundwater Sediments Using Chemical Treatment, Petrographic, and Thermal Oxidation Methods, *Proceedings of the American Chemical Society Meeting*, Division of Environmental Chemistry, New Orleans, Spring Meeting, 2008.
84. Werth, C.J., Transverse mixing-limited reaction in groundwater: Does pore-scale morphology matter? Gordon Research Conference on Flow and Transport in Permeable Media, Magdalen College, Oxford, UK, July 2008.
85. Strathmann, T.J., C.J. Werth, J.R. Shapley, K.D. Hurley, C.E. Joseph, and A.J. Friedrich. *Development of Metal Catalysts for Reducing Perchlorate and NDMA at Ambient Temperature and Pressure*. Presented at the 6<sup>th</sup> International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, CA, May 19-22, 2008.
86. Zhang, C. Y., Wang, X., Zilles, J., Muller, R. H., Werth, C. J. Microbial Transport and Growth Along the Transverse Mixing Zone Between 2,4-DP and Oxygen in a Model Dynamic Soil System. American Geophysical Union Fall Meeting: San Francisco, CA, 15 - 19 December 2008.
87. Dehoff, K., Zhang, C. Y., Werth, C. J. Pore-Scale Study of Mixing Induced Precipitation and Permeability Reduction. American Geophysical Union Fall Meeting: San Francisco, CA, 15 - 19 December 2008.
88. Werth, C.J., Valocchi, A.J., Oostrom, M., Yoon, H., and Zhang, C. (ABSTRACT) Physical and Chemical Properties that Give Rise to Flow ByPassing in DNAPL Impacted Groundwater Source Zones, Fall Meeting, Abstract H33J-08, 2008.
89. Yoon, H., Werth, C.J., Valocchi, A.J., and Oostrom, M. (ABSTRACT) Impact of multiphase flow and transport on NAPL distribution and NAPL removal mechanisms in unsaturated porous media, Fall Meeting, Abstract H41C-0895, 2008.

## **Invited Lecturers**

At conferences and workshops:

American Chemical Society National Meeting, Las Vegas, NV, Fall 1997, “Characterization of slow desorbing sites via isotope exchange column studies.”

European Geophysical Society Meeting, Nice, France, Spring 2000, “Structural evaluation of slow desorbing site via isotope exchange column studies.”

American Geophysical Union National Meeting, San Francisco, Fall 2001, “Pore-scale evaluation of dense nonaqueous-phase liquid dissolution using silicon-based micromodels.”

1<sup>st</sup> International Workshop on Groundwater Risk Assessment at Contaminated Sites, Tuebingen, Germany, Spring 2002, “Analysis of pore-scale mass transfer processes that control nonaqueous phase liquid dissolution and the implications for risk assessment.”

National Institute of Environmental Health Sciences (NIEHS) Superfund Basic Research Program DNAPL Source Zone Workshop, “NAPL Dissolution – Pore Scale Experimentation,” Tucson, AZ, February 24-25, 2005.

German – American workshop on Biogeochemical Gradients, Sponsored by the German National Science Foundation, “Effects of Solute Mixing at the Pore Scale on Reactions in Groundwater, Spring, 2005.

Society of Environmental Toxicology and Chemistry symposium on The Role of Black Carbon and NAPLs in sorption and bioavailability of POPs, May, 2006 (Declined)

US-Israeli Workshop on Nanotechnology for Water Purification, “Impact of Natural Water Solutes on Nitrate Reduction by Alumina-Supported Pd-Cu Catalysts”, March, 2006.

American Geophysical Union National Meeting, San Francisco, “Impact of Source Zone Architecture on Dense Nonaqueous Phase Liquid Dissolution”, Fall, 2006.

Aquaterra Biogeochemical Workshop, Tuebingen University, Teubingen, Germany, Spring, 2007, “Watershed-scale processes that affect pollutant partitioning, transport, and fate.”

American Chemical Society National Meeting, Symposium on Black Carbon Measurements in Air, Water and Other Media, “Effects of Black Carbon on Polycyclic Aromatic Hydrocarbon Fate in an Urban Watershed”, New Orleans, April, 2008.

Gordon Research Conference, Flow and Transport in Porous Media, “Transverse mixing-limited reaction in groundwater; does pore-scale morphology matter”, Magdalen College, Oxford, Summer, 2008.

#### At Universities:

Northwestern University, Evanston, IL, Spring 1998, “Sterically hindered counter-diffusion of trichloroethylene isotopes in silica gel and geosorbent micropores.”

Vanderbilt University, Nashville, TN, Spring 1999, “Structural evaluation of slow desorbing sites via temperature stepped desorption profiles.”

University of Illinois at Chicago, Chicago, Spring 2000, “Structural evaluation of slow desorbing sites in model and natural sediments.”

Tuebingen University, Tuebingen, Germany, Spring 2000, “Investigation of pore-scale mechanisms controlling DNAPL dissolution: New techniques and initial results.”

University of Arizona, Tucson, AZ, Fall 2001, “Investigation of pore-scale mechanisms controlling nonaqueous phase liquid dissolution.”

Johns Hopkins University, Baltimore, MD, Fall 2001, “Investigation of pore-scale mechanisms controlling nonaqueous phase liquid dissolution.”

Stanford University, Stanford, CA, Fall 2001, “Investigation of pore-scale mechanisms controlling nonaqueous phase liquid dissolution.”

Purdue University, West Lafayette, IN, Spring 2002, “Pore-scale analysis of dense nonaqueous phase liquid dissolution.”

Technical University of Munich, Munich, Germany, Spring 2002, “Evaluation of a halorespiration enhancing redox transition zone.”

Tuebingen University, Tuebingen, Germany, Fall 2004, “Determining the contribution of different carbonaceous material fractions to organic pollutant fate in soils and sediments.”

- Hohenheim University, Hohenheim, Germany, Fall 2004, "Determining the contribution of different carbonaceous material fractions in soils and sediments to organic pollutant sorption."
- UFZ, Leipzig, Germany, Fall 2004, "A Pore-Scale Study of Biomass Growth Effects on Transverse Mixing Limited Reactions In Groundwater During Bioremediation."
- University of Delaware, Fall 2005, "The Contribution of Black Carbon to Hydrophobic Organic Chemical Sorption in Central Illinois Aquifer Sediments."
- Asian Institute of Technology, Spring 2006, "Effects of heterogeneous permeability fields on DNAPL dissolution and cleanup."
- Washington University, Spring 2006, "Effects of transverse dispersion on bioremediation of chlorinated solvents."

## **Graduate Students Advised and Theses Titles**

### M.S. Students

1. Humberto Castilla, M.S. thesis, UIUC, 1998, Effects of temperature on the slow desorption of VOCs in soils and sediments.
2. Scott McMillan, M.S. thesis, UIUC, 1998, A sterically-hindered counter-diffusion model of trichloroethylene isotope exchange in silica gel and geosorbent micropores.
3. Bradley Grens, M.S. thesis, UIUC, 1999, Durability of wood-based versus coal-based granular activated carbon.
4. Karen Hansen, M.S. thesis, UIUC, 2000, Effects of concentration and incubation time on the slow desorption of TCE from a soil.
5. Alicia Aragon, M.S. thesis, UIUC, 2000, Characterization of non-aqueous phase liquid dissolution in porous media using nuclear magnetic resonance imaging.
6. Sinziana Vera, M.S. thesis, UIUC, 2000, Evaluation of different polymeric organic materials (POMs) to stimulate reductive dechlorination.
7. Andrew Fuller, M.S. thesis, UIUC, 2000, Development and testing of a protocol for determining the photochemical generation of hydroxyl radical, singlet oxygen, and peroxy radicals in natural waters.
8. Chad Knutson, M.S. thesis, UIUC, 2000, Pore-scale modeling of dissolution from variably distributed NAPL blobs.
9. Thomas Willingham, M.S. thesis, UIUC, 2001, Long term evaluation of transport through a field-scale compacted earthen liner.
10. Changyong Zhang, M.S. thesis, UIUC, 2001, A magnetic resonance imaging study of dense nonaqueous phase liquid dissolution from angular porous media.
11. Julia Stamerjohn, M.S. thesis, UIUC, 2002, Effects of moisture on trichloroethene sorption to model and natural solids.
12. Eric Roundy, M.S. thesis, UIUC, 2005, The Effects of Natural Water Ions and Humic Acid on Nitrate Reduction Using an Alumina Supported Pd-Cu Catalyst.
13. Sheldon Adrian Gale, M.S. thesis, UIUC, 2005, Development Of Methods For Characterization Of Biomass Growth In Porous Media Along A Transverse Mixing Zone.
14. Rene Suarez-Soto, M.S. thesis, UIUC, 2005, Biological Degradation Of Tetrachloroethylene (PCE) At The Pore Scale.
15. Scott Nellis, M.S. thesis, UIUC, 2008, Effect Of Mixture Properties And Aging On Soil Wettability At The Department Of Energy's Hanford Site.
16. Garvin Prescod, M.S. thesis, UIUC, 2008, Methods for Fabrication of Microfluidic Systems to Evaluate Multi-Phase Fluid Behavior in Porous Media.
17. Neha Hridaya, M.S. thesis, UIUC, 2008, Development Of An Environmental Consequence Model For Assessing The Impact Of Hazardous Chemical Spills From Railroad Tank Cars On Groundwater Cleanup Times And Cost.

### Ph.D. Students

1. Jun Li, Ph.D. thesis, UIUC, 2002, Evaluating competitive sorption mechanisms of volatile organic chemical mixtures in soils and sediments using polymers and zeolites.
2. Cheema Chomsurin, Ph.D. thesis, UIUC, 2003, Pore-scale analysis of dense nonaqueous phase liquid dissolution using silicon-based micromodels.
3. Rachel Brennan (co-advised with Sanford), Ph.D. thesis, UIUC, 2003, Evaluation of chitin-enhanced bioremediation of chlorinated solvents.
4. Chad Knutson (co-advised with Valocchi), Ph.D. thesis, UIUC, 2004, A pore scale study of substrate mixing and biological degradation in porous media.
5. Sangjo Jeong, Ph.D. thesis, UIUC, 2004, The contribution of different carbonaceous material fractions to the sorption of hydrophobic organic contaminants to subsurface sediments.
6. Hongkyu Yoon (co-advised with Valocchi), Ph.D. thesis, UIUC 2005, Influence of Soil Moisture Dynamics on DNAPL Spill-Zone Architecture and Its Impact on Mass Removal Mechanisms during Soil Vapor Extraction in Heterogeneous Porous Media.
7. Changyong Zhang, Ph.D. thesis, UIUC, 2006, Impacts Of Source Zone Architecture On Nonaqueous Phase Liquid Dissolution And Cleanup: A Magnetic Resonance Imaging Study.
8. Thomas Willingham (co-advised with Valocchi), Ph.D. thesis, UIUC, 2006, Analysis Of Solute Mixing At The Pore-Scale Using Micromodels And Lattice-Boltzmann Finite Volume Modeling.
9. Brian Chaplin, Ph.D. thesis, UIUC, 2007, Mechanistic Study of Fouling and Regeneration of Palladium-Based Bimetallic Catalysts Used for the Removal of Pollutants from Drinking Water.
10. Gayathri Gopalakrishnan (co-advised with Minsker), Ph.D. thesis, UIUC, 2008, Nature's Sensors: Using Plants As An Alternative Monitoring Approach for Subsurface Contamination.

#### **Post-Doctoral Researchers**

Indumathi Nambi, 2000-2002, India, Ph.D. from Clarkson University

Yanjie Chu, 2000-2003, China, Ph.D. from U. of Delaware

Ram Acharya, 2005-2007, Nepal, Netherlands Ph.D.

Hongkyu Yoon, 2005-Present, Korea, UIUC Ph.D.,

Changyong Zhang, 2007-Present, China, UIUC Ph.D.