

JESSICA LYNN ANDERSON

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EDUCATION

- 2003 - 2008 **University of Notre Dame** Notre Dame, IN, USA
Department of Chemical and Biomolecular Engineering
Ph.D., Chemical Engineering, 2008
M.S., Chemical Engineering, 2006
- GPA: 3.9 / 4.0
- 1998 - 2002 **Iowa State University** Ames, IA, USA
B.S., Chemical Engineering, 2002
- Overall GPA: 3.3 / 4.0 Major GPA: 3.7 / 4.0

ACADEMIC RESEARCH EXPERIENCE

Doctoral research University of Notre Dame, Notre Dame, IN, USA 2003 - 2008
Dissertation Title: "Tunable Ionic Liquids for Gas Separation: Solubility Studies for Thermodynamic Analysis"

The dissertation examines the potential of ionic liquids (ILs) for the separation and capture of industrial byproduct gases including CO₂, O₂, N₂, H₂O, NO_x, SO_x. The use of ILs as solvents for reactions is also investigated where the reaction depends on the concentration of the reacting species such as hydrogenations, oxidations, and hydroformylations, along with the synthesis of novel ILs.

Dissertation Advisor: Dr. Joan F. Brennecke

Undergraduate research Ames Laboratory, Ames, IA, USA 1999 - 2002
Advisor: Dr. Vitalij Pecharsky

Prepared and heat treated metal alloys for magnetic refrigeration experiments, testing physical properties of an alloy when brought into a magnetic field. Prepared and presented data received from test measurements to group of project superiors quarterly.

PROFESSIONAL EXPERIENCE

Summer Intern DuPont, Wilmington, DE, USA Summer 2006
Researched the conductivity of ionic liquid/solvent mixtures for use as thermally conductive fluids. Assessed and improved existing experimental procedures for conductivity measurements. Built and implemented a new experimental apparatus for determining the vapor pressure of ionic liquid/solvent mixtures.

Summer Intern Argonne National Laboratory, Argonne, IL, USA Summer 2002
Researched and then implemented controls for aluminum oxide growth on molten aluminum alloys. Assessed and selected a concentration determination procedure through chemical isolation for product stream molecule measurements.

Intern Salsbury Chemicals, Inc., Charles City, IA, USA Jan. - May 2001
Facilitated and validated the installation of a new hydrogenation reactor. Revised and issued Standard Operation Procedures, Piping and Instrumentation Diagrams, and Loop Sheets for new equipment for both a glycol coolant system and the new hydrogenation reactor. Upgraded the digital control system for the addition of automatic valves and supplementary wiring to the new systems.

TEACHING EXPERIENCE

Assoc. Professional Specialist University of Notre Dame, Notre Dame, IN, USA 2008-present

- Chemical Reaction Engineering – CBE 40445, Fall Semester 2008
Taught reaction engineering in conjunction with Dr. Bill Schneider. Class was fairly large (~50 students) with the lecture responsibilities divided between Dr. Schneider and myself. Additionally, I was responsible for homework assignments and solutions, managing tutorials in Matlab and a weekly class recitation. Also responsible for managing the three course teaching assistants who helped with grading duties.
- Chemical Engineering Laboratory II – CHE 41459, Fall Semester 2008
This lab project is part of our unit operations laboratories at Notre Dame. My duties primarily include supervision of several lab groups on a cooling tower project. Additional lab duties include grading lab reports, lab notebooks, and oral presentations, all for completeness as well as technical writing and presentation skills.

Visiting Professor in ChE Rose-Hulman Institute of Technology, Terre Haute, IN, USA

- Conservation Principles and Balances – CHE 201, Fall Quarter 2007
Taught one section of *Meatballs (material and energy balances)*, while closely mentored with Dr. Hossein Hariri who is teaching the remaining sections of class. Class is organized to be largely team-based with homework project reports and team exercises, where students are individually assessed through weekly quizzes and peer assessment of teams.
- Chemical Engineering Lab Project II – CHE 412, Fall Quarter 2007
This lab project is part of our unit operations laboratories at Rose-Hulman. My duties primarily include supervision of several lab groups on three different projects. Additional lab duties include grading lab reports, lab notebooks, and daily lab memos for accuracy, completeness and technical writing skills.
- Basic Chemical Process Calculations – CHE 202, Winter Quarter 2007
This class is the second quarter of CHE 201 and is very similar in setup to CHE 201. Again I am teaching one section of this class, and working closely with Dr. Mark Anklam who will be teaching the remaining sections.
- Topics in Energy & Environment – CHE 490, Winter Quarter 2007
This class is a new introduction to Rose-Hulman. This class is largely survey based with open discussion on readings from popular culture, literature, and policy. Topics covered include current energy technologies and their environmental impacts, renewable energy technologies that have reduced environmental impacts, and an introduction to climate and climate modeling.
- Chemical Engineering Lab Project III – CHE 413, Winter Quarter 2007
Duties will be similar to those described above for Chemical Engineering Project II.
- Introduction to Design – EM 103, Spring Quarter 2008
This class introduces the engineering design process including problem definition, analysis, alternate solutions, specifications of final solution, and techniques of oral and written communications. In addition, the course stresses the importance of teamwork through group design efforts. Three sections of this class were taught this quarter.
- Chemical Engineering Lab Project I – CHE 411, Spring Quarter 2008
Duties will be similar to those described above for Chemical Engineering Projects II and III. The main difference being that this lab project is for the junior class, when parts II and III are taken during the senior year.

Graduate Student Instructor University of Notre Dame, Notre Dame, IN, USA

- Chemical Engineering Thermodynamics - CBE 20256, Spring 2006
Taught seven class lectures, prepared thermodynamic demonstrations and laboratories which related to class material, administered office hours, and instructed homework recitations.
- Energy and Climate - CBE 60598, Spring 2007

Taught several class lectures, arranged reading material for class from literature, internet, etc. on energy opinions and facts, prepared all quizzes and several homework problems which related to class materials, and administered office hours.

Teaching Assistant University of Notre Dame, Notre Dame, IN, USA

- Science of Engineering Materials - CBE 30361, Fall 2003 & Fall 2004
Prepared solutions to homework problems, graded homework, quizzes, and exams.
- Advanced Chemical Engineering Thermodynamics - CBE 60553, Spring 2004
Administered homework help sessions, prepared solutions to homework problems, and graded homework, quizzes, and exams.
- Introduction to Engineering Systems - EG 10111, Spring/Summer 2003
Generated and revamped lab scale engineering systems such as model CSTR experiments using pumps and conductivity probes, programmed Labview for computer controlled reactions.

PROGRAMMING AND SOFTWARE EXPERIENCE

LINUX, MS Windows, MS Office, FORTRAN 90, Matlab, Mathcad, Sigma Plot, Endnote, Labview, Adobe Illustrator and Acrobat, ISIS/Draw, ChemDraw

PUBLICATIONS

- Chapeaux, A.C., Anderson, J.L., Aki, S.N.V.K., Brennecke, J.F. "Solubility of O₂ as well as O₂/CO₂ and SO₂/N₂ gas mixtures in [hmim][Tf₂N]" , *Ind. Eng. Chem. Res.*, **2008**, In preparation.
- Anderson, J. L., Dixon, J. K., Brennecke, J. F. "Solubility of CO₂, CH₄, C₂H₆, C₂H₄, O₂, and N₂ in 1-Hexyl-3-methylpyridinium Bis(trifluoromethylsulfonyl)imide: Comparison to Other Ionic Liquids", *Accounts Chem. Res.*, **2007**, *40 (11)*, 1208-1216.
- Muldoon, M. J, Aki, S. N. V. K., Anderson, J. L., Dixon, J. K., Brennecke, J. F. "Improving Carbon Dioxide Solubility in Ionic Liquids", *J. Phys. Chem. B*, **2007**, *111(30)*, 9001-9009.
- Anderson, J. L., Dixon, J. K., Maginn, E. J., Brennecke, J. F. "Measurement of SO₂ Solubility in Ionic Liquids", *J. Phys. Chem. B*, **2006**, *110*, 15059-15062.
- Anthony, J. L., Anderson, J. L., Maginn, E. J., Brennecke, J. F. "Anion Effects on Gas Solubility in Ionic Liquids", *J. Phys. Chem. B*, **2005**, *109(13)*, 6366-6374.
- Crosthwaite, J. M., Muldoon, M. J., Dixon, J. K., Anderson, J. L., Brennecke, J. F. "Phase Transition and Decomposition Temperatures, Heat Capacities and Viscosities of Pyridinium Ionic Liquids", *J. Chem. Thermodyn.*, **2005**, *37(6)*, 559-568.
- Anderson, J. L., Anthony, J. L., Maginn, E. J., Brennecke, J. F. "Gas Solubilities in Ionic Liquids". In *Ionic Liquids in Synthesis*, 2nd Ed.; Wasserscheid, P., Welton, T., Eds.; Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim, **2008**: Vol. 1-2.

ORAL AND POSTER PRESENTATIONS

- Oral:** J.L. Anderson. "Topics in Energy and the Environment: Opinions and Evaluations of the Classroom Experience". In *Annual ASEE IL/IN Section Conference*. 2008. Terre Haute, IN, USA.
- J.L. Anderson, J.K. Dixon, W. Shi, K. Wilbanks, E.J. Maginn, J.F. Brennecke. "Ionic Liquids as Absorption Media for Pure and Mixed Gas Capture". In *American Institute of Chemical Engineering Annual Conference*. 2007. Salt Lake City, UT, USA.
- J.L. Anderson, J.K. Dixon, M.J. Muldoon, J.F. Brennecke, E.J. Maginn. "Ionic Liquids as CO₂ Capture Media". in *CHEMRAWN-XVII and ICCDU-IX Conference on Greenhouse Gases Mitigation and Utilization*. 2007. Kingston, Ontario, Canada.
- J.L. Anderson, D.J. Couling, D.G. Hert, S.N.V.K. Aki, J.K. Dixon, M.J. Muldoon, J.F. Brennecke. "Pure and Mixed Gas Solubilities in Tunable Ionic Liquids". in *19th International Conference on Chemical Thermodynamics*. 2006. Boulder, CO, USA.

- J.L. Anderson, J.K. Dixon, M.J. Muldoon, E.J. Maginn, J.F. Brennecke. "Gas Solubilities in Tunable Ionic Liquids". in *American Institute of Chemical Engineering Annual Conference*. 2005. Cincinnati, OH, USA.
- J.L. Anderson, J.K. Dixon, M.J. Muldoon, E.J. Maginn, J.F. Brennecke. "Tunable Ionic Liquids for Gas Separation: Solubility Studies for Thermodynamic Properties". in *UNDERC-GAANN*. 2005. Land O'Lakes, WI, USA.
- Poster:** J.L. Anderson, J.K. Dixon, E.J. Maginn, J.F. Brennecke. "Ionic Liquids for Selective Gas Separations". in *EUCHEM Conference on Molten Salts & Ionic Liquids*. 2006. Hammamet, Tunisia.
- J.L. Anderson, J.K. Dixon, E.J. Maginn, J.F. Brennecke. "Ionic Liquids as Novel Absorbents for Acid Gas Removal". in *Fifth Annual Conference on Carbon Capture and Sequestration*. 2006. Alexandria, VA, USA.
- J.L. Anderson, D. Couling, S.N.V.K. Aki, D.G. Hert, J.F. Brennecke. "Pure and Mixed Gas Solubilities CO₂/IL Mixtures". in *1st International Congress on Ionic Liquids*. 2005. Salzburg, Austria.
- J.L. Anderson, S.N.V.K. Aki, D.G. Hert, J.F. Brennecke. "Gas Solubilities in Ionic Liquids". in *Ionic Liquids Workshop*. 2005. Notre Dame, IN, USA.
- J.L. Anderson, A.M. Jakubowski, J.L. Anthony, J.F. Brennecke. "Solubilities and Thermodynamic Properties of Various Gases in Imidazolium Based Ionic Liquids". in *American Chemical Society Green Chemistry Summer School*. 2004. Pittsburgh, PA, USA.

ORGANIZATION MEMBERSHIPS

American Institute of Chemical Engineers (AIChE)
American Society for Engineering Education (ASEE)
Society of Women Engineers (SWE)
American Chemical Society (ACS)

REFERENCES

Dr. Joan F. Brennecke
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