CURRICULUM VITAE

David R. Wagner, Ph.D.
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EDUCATION

2013 Ph.D., Chemical Engineering, University of Utah
2011 M.Sc. and B.Sc. (joint degrees), Chemical Engineering, University of Utah

PROFESSIONAL EXPERIENCE

2017-Present *Advisor*, EnviroComp Consulting, Inc.

2016-Present *Faculty Research Assistant*, School of Mechanical, Industrial, and Manufacturing Engineering, Oregon State University, Corvallis, Oregon

Currently investigating internal combustion engine use for chemicals production as well as fluidization behavior of oxydehydrogenation catalysts for olefin synthesis. Work is conducted at OSU-Cascades in Bend, OR in Energy Systems Engineering.

2016 *Lecturer*, Dept. of Biomedical, Chemical, & Materials Engineering, San Jose State University, San Jose, California

Developed and executed three chemical engineering curricula: Senior Chemical Plant Design, Graduate Kinetics, and Graduate Air Pollution Control Engineering. The average end-of-year industry and faculty evaluations increased by ten percent from the previous year, and student evaluations averaged 4.73 out of 5.0.

2015 *Senior Research Engineer*, Thermochemical Energy Conversion Laboratory, Department of Applied Physics and Electronics, Umeå University, Umeå, Sweden

Focused on a collaborative project between Umeå University, The University of Utah, and the SP Energy Technology Center in Piteå, Sweden to increase feasibility of continual biomass feed to pressurized entrained-flow reactors.

2013 - 2015 *Postdoctoral Fellow*, Thermochemical Energy Conversion Laboratory, Department of Applied Physics and Electronics, Umeå University, Umeå, Sweden

Aided in design, fabrication, and operation of a laboratory-scale entrained-flow reactor for use in fuel-ash behavior during pyrolysis, gasification, and combustion processes. Additional work included investigations of rapid heating of solid fuels and computational simulation of combustion and gasification kinetics.

2009 - 2013 *Graduate Research Assistant*, Department of Chemical Engineering and The Institute for Clean and Secure Energy, The University of Utah, Salt Lake City, Utah

Graduate studies focused on design, fabrication, and operation of a sampling system in a high-pressure entrained-flow gasifier and of a high-pressure wire-mesh reactor. Empirical and theoretical modeling of gasifiers was also performed with high-pressure thermogravimetric analyzer and laminar entrained-flow reactor testing. Research was partially funded in collaboration with industrial partner Eastman Chemical Company.

2005 - 2009 *Research Assistant*, Department of Chemical Engineering and The Institute for Clean and Secure Energy, The University of Utah, Salt Lake City, Utah

Focal work comprised component fabrication and operation of a pilot-scale circulating fluidized bed as well as construction of a pilot-scale cement-preheater cyclone tower. Additional duties included installation and maintenance of instrumentation and mechanical, electrical, and fluid systems.

2008 *Intern*, United States Department of Energy, National Energy Technology Laboratory, Morgantown, West Virginia

Principal project incorporated the design and fabrication of solids tracer probes to determine residence time distributions for industrial-scale circulating fluidized beds. Additional testing campaigns measured fluidization velocities and particle sphericities.

TEACHING EXPERIENCE

2016 San Jose State University - Lecturer
CHE 165: Plant Design (4 cr, Senior-level)
CHE 218: Advanced Chemical Engineering Kinetics and Reactor Design (3 cr, graduate)
CHE 287: Air Pollution Control Engineering (3 cr, graduate)

University of Utah – Teaching Assistant Positions
2015 CH EN 5253: Senior Design II (3 cr, Senior-level)
2013 CH EN 4905: Senior Projects Laboratory II (4 cr, Senior-level)
2011 CH EN 4253: Senior Design I (3 cr, Senior-level)
2010 CH EN 3433: Heat Transfer (3 cr, Junior-level)
2009 CH EN 3433: Heat Transfer (3 cr, Junior-level)

PROFESSIONAL MEMBERSHIPS

American Institute of Chemical Engineers (AIChE)
American Chemical Society (ACS) – Energy & Fuels Division
American Association for the Advancement of Science (AAAS)
The Combustion Institute (CI)

AWARDS/ACCOMPLISHMENTS

2008 Fundamentals of Engineering Exam, EIT – Chemical, Passed
2012 John Zink Company Scholarship
2017 OSHA 10-hour Training for Industry

RESEARCH GRANTS

2015 "New fuels and feeding systems suited for the PEBG technology," Swedish Bio4Gasification (B4G) program, Problem Oriented research Projects (POP) with SP-ETC, BioGreen, University of Utah, and Umeå University, June – October 2015, 600,000 SEK (~75,000 USD)

PEER-REVIEWED PUBLICATIONS

1. Holmgren, P., **Wagner, D.R.**, Strandberg, A., Molinder, R., Wiinikka, H., Umeki, K., Broström, M., "Size, shape, and density changes of biomass particles during rapid devolatilization," *Fuel, 206*, 342-351 (2017).

2. Strandberg, A., Holmgren, P., **Wagner, D.R.**, Molinder, R., Wiinikka, H., Umeki, K., Broström, M., "Effects of pyrolysis conditions and ash formation on gasification rates of biomass char," *Energy & Fuels, 31,* 6507-6514 (2017).
3. **Wagner, D.R.**, Broström, M, "Time-dependent variations of activation energy during rapid devolatilization of biomass," *Journal of Analytical and Applied Pyrolysis, 118,* 98-104 (2016)
4. **Wagner, D.R.**, Whitty, K.J., "Extractive gas-phase sampling of the reaction zone of a pressurized entrained-flow coal gasifier," *Fuel Proc. Tech*., *137*, 157-163 (2015).
5. Sur, R., Sun, K., Jeffries, J. B., Hanson, R. K., Pummill, R. J., Waind, T., **Wagner, D.R.**, and Whitty, K. J. "TDLAS-based sensors for in situ measurement of syngas composition in a pressurized, oxygen-blown, entrained flow coal gasifier," *Appl. Phys. B.* (2014)
6. **Wagner, D.R.**, Whitty, K.J., "A pulse-width modulation controlled wire-mesh heater apparatus for Investigation of solid fuel pyrolysis," *Rev. Sci. Inst.* 83 115116 (2012).

INVITED PRESENTATIONS

1. **Wagner, D.R.** "Reaction Engineering in Mechanical and Chemical Engineering," Thermal-Fluids Sciences Seminar Series, 3 March 2017, Corvallis, Oregon (2017)
2. **Wagner, D.R.** "Entrained Flow Gasification in the United States," Keynote Presentation, Bio4Gasification Meeting, 22 January 2014, Piteå, Sweden (2014)

CONFERENCE PROCEEDINGS AND PRESENTATIONS

1. **Wagner, D.R.**, Lavrich, Z., Taie, Z., Halliday, D., Hagen, C.L., "Dehydrogenation Catalysis in Rotating Fluidized Beds," American Chemical Society-Northwest Regional Meeting, 25-28 June 2017, Corvallis, OR, USA (2017).
2. **Wagner, D.R.**, Lavrich, Z., Taie, Z., Halliday, D., Hagen, C.L., "Partial Oxidation of Hydrocarbons in Novel Fluidized Bed Reactors," [Poster] The Combustion Institute, 10^{th} U.S. National Meeting, 23-26 April 2017, College Park, Maryland (2017).
3. Qu, Z., Holmgren, P., Skoglund, N., **Wagner, D.R.**, Broström, M., Schmidt, F.M., "TDLAS-based in situ detection of atomic potassium during combustion of biomass in an entrained flow reactor," 22^{nd} International Impacts of Fuel Quality on Power Production Conference, 19-23 September 2016, Prague, Czech Republic (2016).
4. **Wagner, D.R.**, Broström, M., "The effect of particle size, temperature, and residence time on biomass devolatilization behavior in a wire-mesh reactor," Impacts of Fuel Quality on Power Production Conference, 26-31 October 2014, Salt Lake City, UT, USA (2014).
5. **Wagner, D.R.**, Holmgren, P., Strandberg, A. Wiinikka, H., Molinder, R., Broström, M., "Fate of inorganic species during biomass devolatilization in a drop tube furnace," Impacts of Fuel Quality on Power Production Conference, 26-31 October 2014, Salt Lake City, UT, USA (2014).
6. **Wagner, D.R.**, Qu, Z., Broström, M., Schmidt, F., "Validation of reacting flow models via tunable diode laser absorption spectroscopy," [Poster] Impacts of Fuel Quality on Power Production Conference, 26-31 October 2014, Salt Lake City, UT, USA (2014).
7. Strandberg, A., **Wagner, D.R.**, Holmgren, P., Molinder, R., Wiinikka, H., Umeki, K., Broström, M., "Influence of biomass particle properties and pyrolysis conditions on intrinsic char gasification reactivity," Impacts of Fuel Quality on Power Production Conference, 26-31 October 2014, Salt Lake City, UT, USA (2014).

8. Holmgren, P., Umeki, K., Strandberg, A., **Wagner, D.R.**, Molinder, R., Wiinikka, H., Broström, M., "Size, shape and density changes of biomass particles during devolatilization in a drop tube furnace," Impacts of Fuel Quality on Power Production Conference, 26-31 October 2014, Salt Lake City, UT, USA (2014).
9. **Wagner, D.R.**, Whitty, K.J., "Gas-phase Measurements of a Bituminous Coal in a Pressurized Entrained-Flow Gasifier," 8th U.S. National Combustion Meeting, 19-22 May 2013, Park City, UT (2013).
10. Whitty, K.J., Waind, T.M., **Wagner, D.R.**, "Pressurized Entrained-Flow Gasifier Performance: A Parametric Study," 28th Annual International Pittsburgh Coal Conference, 12-15 September 2011, Pittsburgh, PA (2011).
11. Whitty, K.J., **Wagner, D.R.**, Waind, T., "Commissioning of a 500 kWth Pressurized Entrained-Flow Coal Gasifier," 2010 AIChE Annual Meeting, 7-12 November 2010, Salt Lake City, UT (2010).
12. **Wagner, D.R.**, Whitty, K.J., Fanning, P., Shoaf, G., "Pyrolysis and Gasification Reactivity of Coal and Petcoke Under High Pressure Conditions" 2010 AIChE Annual Meeting, 7-12 November 2010, Salt Lake City, UT (2010).
13. Whitty, K., Pummill, R., Waind, T., Wagner, D.A., **Wagner, D.R.**, "Performance of a 500 kWth Pressurized Entrained Flow Coal Gasifier," 27th Annual International Pittsburgh Coal Conference, 11-14 October 2010, Istanbul, Turkey (2010).
14. **Wagner, D.R.**, Whitty, K., Fanning, P., Shoaf, G., "Investigation of Component Release During Pressurized, High Heating Rate Devolatilization of Coal and Petroleum Coke," 27th Annual International Pittsburgh Coal Conference, 11-14 October 2010, Istanbul, Turkey (2010).

THESES

1. "Fundamental Coal Experimentation for Aiding Large-Scale Gasification and Modeling," Doctoral Thesis, Department of Chemical Engineering, University of Utah, (2013).
2. "Pyrolysis Behavior of Coal and Petroleum Coke at High Temperature and High Pressure," Masters Thesis, Department of Chemical Engineering, University of Utah, (2011).
3. "Circulating Fluidized Beds and Operation," Bachelors Thesis, Department of Chemical Engineering, University of Utah, (2009).

TECHNICAL REPORTS

1. **Wagner, D.R.**, Molinder, R., and Broström, M., "New fuels and feeding systems suited for the PEBG technology," Umeå University, Thermochemical Energy Conversion Laboratory (2016)
2. **Wagner, D.R.**, "Development of a High Pressure Extractive Sampling System for Entrained-Flow Gasification," University of Utah (2013).
3. **Wagner, D.R.**, "Measurement of Char Reactivity in a High Pressure TGA," Deliverable Report for Eastman Chemical Company under University of Utah project "Gasification Properties of Coal and Petcoke," (2011).
4. **Wagner, D.R.**, "Investigation of Pyrolysis Behavior in a High Pressure Wire Mesh Heater," Deliverable Report for Eastman Chemical Company under University of Utah project "Gasification Properties of Coal and Petcoke," (2011).

5. **Wagner, D.R.**, "High Temperature, Atmospheric Pressure Entrained-Flow Reactor Studies," Deliverable Report for Eastman Chemical Company under University of Utah project "Gasification Properties of Coal and Petcoke," (2009).
6. **Wagner, D.R.**, "Basic Fuel Characterization of an Appalachian Coal, a Texas Lignite, and a Petroleum Coke," Deliverable Report for Eastman Chemical Company under University of Utah project "Gasification Properties of Coal and Petcoke," (2009).
7. **Wagner, D.R.**, "A Literature Review of Gasification Properties and Processes," Deliverable Report for Eastman Chemical Company under University of Utah project "Gasification Properties of Coal and Petcoke," (2009).

REVIEWER

Energy & Fuels

Fuel Processing Technology

Fuel

SKILLS

Proficient or familiar in the following skillsets -

Hardware: Electrical, pipe-fitting, arc welding, oxy-acetylene torching, metal- and woodworking

Analytical: Thermogravimetric analysis, gas chromatography, Fourier transform infrared spectroscopy

Software: SolidWorks/AutoCAD, AspenPlus, COMSOL, MatLab, JMP Statistics, OPTO 22 and NI LabVIEW, Origin, MS Office