

Cortney J. Higgins

Civil & Environmental Engineering and Engineering & Public Policy · Carnegie Mellon University
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Education

Ph.D., Civil & Environmental Engineering, Engineering & Public Policy, Carnegie Mellon University, 2007

M.S., Civil & Environmental Engineering, Carnegie Mellon University, 2004

B.A., Chemistry, *magna cum laude*, Hendrix College, 2001

Research & Work Experience

PhD Student

01/04 to 8/07

Green Design Institute
Civil & Environmental Engineering Dept. and Engineering & Public Policy Dept.
Carnegie Mellon University
Pittsburgh, PA

- Researched the material flows of heavy metals through the U.S. economy and developed a hybrid input-output model used to estimate flows, as well as the human health and ecological impacts of metals use by industry. This model has been developed for the metal lead.
- Used this hybrid input-output tool for a life cycle assessment (LCA) of various manufacturing sectors within the economy and prescribed effective management plans for lead at a national level.
- Knowledgeable in both process and input-output based LCA, and familiar with environmental impact assessment.
- Proficient in quantitative policy analysis as well as developing mathematical models for environmental systems.
- Worked as a project manager for the undergraduate EPP project course, where I advised a small group of students (4-5) conducting a life cycle assessment of hybrid, diesel, and gasoline vehicles.

Master's Student

8/02 to 12/03

Civil & Environmental Engineering Dept.
Carnegie Mellon University
Pittsburgh, PA

- Researched the chemistry of cyanide in aquatic and sediment toxicity testing to be used for the reassessment of the Cyanide Ambient Water Quality Criteria, including both literature review and laboratory tests.
- Modeled speciation of cyanide in aqueous systems using MINEQL and determined a K_{oc} value for cyanide sorption to sediment using my laboratory experimental results.

Green Chemistry Research Associate

9/01 to 7/02

Zero Waste Alliance
Portland, OR

- Carried out research related to green chemistry and helping businesses to become sustainable.
- Aided in the development of a chemical ranking system for chemicals of concern by helping to assemble a database of chemicals, helping to designing the chemical ranking scheme, and helping to designing a questionnaire given to users of the system.
- Researched the feasibility of onsite hypochlorite generation system as a replacement technology for treating wastewater at a local municipal wastewater treatment facility.
- Wrote up my research for reports and edited documents given to our clients.

Research Assistant

6/01 to 8/01

Chemistry Dept.
Hendrix College
Conway, AR

- Assisted in preparation of course topics and laboratory handouts for a green organic laboratory course at Hendrix College. These materials introduced students to the fundamentals of Green Chemistry, risk assessment, and chemical toxicity.

Research Assistant

6/00 to 8/00

Chemistry Dept.
Columbia University
New York, NY

- Conducted Monte Carlo simulations of the pyrazine and carbon monoxide collisions, tracking energy transfer between the molecules.

Research Assistant

6/99 to 8/99

Chemistry Dept.
Hendrix College
Conway, AR

- Conducted laboratory experiments that investigated the effects of added pressure, phase transfer catalysts, and co-solvents on product yield and product isomer ratios for Heck carbon coupling reactions carried out in High Temperature Water (HTW).

Publications

Higgins, C., Matthews, H.S., Small, M. and Hendrickson, C. (2007). An Intermediate-Sized Mixed Unit Input-Output Model for Lead in the U.S., 1990–2004, submitted to *J. Ind. Ecol.*, April, 2007.

Higgins, C., Matthews, H.S., Hendrickson, C., and Small, M. (2007). Lead demand of future vehicle technology, *Trans. Research Part D*, 12 (2):103–114.

Hawkins, T., Hendrickson, C., Higgins, C., Matthews, H.S., and Suh, S. (2007). A mixed-unit input-output model for environmental life-cycle assessment and material flow analysis, *Envir. Sci. and Tech.*, 41:1024–1031.

Higgins, C.J. and Dzombak, D.A. (2006). Free cyanide sorption on freshwater sediment and model components, *Soil and Sediment Contamination*, 15:497–510.

Gensemer, R.W., DeForest, D.K., Stenhouse, A.J., Higgins, C.J., and Cardwell, R.D., “Aquatic Toxicity of Cyanide” in Dzombak, D.A., Ghosh, R.S., and Wong-Chong, G.M. (2005). *Cyanide in*

Water and Soil: Chemistry, Risk, and Management, Taylor & Francis/CRC Press, Boca Raton, FL.

Higgins, C. and Chapman S. (2004) Collisional energy transfer between hot pyrazine and cold CO: a classical trajectory study, *J. Phys. Chem. A* 108 (39): 8009–8018.

Gron, L.U., LaCroix, J.E., Higgins, C. J., Steelman, K.L. and Tinsley, A.S. (2001). Heck reactions in hydrothermal, sub-critical water: water density as an important reaction variable, *Tetrahedron Letters*, 42(49):8555–8557.

Chapman, S., Flynn, G. W., Ju, Q., Seiser, N. and Higgins, C. (2001). Classical trajectory study of energy transfer in pyrazine-CO collisions, *J. Phys. Chem. A*, 105(12): 2858–2866.

Presentations & Posters

Higgins, C., Matthews, H., Small, M., and Hendrickson, C. "Heavy Metals Through the Years: Flows and Impacts" (presentation) *The 4th International Conference of the Society for Industrial Ecology*, Toronto, Ontario, Canada. Jun. 17-20, 2007.

Higgins, C., Matthews, H., Small, M., and Hendrickson, C. "Quantifying and Assessing the Impacts of Heavy Metal Flows: Integration of Impact Assessment with a Dynamic Mixed Unit Economic Input-Output Life Cycle Assessment Model." (poster) *The 27th Annual SETAC Meeting in North America*, Montreal, Quebec, Canada. Nov. 5-9, 2006.

Higgins, C., Hawkins, T., Suh, S., Matthews, H., Goyal, A., and Hendrickson, C. An Economic and Material Flow Input-Output Model for Metals in the United States. (poster) *The 26th Annual SETAC Meeting in North America*, Baltimore, MD. Nov. 13-17, 2005.

Reports

Fifarek, B., Higgins, C., and MacDonald, J. eds., *Hybrids and Diesels in the American Automobile Fleet: 2005–2020*, Engineering & Public Policy Project, Carnegie Mellon University, 2005.

Higgins C. *Cyanide Chemistry in Aquatic and Sediment Toxicity Testing*. Masters Thesis, Civil & Environmental Eng., Carnegie Mellon University. 2004.

Fifarek B, Harris A, Hawkins T, Higgins C. *Burial v. Cremation: A Life Cycle Assessment For Alternative End-of-Life Options*. Carnegie Mellon University. 2004.

Professional Activities and Honors

Member, International Society for Industrial Ecology (2007–present)

Stephen Omar Lee Award for outstanding project for Project Management in Engineering and Public Policy Project course (2006)

Member, Society of Environmental Toxicology and Chemistry (2004–present)

Member, Phi Beta Kappa National Honor Society (2001–present)

Member, Pi Mu Epsilon, Mathematics Honor Society (2000–present)